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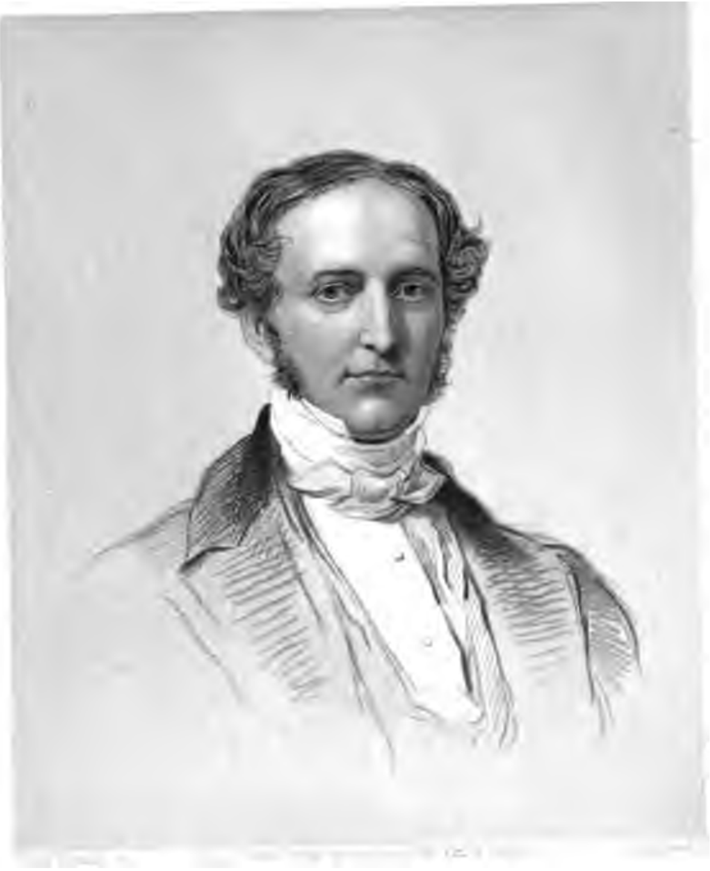

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VOL. VIII.

PEASANT TO ROUMELIA

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Peasant Proprietorship is a system of cultivation of small holdings of land by occupiers who own the land, or hold it on some secure or permanent tenure. Perhaps there is no question on which there is a greater diversity of opinion. On the one hand the small cultivator is held up as a pattern of industry, thrift,. and prosperity, and on the other as an example of unceasing toil and miserable failure.

Arthur Young held that the best system of agriculture was that which secured the largest amount of produce from the land. It is evident, however, that another consideration of great importance must be taken into account—viz. the numbers, quality, and condition of those engaged in tilling the soil. Though nations might attain to brilliant positions by trade, commerce, and the accumulation of wealth, yet the permanent strength, the solidity, and resisting power of a country must closely depend on the number and condition of its rural population. Hence if it could be proved that vast areas of land could be cultivated at the greatest money profit, by means of machinery and a handful of labourers, yet such a method of cultivation would be adverse to the real interests of the nation as a whole.

There is substantial evidence, however, that small holdings of land are more productive in proportion than large farms, and that they are specially adapted to the production of certain kinds of food. It is from these causes that the rent value and purchase price of the smaller holdings in continental countries are so much higher than are found to obtain with the larger farms of Great Britain. It is frequently quoted in opposition to this view that the yield of corn per acre is much greater in England than on the Continent. This comparison, however, is of little value from the fact that the average of continental production is much lowered through the low yields of poor land, hillsides, and wastes, which, if in England, would not be cultivated at all. The evidence of the Royal Commission on Agriculture (1880) shows that the vast majority of holdings in the Netherlands are from 10 to 60 acres, held for the most part by cultivating owners, and that the small and medium-sized farms are generally the best cultivated and managed. Mr Jenkins, the assistant commissioner, gave many examples of what he terms 'intensive' cultivation in Holland. One of these is that of a man who owned 22 acres of land, and rented 10 acres more. He had thirty milking cows in the fields, and ten feeding beasts in the stall. He fed every year thirty beasts besides his own cast cows, and spent above £600 per annum for food, principally for winter keep.

Belgium is rather a country of small cultivators than of peasant proprietors. If we leave out of account the owners of very small plots of land, it is the small tenant-farmer who is the most important element in Belgian agriculture. In spite, however, of excessive rents, the insecurity and other drawbacks of tenancies as compared with ownership, Belgium is a striking example of the advantages of *la petite culture.* M. de Laveleye states that Belgium is the best cultivated and the most productive country in the world; and refers to Flanders, with land naturally the worst in Europe, as a marvellous triumph of care, industry, and forethought on the part of the cultivators. According to the report above quoted, the available supply of milk and its products per head of the population is in Belgium about twice as great as that in Great Britain. In most districts in Belgium the labourer is a *petit cultivateur*—i.e. while hiring himself out as a labourer, he cultivates and often owns a piece of land stocked with rabbits, pigs, poultry, goats, and sometimes one or a couple of cows. A man of this class in the Ardennes, who was working with his son for a farmer at five francs per day, was found on inquiry by the present writer to be the owner of a cottage with 6 acres of land, two cows, and other smaller stock. This man is a type of a most numerous class whose aim is to be become small farmers, and who, with that end in view, work hard and practise the severest thrift and perseverance.

In Great Britain the amount of stock per acre carried on small holdings is larger—with the exception of sheep—than that carried on a similar area of land in large farms. Tables compiled by the writer from the agricultural returns of Great Britain, and printed in the evidence given before the Select Committee on Small Holdings (1889), show that the area of land in Great Britain cultivated in small holdings of 1 acre to 100 acres is about the same as the area cultivated in large farms of 300 acres and upwards, the area being about 9¼ and 9½ million acres respectively. The tables show that the small holdings carry 511,038 horses, the large farms 314,016; cows and other cattle 2,660,281 as against 1,227,904; pigs 1,178,500 as against 383,626. Only in sheep is the advantage shown to be with the large farms. It frequently happens that cases showing the failure of *petite culture* refer really to small cultivators who hold their land on a yearly tenancy or some other uncertain tenure, a class altogether distinct from and lacking the essential conditions of peasant proprietors. The great prosperity of agriculture in Denmark, and the large and increasing exports of butter, eggs, cattle, pigs, &c. from that country are due to the fact that the great bulk of the land is cultivated by owners, mainly by peasant proprietors of farms from 25 to 125 acres. Mr Jenkins gives interesting examples, not exceptional, of prosperous highly cultivated peasant farms in Denmark. One small owner of 50 acres of land kept eighteen cows, fed eighteen pigs annually, and had two horses to work the arable land. The whole family was employed on the farm or in the dairy. The dairy, though small, 12 by 14 feet, was a perfect sight for order, cleanliness, and for the complete though inexpensive character of the arrangements and appliances. The majority of the agricultural labourers in Denmark possess a cottage with a few acres of land, either his own or on lease. In Germany the agrarian reforms inaugurated by Stein and Hardenberg early in the 19th century, and continued up to recent date, for the promotion of cultivating ownership in land, were undoubtedly the groundwork of the strength and solidity of the German nation.

In direct connection with the subject of peasant proprietorship is the fact of Britain's great and increasing dependence on foreign countries for a supply of the smaller articles of food. Besides fruit, vegetables, honey, flowers, &c., the importation of which is yearly increasing, the value of the following articles in pounds sterling imported in 1889 was as follows: Cheese above 4½ million; butter above 10¼ million; margarine above 3½ million; lard above 2 million; poultry, game, and rabbits above 3¼ million; bacon and hams above 9¾ million; pork, potatoes, and onions above 2 million; eggs above 3 million. This gives the enormous aggregate value of 36 million sterling paid annually to the foreigner for these smaller articles of food, for the production of which the soil and climate of England are for the most part specially fitted. In the face of chronic complaints of agricultural depression, this great volume of trade is allowed to pass into the hands of the small cultivator abroad. The reason is that the system of large farming is not adapted to the supply of these articles. The large farmer who raises corn and cattle cannot successfully compete with the small grower who is accustomed to minute and intensive cultivation. Peasant proprietorship is a separate and distinct business. The conditions of its success are close personal attention, hard work, and the strictest frugality. The peasant cultivator employs but little hired labour, every member of the family doing something useful on the little holding. The system develops a handiness, a fertility of resources, an adaptation of means to ends, and an incessant industry, qualities hardly to be expected in connection with hired labour. As owner of his little holding the peasant proprietor has no restrictions as to cropping or methods of cultivation. He has no doubts about compensation for unexhausted manures and improvements, and no uncertainty as to tenure. As a small owner who for many years has lived on and successfully cultivated a few acres of land remarked to the present writer—'The more I care for and work my land the more it gives me back; my little farm is my bank in which I put my labour and savings, which it pays me back with good interest.' It is often said that thrift, prudence, and perseverance are peculiar to the peasant proprietor on the Continent, and are the cause of his success. The history of peasant proprietorship, however, shows that these qualities are the result and not the cause of cultivating ownership. Improvident habits, early marriages, and little thought for the morrow are the too frequent accompaniments of a condition in which there is no prospect in life beyond that of a mere wage-receiver. The great secret of success of peasant proprietorship is summed up by Adam Smith in a striking passage in his *Wealth of Nations*: 'A small proprietor who knows every part of his little territory, who views it with all the affection which property, especially small property, naturally inspires, and who upon that account takes pleasure not only in cultivating but in adorning it, is generally of all improvers the most industrious, the most intelligent, and the most successful.' The two great drawbacks of peasant proprietorship are excessive subdivision and the unlimited power of mortgage. The land-hunger—especially in France—is so great that the proprietor of a few acres will submit to any privation to save money, and will borrow at any rate, in order to acquire more land. The money-lender on the Continent, like the 'gombeen' man in Ireland, is the chief cause of trouble and difficulty to the small cultivator. The creation of a peasant proprietorship in Great Britain, though much discussed, has not till recently been seriously entertained as a practical question. In 1889 the government appointed a Select Committee on Small Holdings, and the evidence contains practical information on the various aspects of peasant proprietorship, and on the applicability of the system to Great Britain. The committee in their Report (1890) unanimously recommend that facilities should be given for the creation of small holdings, and they adopt the principles of Mr Jesse Collings' Small Holdings Bill. The general provisions of this bill are as follows: Local authorities are empowered by moneys borrowed for that purpose from the state, to acquire land and to sell the same in small holdings not exceeding 50 acres each. Purchasers are required to pay down as proof of their *bona fides* a portion not exceeding one-fourth or one-fifth of the purchase-money. A part of the balance is to be paid off by annual payments, but the remainder—a small proportion of the original cost—is to remain at a perpetual feu or quit-rent. This provision, while it protects the small holder—to a great extent—from the money-lender, at the same time makes the terms of purchase as easy as possible. It also enables the local authority to enforce the conditions provided against subletting and subdivision. The local authorities are further empowered to *let* land on favourable conditions in small holdings not exceeding 10 acres each. The report of the Select Committee declares that the extension of small ownerships 'is a matter of national importance both in the interests of the rural population, and also as adding to the security of property generally.' The committee recommend that a sum not exceeding in the first instance five millions sterling should be devoted to the experiment, and 'earnestly hope that no time will be lost in introducing legislation to give effect to their recommendations.' This report, followed by the announcement of legislation on the subject in the Queen's speech of 1890, and the acceptance by the government in 1891 of the second reading of the Small Holdings Bill referred to, may together be taken as the first practical steps towards the creation of a peasant proprietorship in Great Britain.

See, besides the reports cited above, that from H.M. representatives abroad, *On the Tenure of Land in the several Countries in Europe* (1869); Laveleye's works on the rural economy of Belgium (new ed. 1875) and the Netherlands (1864); Lavergne, *Économie Rurale de la France* (4th ed. 1877); and W. T. Thornton's *Plea for Peasant Proprietors* (new ed. 1874).

Peasant War (*Bauernkrieg*), a great insurrection of the German peasantry which broke out in the beginning of the year 1525. The oppression of the peasants had gradually increased in severity as the nobility became more extravagant and the clergy more sensual and degenerate. The example of Switzerland encouraged the hope of success, and from 1431 to 1517 there were risings amongst the peasants of the south and west of Germany. A peasant rebellion took place in the Rhine countries in 1502, and another in Würtemberg, in 1514, both of which were put down without any abatement of grievances. The Reformation, by stirring up the desire of freedom, must be reckoned amongst the causes of the great insurrection itself; although Luther, Melanchthon, and the other leading reformers, whilst urging the nobles to justice and humanity, strongly reprobated the violent proceedings of the peasants. The Anabaptists, however, encouraged them, and peasant insurrections, quickly suppressed, took place in 1522 and 1523. In January 1525 the peasantry of the abbacy of Kempten suddenly assailed and plundered the convent. This proved the signal for a rising of the peasants throughout the south of Germany. Many of the princes and nobles at first regarded the insurrection with complacency, because it was directed in the first instance chiefly against the ecclesiastical lords; some, too, because it seemed to set bounds to the increase of Austrian power. But the Archduke Ferdinand hastened to raise an army, and entrusted the command of it to Von Waldburg, a man of stern and unscrupulous character. Von Waldburg defeated and destroyed some large bodies of peasants, but was himself defeated by them on the 22d of April. Meanwhile the insurrection extended, and a number of towns took part in it, as Heilbronn, Mühlhausen, Fulda, Frankfort, &c., but there was a total want of organisation and co-operation. On 25th March 1525 there appeared in Upper Swabia a manifesto, in which the insurgents demanded the free election of their parish clergy; the appropriation of the tithes, after maintenance of the parish clergy, to the support of the poor; the abolition of serfdom; the restoration to the community of forests, fields, and meadows which the secular and ecclesiastical lords had appropriated; release from arbitrary augmentation and multiplication of services, duties, and rents; the equal administration of justice; and the abolition of some of the most odious exactions of the clergy. The conduct of the insurgents was not, however, in accordance with the moderation of their demands. Their many separate bands destroyed convents and castles (more than 1000 in all), murdered, pillaged, and were guilty of the greatest excesses. A number of princes and knights concluded treaties with the peasants, conceding their principal demands. The siege of Marienberg, near Würzburg, gave time to their enemies to strengthen their forces. Götz von Berlichingen (q.v.) was one of the captains of the besieging peasants, who, he afterwards maintained, had forced him to lead them. In May and June 1525 the peasants sustained a number of severe defeats; and the Landgrave Philip of Hesse, the Saxon Dukes, the electors of the Palatinate and Treves, and Frundsberg were successful farther north. The peasants were everywhere treated with terrible cruelty; more than 130,000 were killed in Upper Germany alone. Multitudes were hanged in the streets, and many were put to death with the greatest tortures. Würzburg and other towns which had joined them suffered the terrible revenge of the victors. It is supposed that more than 150,000 persons lost their lives in the Peasant War. Flourishing and populous districts were desolated. The lot of the defeated insurgents became harder than ever, and many burdens of the peasantry originated at this period. The cause of the Reformation and of German national life also was very injuriously affected. Similar peasant insurrections in other countries are treated of under TYLER (WAT), CADE (JACK), KET (ROBERT), JACQUERIE, SPARTACUS.

See works by Jörg (1851), Cornelius (1861), Baumann (1877), Fries (1883), Hartfelder (1884; 2d ed. 1889); the histories of Germany; and works cited at LUTHER, &c.

Peastone, or PISOLITE, a coarse variety of Oolite (q.v.).

Peat, a substance formed by the decomposition of plants amidst much moisture, as in marshes and morasses, and sometimes described as a kind of humus or soil, formed by the accumulation of the remains of mosses and other marsh-plants. The remains of the plants are often so well preserved in it that the species can be easily distinguished. Reeds, rushes, and other aquatic plants may usually be traced in peat, and stems of heath are often abundant in it; but it chiefly consists in the northern parts of the world of different species of *Sphagnum* or Bog-moss (see BOG-PLANTS). Mosses of this genus grow in very wet situations, and throw out new shoots in their upper parts whilst their lower parts are decaying and being converted into peat; so that shallow pools are gradually changed into bogs. Stools and trunks of trees often occur under peat in the British Islands and in north-western Europe generally. And not only so, but similar stools and trunks frequently are met with occupying a middle position in many peat-bogs—i.e. resting on peat and covered by a variable thickness of the same accumulation. It cannot be doubted that the overturning of trees, whether by natural causes or by man's hand, would in many cases impede surface drainage, and so eventually give rise to the formation of bogs. But there is reason to suspect that the succession of 'buried forests' and peat so frequently seen in the bogs of north-western Europe points to climatic changes (see POST-GLACIAL SYSTEM). Peat is vegetable matter more or less decomposed, and passes by insensible degrees into Lignite (q.v.). The less perfectly decomposed peat is generally of a brown colour; that which is more perfectly decomposed is often nearly black. Moist peat possesses a decided and powerful antiseptic property, which is attributed to the presence of gallic acid and tannin, and is manifested in the perfect preservation not only of ancient trees and of leaves, fruits, &c., but sometimes even of animal bodies. Thus, in some instances human bodies have been found perfectly preserved in peat after the lapse of centuries.

The formation of peat takes place only in the colder parts of the world. In warm regions the decay of vegetable substances after life has ceased is too rapid. The surface covered by peat is very extensive in all temperate regions. In England it is considerable; it is greater in Scotland, and very great in Ireland. Some large peat-bogs occur in the south of Europe, even near the sea, and in more northern regions the mosses or bogs are still more extensive; they occur also in the northern United States, but more extensively in Canada and Newfoundland. For their physical characters and the mode of reclaiming them, see BOG, and WASTE LANDS. Mere peat is not a good soil, even when sufficiently drained, but by the application of lime, marl, &c. it is soon converted into valuable land, yielding excellent crops. A mixture of peat is often of benefit to soils otherwise poor; and for many shrubs, as rhododendrons, kalmias, whortleberries, &c., no soil is so suitable as one largely composed of peat.

Peat is the ordinary fuel of great part of Ireland, and is still much in request in the hillier parts of Scotland and England. In Holland, Denmark, and parts of north Germany it is also in use for the same purpose. Peat is a light and bulky kind of fuel, and cannot be conveyed to considerable distances without too great expense. Efforts have, however, been made to render it more generally useful, and so to promote the reclaiming of bogs, by compressing it until its specific gravity is nearly equal to that of coal. For this purpose it is first reduced to a pulp. But the process has not yet been advantageously prosecuted on an extensive scale, though numerous machines for the purpose have been patented in Germany and in the United States. Peat-charcoal, made from uncompressed peat, is very light and inflammable, and therefore unsuitable for many purposes, but for others it is particularly adapted, and no kind of charcoal excels it in antiseptic and deodorising properties. Peat-charcoal is highly esteemed for the smelting of iron and for working and tempering the finer kinds of cutlery. Charcoal made from compressed peat is in density superior to wood-charcoal, and is capable of being used as coke. But the conversion of peat into charcoal has not proved remunerative; and the attempts to obtain valuable products (pyroligneous acid, ammonia, inflammable oils, burning gas, tar, &c.) from its destructive distillation have been similarly unsuccessful.

Peat, specially prepared, is very serviceable for horses' bedding, &c. As antiseptic, it has been used for laying on wounds. Flower-pots are sometimes made of peat; it is easy to transplant flowers growing in them without loosening the earth from the roots, the pot being readily cut to pieces; and liquid manure applied outside finds its way to the roots.

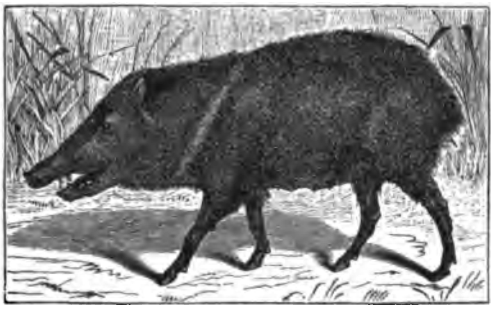
See Rennie, *Essays on the Natural History and Origin of Peat-moss* (1810); Aiton, *Treatise on the Origin, Qualities, and Cultivation of Moss-earth* (1811); Steele, *Natural and Agricultural History of Peat-moss or Turf-bog* (1826); a parliamentary *Report on the Destructive Distillation of Peat* (1851); Rev. J. Peter, *The Peat Mosses of Buchan* (1875); J. Geikie, *Prehistoric Europe.*

Pebble (probably allied to *bubble*, from the sound of water running among stones), a small, round, water-worn stone of any kind; but with jewellers sometimes an agate—agates being often found as loose pebbles in streams, and those of Scotland in particular being popularly designated *Scotch Pebbles.* Hence the name has come even to be extended to rock-crystal when not in the crystalline form. Deposits of pebbles (in the sense of water-worn stones) occur among the rocks of all periods, but the pebbles are seldom loose; they are generally cemented together by iron, lime, or silica, forming a pudding-stone of greater or less hardness (see CONGLOMERATE). Single pebbles are sometimes found in deposits which have been formed in perfectly still water, as in chalk and fine silt. They must have been floated to their places entangled in the roots of trees, or attached to the roots of large buoyant seaweeds.—BRAZILIAN PEBBLES (so called from Brazil having been long famous for the purity of its rock-crystal) are very pure pieces of Rock-crystal (q.v.) used by opticians for making the lenses of spectacles, &c.

Pebrine Disease. See PASTEUR, SILK.

Pecan Nut. See HICKORY.

Peccary (*Dicotyles*), a genus of the family Suidæ, containing at least two species. They have fewer teeth (thirty-eight) than the ordinary swine (forty-four), and a very short tail. The name Dicotyles is derived from a gland upon the back, almost corresponding in position to the navel below. *D. torquatus* is found from Arkansas to Patagonia, and is about 3 feet long; but the larger and fiercer *D. labiatus* only ranges from Central America to southern Brazil. The latter is exceptionally pugnacious, and, as it goes about commonly in herds, it is extremely dangerous to meet with. Even the jaguar is said to retire before several of these animals when banded together. Both species, which freely breed together, are usually to be seen at the Zoological Gardens in London.



Peccary (*Dicotyles labiatus*).

Pe-chi-li, GULF OF, a land-locked extension of the Yellow Sea (q.v.), between the base of the Corean peninsula and the Chinese province of Shan-tung, into which the Pei-ho (q.v.) discharges.

Peck, a measure of capacity for dry goods, such as grain, fruit, &c., used in Britain, and equivalent to two imperial gallons, or 554·548 cubic inches. It is thus the fourth part of a Bushel (q.v.). The old Scotch peck, the sixteenth part of a boll, when of wheat was slightly less than the imperial peck, but when of barley was equal to about 1·456 of it.

Pecock, REGINALD, author of *The Repressor of Over-Much Blaming of the Clergy*, was most probably born in Wales; was a Fellow of Oriel College, Oxford, in 1417, and was ordained acolyte and sub-deacon in 1420, proceeding to deacon's and priest's orders in the two following years. His preferments were the mastership of Whittington College, London, together with the rectory of St Michael in Riola; the bishopric of St Asaph's, from Duke Humphrey of Gloucester in 1444, when he also received his degree of Doctor of Divinity, and of Chichester, through the patronage of the ill-fated William de la Pole, Duke of Suffolk, in 1450. A student of great learning and industry, he plunged eagerly into the controversies of the day, and compiled many treatises, of which the *Donet* (*c.* 1440), on the main truths of Christianity, and his practical *Treatise on Faith* (*c.* 1456), written for the Lollards, are still extant.

In the latter he gives up infallible authority in the church, makes faith a matter of probability rather than of knowledge, lays a broad foundation for a really rational piety, and makes a noble approximation to the doctrine of religious toleration. The object of his *Repressor* (c. 1449) was to promote the peace of the church by plain arguments against Lollardy, written in the mother-tongue. He maintained that bishops had higher duties than mere preaching, and strove with great patience and clear logic to demonstrate the reasonableness of those doctrines and ordinances of the church which the Lollards rejected as not founded on Scripture. Of a liberal and tolerant spirit far before his time, Pecock pointed out with much point and originality the teaching of natural religion about man's moral duties, asserting that the judgment of reason must not be overruled and twisted into conformity with Scripture, which rather confirms than serves as the authority for the light of nature. In his argument that Scripture pre-supposes a knowledge of the moral virtues, and that its special object is to make known those truths which reason could not have discovered, he is distinctly the forerunner of the great Hooker. His attack on the Donation of Constantine is an admirable piece of reasoning, and his argument that experience shows that there is no subject on which men are more likely to err than the interpretation of Scripture deals a deadly blow to the bibliolatry of Lollardy and Protestantism. Pecock's philosophic breadth and independence of judgment brought upon him the suspicions of the church, and especially of the friars, whom he had stigmatised as 'pulpit bawlers.' The storm of opposition that had long been gathering burst upon his head at a council held at Westminster in 1457. He was hotly denounced for having written in English, and for making reason paramount even to the authority of the old doctors, while many slanderous and baseless charges besides were heaped upon his head. He was summoned before Archbishop Bourchier at Lambeth, where his writings were subjected to examination by twenty-four doctors. In the end he was condemned by the archbishop as a heretic whose doctrines were contrary to St Augustine, St Jerome, and St Gregory, and the cruel alternative was put before him, to abjure his errors or be burned. He elected to abjure, made confession of many errors and heresies of which he had never been guilty, and with his own hands delivered to the executioner his three folios and eleven quartos for the flames. Against the further sentence that he should be deprived of his see he appealed to Rome, and the pope indeed commanded him to be reinstated, but he was prevailed upon to resign his bishopric into the hands of the king. The rest of his days he spent in the abbey of Thorney in Cambridgeshire. Forty pounds a year was allowed for his maintenance; he was to have the service of an attendant, somewhat liberal diet, and a private chamber with a chimney and a passage leading from it which gave a sight of an altar and allowed him to hear mass. But writing materials he was denied, and his books were but five—a portuous (breviary), a mass-book, a psalter, a legendary, and a Bible.

See the article LOLLARDS; also James Gairdner's essays on 'The Lollards,' in *Studies in English History* (1881); the Introduction to Churchill Babington's edition of the *Repressor* in the Rolls series (2 vols. 1860); and the *Life* by John Lewis (1774; reprinted, Oxford, 1820).

Pecos, a river of New Mexico and Texas, flows some 800 miles SSE. to the Rio Grande.

Pecten. See SCALLOP.

Pectic Acid and **Pectin.** See FRUIT, Vol. V. p. 21.

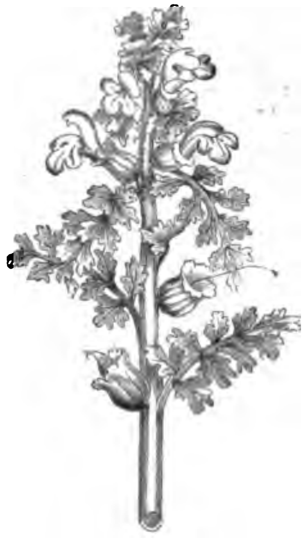
Peculiar. See BENEFICE.

Peculiar People, a sect of Faith-healers, founded in London in the year 1838. They reject medical aid in cases of disease, although not in surgical cases, and rely on anointing with oil by the elders, and on unceasing prayer, with patient nursing. They have their own collection of hymns, usually select their preachers from among the elders, and baptise their children when they are considered old enough to understand the ceremony and to express consent. Their communities are not numerous, and the members are nearly all very poor working-folk; but they bear a high character for morality and Christian charity. See FAITH-HEALING.

Pedestrianism. See ATHLETIC SPORTS.

Pedicellariæ, very remarkable minute structures on the skin of sea-urchins and starfish, having the form of a stalk with a three-bladed or two-bladed snapping forceps at the summit. They take hold of algæ preparatory to the application of the suctorial feet, and probably help likewise to keep the surface of the echinoderm clean.

Pedicularis, a genus of herbs of the natural order Scrophulariaceæ, some of which have rather large and finely-coloured flowers. Two species, *P. palustris* and *P. sylvatica*, are natives of Britain, common in wet grounds. Both have received the name of Lousewort, the English equivalent of 'pedicularis,' from their supposed influence in producing the lousy disease in sheep—an influence purely imaginary. Their acridity renders them obnoxious to sheep; but cattle, goats, and swine eat them. Continental Europe and the northern parts of Asia produce many other species, and some are found in North America. *P. sceptrum*, or King Charles's Sceptre, is one of the principal ornaments of marshy grounds in the most northern countries of Europe. *P. sylvatica* is said to be astringent and serviceable in stopping hæmorrhage; and applied externally it helps to cleanse ulcers.



Lousewort (*Pedicularis palustris*).

Pedigree (possibly from *pied de grue*, 'crane's foot,' from the slender lines used in drawing pedigrees), a tabular view of the members of a particular family, with the relations in which they stand to each other, accompanied or unaccompanied by a notice of the chief events in the life of each, with their dates, and the evidence of the facts stated. Pedigrees are indispensable aids to the student of history. The materials to be used in the formation of a pedigree are notes of the facts to be set forth, and a recognised series of signs and abbreviations. These notes comprise the name of every person who is to appear in the pedigree, with such dates and circumstances as it may be considered desirable to record. Among the commonest abbreviations are *dau.*, for daughter of; *s. and h.*, son and heir of; *coh.*, coheir of; *w.*, wife of; *s. p.* (*sine prole*), without issue; *v. p.* (*vitâ patris*), in his father's lifetime; *b.*, born; *d.*, died; *dep.*, deposed; K., king; E., earl, &c. The sign = placed between two names indicates that they were husband and wife; ↧ indicates that they had children; ↓ under a name signifies that the person had children. Men are frequently indicated by small squares, women by circles or lozenges. All persons of the same generation are to be kept in the same horizontal line; and the main line of descent is, wherever possible, to be indicated by keeping the successive names in a vertical column. Continuous lines indicate the succession of the different generations. The members of the same family are generally arranged in their order of birth in two groups—the sons first, and then the daughters; but where the same father or mother has children by more than one marriage, the children of each marriage ought to form distinct groups. The actual arrangement, however, of a pedigree must always depend on the leading object which it is intended to illustrate. Specimens may be seen in the articles BONAPARTE and BOURBON.

Tabular genealogies, generally brief, and meant to illustrate some particular claim of right, are found among the records, public and private, of the early middle ages; but after the incorporation of the English Heralds' College far more attention was devoted to the compilation of pedigrees of families, more particularly with reference to their claims to dignities and heraldic insignia. In the course of the 16th century the heralds obtained copies of all such accounts of the English families of any distinction as could be supplied to them, and entered them in the books which contain the records of their official proceedings. Royal commissions were issued till 1704 to the two provincial kings-of-arms, empowering them to visit in turn the several counties of England, in order to collect from the principal persons of each county an account of the changes which had taken place in their respective families in the interval since the last preceding visitation, and to inquire what account could be given of themselves by families who had stepped into the rank of gentry, or had become settled in the county since that period. The register-books kept by the heralds and their assistants contain the pedigrees and arms collected in the course of the visitations, with the signatures of the heads of the families. See HERALDRY, Vol. V. p. 660.

In Scotland, in the absence of the regular system of visitations which prevailed in England, there is a great deal of evidence regarding the pedigrees of the historical families of the country scattered here and there in public and private collections, including the Advocates' Library and Lyon Office. A register of genealogies exists in the Lyon Office, in which the pedigrees of applicants, after being proved to the satisfaction of the heraldic authorities, are inserted with the accompanying evidence; and the Register of Arms contains much valuable information. To what extent the register of genealogies in the Lyon Office may be admitted as a probative document, conclusive of the facts which it sets forth, has not been ascertained by actual decision; but there can be no doubt that, in questions both as to property and honours, it would be regarded as a most important adminicle of proof.

See the works of Sir Bernard Burke (q.v.) and Sir Harris Nicolas (q.v.); Doyle, *Official Baronage* (1886); Foster, *Peerage, Baronetage, and Knightage* (1883), and *Collectanea Genealogica* (1882); Marshall, *The Genealogist's Guide* (1879; 2d ed. 1885); Roberts, *Calendarium Genealogicum* (1865); G. Burnett, *Popular Genealogist, or the Art of Pedigree-making* (Edin. 1865); Rye, *Records and Record Searching* (1888); Whitmore, *The American Genealogist* (1862; 2d ed. 1875); Durrie, *Bibliographia Genealogica Americana* (1868).

Pediment, the triangular space over the portico at the ends of the roof of classic buildings. It may be called the gable of classic buildings, and is frequently enriched with sculpture, for which it forms a fine setting. See GREEK ARCHITECTURE.

Pedlars. See HAWKERS.

Pedo'meter, an instrument for measuring walking distances. It has a dial which records revolutions of the mechanism; and the mechanism is generally actuated by the relative movement of a comparatively heavy suspended mass attendant on each step, though in some forms it is driven by a cord connected with the foot. In all cases the thing measured is the number of steps rather than the distance walked; and the user must find the true meaning of the readings of the apparatus as applied to his own walking.—An instrument attached to the wheel of a carriage so as to mark the number of revolutions of the wheel and so the distance traversed is called *hodometer* or *odometer* (Gr. *hodos*, 'way,' and *metron*, 'measure'). This is usually a train of wheelwork attached to the axle of the carriage, and communicating motion to an index on a dial. A similar instrument, called a cyclometer, is attached to bicycles and tricycles. The name odometer is also given to a wheel used by surveyors, which records the distances in miles or rods.

Pedro I., emperor of Brazil (1798–1822), second son of John VI. of Portugal, fled to Brazil with his parents on Napoleon's invasion of Portugal, and became prince-regent of Brazil on his father's return to Portugal. For the proclamation of Brazilian independence and subsequent history, see BRAZIL.—PEDRO II., his son, born 2d December 1825, became king in 1831 on his father's abdication, was declared of age in 1840, and, distinguished by his love of learning and simple scholarly tastes, reigned over Brazil in peace until the sudden revolution of November 15, 1889, compelled him to withdraw to Europe, where he subsequently lived, mainly in France (Brazil becoming a republic), until his death, 4th December 1891. See Life, in French, by Mossé (1889).

Pedro the Cruel, king of Castile and Leon, was the only legitimate son of Alfonso XI., and was born at Burgos, 30th August 1334. On his father's death (1350) Pedro succeeded to the throne without opposition, but left the whole exercise of power to his mother, Donna Maria of Portugal, and Albuquerque, his father's prime-minister and chancellor. But by the instigation of his mistress (afterwards his queen), Marie de Padilla, Pedro emancipated himself in 1353 from the guidance of the queen-mother. He now obtained exceeding popularity; but the strict justice with which he decided all causes between the rich and poor, the clergy and the laity, combined with a haughty and imperious carriage towards them, alienated from him the nobles and clergy. The plottings of Albuquerque, who had fled to Portugal, having culminated (1354) in a revolt in Estremadura, Pedro marched against the rebels, but was betrayed by his brother Henry and taken prisoner. Escaping, he found himself speedily at the head of a powerful army, with which, despite the excommunication of the pope, he speedily reduced his opponents to submission. But having been betrayed by his relatives, and even by his mother, he became suspicious of every one; and the rest of his reign was devoted to the destruction of the power of the great vassals, the establishment of his own authority on the ruins of their feudal tyranny, and long-continued and bloody wars with the kingdoms of Aragon and Granada. He owes the epithet Cruel mainly to the murder of his brother Don Fadrique in 1358. But he is still often called in Spain 'the Justiciary,' from remembrance of his better qualities. The people were in general well and justly governed, but the heavy taxes imposed to maintain the cost of his long wars with Aragon and Granada dissipated his popularity. Henry, who had fled to France, now seizing the favourable opportunity, returned (1366) at the head of a body of exiles, backed by Bertrand du Guesclin (q.v.) with an army of mercenaries, and aided by Aragon, France, and the pope. Pedro, however, by great promises of territory and money, prevailed upon Edward the Black Prince to espouse his cause. Edward invaded Castile in the spring of 1367, totally defeated Henry and Du Guesclin at Navarrete (13th April), taking the latter prisoner. But the king disgusted his chivalrous ally by his cruelty to the vanquished, and paid no heed to his remonstrances; Edward accordingly repassed the Pyrenees, and left the misguided monarch to his fate. The whole kingdom groaned under his cruelties; rebellions broke out everywhere; and, in autumn 1367, Henry returned with 400 lances, the people immediately flocking to his standard. Pedro's scanty and ill-disciplined forces, including many Saracens, were routed at Montiel (14th March 1369), and himself compelled to retire for safety within the town, whence he was treacherously decoyed and captured by Du Guesclin. He was carried to a tent, where a single combat took place between him and Henry, in which Pedro was slain, 23d March 1369. See Prosper Mérimée's monograph (1848; 2d ed. 1865; Eng. trans. 1849).

Peduncle. See Flower.

Peeblesshire, or Tweeddale, a southern county of Scotland, bounded by Edinburgh, Selkirk, Dumfries, and Lanark shires. Irregular in outline, it has a maximum length and breadth of 29 and 21 miles, and an area of 356 sq. m. or 227,869 acres. The Tweed, rising in the extreme south, winds 36 miles north-north-eastward and eastward, descending therein from 1500 to 450 feet; and from it the surface rises into big, round, grassy hills—Windlestraw Law (2161 feet), Minchmoor (1856), Hartfell (2651), Broad Law (2754), &c. Among the Tweed's numberless affluents are Talla, Biggar, Lyne, Manor, Eddleston, Leithen, and Quair Waters; and St Mary's Loch touches the southern boundary. Less than one-fifteenth of the entire area is under corn and root crops; but nearly 200,000 sheep graze on the hillsides. The antiquities include over fifty hill-forts, the 'Romanno terraces,' a Roman camp at Lyne, the ruined castles of Neidpath and Drochil, and the old mansion of Traquair; whilst 4 miles SW. of Peebles is the cottage of Davie Ritchie, the 'Black Dwarf' (1740-1811). Peebles and Innerleithen are the only towns. The county unites with Selkirkshire to return one member. Pop. (1801) 8735; (1841) 10,499; (1881) 13,822; (1891) 14,761.

Peebles, the pleasant county town, stands on the left bank of the Tweed, 22 miles S. of Edinburgh. It has a new parish church (1887) and five other modern churches; the Chambers Institution (1859), with library, museum, &c., in the old house of the Yester and Queensberry families; a hydropathic (1881); a public park (1887); tweed-manufactures; and the tower of St Andrew's Church (1196), restored in 1882 by Dr William Chambers (q.v.), who rests beneath its shadow. Mungo Park was a surgeon here. Peebles was made a royal burgh in 1367, and till 1832 returned one member. Pop. (1861) 2045; (1881) 3495; (1891) 4704.

See Dr A. Pennicuik's *Description of Tweeddale* (3d ed. 1875), Dr W. Chambers' *History of Peeblesshire* (1864), Dr John Brown's *Minchmoor* (1864), and *Charters of Peebles* (1873).

Peel, a coast town of the Isle of Man, 11½ miles by rail NW. of Douglas. On Peel Hill (450 feet) is a tower called Corrin's Folly; and on an island sheltering the harbour stand the beautiful ruins of Peel Castle, celebrated by both Scott and Wordsworth. It dates from the 12th century, but was mainly rebuilt by the fourth Earl of Derby in 1593. St German's Cathedral, a cruciform ruin, with a crypt and low central tower, is included in its area. Fishing is Peel's chief industry, but as a watering-place it attracts yearly more and more visitors. Pop. (1861) 2848; (1881) 4360; (1891) 3631.

Peel, Sir Robert, statesman, was born on 5th February 1788, near Bury in Lancashire. His father, Sir Robert Peel (1750–1830, created a baronet in 1800), was a wealthy cotton-spinner, from whom he inherited a great fortune. He was educated at Harrow, and at Christ Church, Oxford, where he took a double first in 1808, and entered the House of Commons in 1809 as member for Cashel, adopting the strong Tory politics of his father. Perceval was then prime-minister. Peel set quietly about the business-work of the House, feeling his way with that steady prudence and persevering diligence that were the conspicuous features of his character. In 1811 he was appointed Under-secretary for the Colonies; and from 1812 to 1818 he held the office of Secretary for Ireland. In this capacity he displayed a strong anti-Catholic spirit (whence the witty Irish gave him the nickname of 'Orange-Peel'), and was in consequence so fiercely attacked by O'Connell that even the cool and cautious Secretary was stung into sending the agitator a challenge. The police, however, prevented the duel from taking place. From 1818 till 1822 Peel remained out of office, but not out of parliament, where he sat for the university of Oxford. He now began to acquire a reputation as a financier and economist, and in 1819 was appointed chairman of the Bank Committee, and moved the resolutions which led to the resumption of cash-payments. He was still as averse as ever to anything like religious or political reform. No member of the Liverpool-Castlereagh cabinet could have been to appearance more resolute; he even vehemently defended the 'Peterloo Massacre' of 1819. In 1822 he re-entered the ministry as Home Secretary—Canning shortly after becoming Foreign Secretary, on the suicide of Lord Castlereagh. The two worked together pretty well for some time, as Peel devoted himself chiefly to financial matters, and especially to the currency; but 'Roman Catholic emancipation' was a question on which Canning was considerably in advance of his brother-secretary; and when the former was called upon by the king, after the resignation of Lord Liverpool, to form a sort of Whig-Tory ministry, Peel, along with the Duke of Wellington and others, withdrew from office. Yet it is singularly characteristic of this most honest statesman that even when he seceded (1827) his opinions were veering round to the liberal and generous view of the claims of Roman Catholics; and when the death of Canning, shortly after, led to the formation of the Wellington-Peel government, its great measure—actually introduced by 'Orange-Peel' himself—was the ever-memorable one for the 'relief' of the Roman Catholics (1829). As Home Secretary he also signalised himself by a reorganisation of the London police force (since popularly called 'Peelers' and 'Bobbies'), and by the introduction of several other important measures.

Meanwhile, the university of Oxford had rejected its apostate representative, and chosen in his stead Sir Harry Inglis. And now came on the great question of parliamentary reform, which Peel firmly but temperately opposed. In 1830 the Wellington-Peel ministry fell, and was succeeded by a Whig ministry under Earl Grey, which, in 1832, carried the Reform Bill. Peel (now, by the death of his father, Sir Robert Peel), when he saw that reform was inevitable, accepted defeat and its results with great equanimity. He shrank from anything like factious opposition to the measure, and contented himself with presenting as forcibly as he could the political *per-contra*. After it was passed he became the leader of the 'Conservative' opposition; and, as we have said, accepting reform itself as a *fait accompli* and irreversible, he only sought by a keen and vigilant criticism of Whig measures to retard the too rapid strides of liberalism. In 1833, when the first reformed parliament assembled, Peel took his seat as member for Tamworth, which he represented till the close of his life. On the retirement of the Melbourne ministry in November 1834 he accepted the office of prime-minister, but could not succeed in giving stability to his administration; he was compelled again to give place to Viscount Melbourne in April 1835, and resumed his place as leader of the opposition. Peel's conduct in opposition was always eminently patriotic. The Whigs, who were being pressed on the one side by the new Radical party and the Anti-corn-law League, and on the other by O'Connell and the Irish repealers, gradually lost ground, and, being all but defeated in 1841 on a motion of want of confidence, dissolved parliament. The general election that ensued was virtually a contest between Free Trade and Protection. Protection won; and, when the new parliament met, a vote of no confidence was carried by a majority of ninety-one.

The Conservative party, headed by Peel, now came into office. The great feature of the new government was the attitude it adopted on the corn-law question. The Whigs, while in office, and even after their expulsion, were bent upon a fixed but moderate duty on foreign corn; the Anti-corn-law League would hear of nothing short of an entire repeal, while Sir Robert was in favour of a modification of the sliding-scale of duty which had existed since 1828. He introduced and carried (1842), in spite of strong opposition, a measure based upon this principle. The deficit in the revenue, which had become quite alarming under the Melbourne administration, next engaged his attention, and led him to bring in a bill (1842) for the imposition of an 'income-tax' of 7d. in the pound, to be levied for three years. To alleviate the new burden Peel commenced a revision of the general tariff, and either abolished or lowered the duties on several very important articles of commerce, such as drugs, dye-woods, cattle, sheep, pigs, salted meat, butter, eggs, cheese, and lard. He also showed himself resolute in the repression of the malcontents of Ireland. O'Connell (q.v.) was tried for conspiracy, and, though the judgment against him was set aside on appeal to the House of Lords, the influence of the 'agitator' was broken. The first half of 1845 was marked by the allowance to Maynooth being increased and changed into a permanent endowment instead of an annual grant, and by the foundation of the Irish unsectarian colleges, and other important measures. But the potato-rot in Ireland during the autumn, followed by a frightful famine, rendered 'cheap corn' a necessity, if millions were not to starve. Cobden and the League redoubled their exertions. Lord John Russell announced the views of the Whig party on the crisis, and Peel again yielded. He told his ministerial colleagues that the corn laws were doomed, and that their repeal was inevitable. Some of them refusing to go along with him, he resigned, but after a few days was recalled, and resumed office. Lord Stanley (afterwards Earl of Derby) seceded, and, with Lord George Bentinck, Disraeli (whose savage attacks goaded Peel into sending him a challenge), and others, formed a 'no-surrender' Tory party; but the Duke of Wellington, Graham, Aberdeen, Gladstone, and other eminent Conservatives stood by him, and the measure for the repeal was carried. He was, however, immediately afterwards defeated on an Irish Protection of Life Bill. Not so much upon this account as because he felt that the course which he had pursued had produced a dissolution of the old ties of party, and that he could not expect for some time to find himself at the head of a strong government, Peel retired from office in June 1846, giving place to a Whig administration under Lord John Russell, to which he gave an independent but general support as the leader of a middle party rather Whig than Tory. In the critical times of 1847–48 he was one of the most important props of the government, whose free-trade principles he had now completely accepted. His ecclesiastical policy had also undergone a remarkable change, and he now frankly supported the Whigs in the efforts to carry an act for the repeal of the Jewish disabilities. He was himself regarded by the working and middle classes generally with much grateful respect. He had a keen English interest in sport, and a cultivated taste in matters literary and artistic. An accident put an end to his career. On the 28th of June 1850 he had delivered a great speech against Lord Palmerston in the Don Pacifico matter; but on the following day he was thrown from his horse near Hyde Park Corner, and was so much injured that he died on the night of the 2d of July. He was buried in the church of Drayton Bassett, his Staffordshire home.

See his *Memoirs*, edited by Earl Stanhope and Viscount Cardwell (2 vols. 1857), his *Speeches* (5 vols. 1835 and 1853), and *The Peel Papers, 1812–27* (1891); monographs on Peel by Guizot (1851), Laurence Peel, Lord Dalling, Barnett Smith, F. C. Montague (1888), Justin M'Carthy (1891), J. R. Thursfield (1891); Shaw Lefevre, *Peel and O'Connell* (1887); Greville's *Memoirs*; Beaconsfield's *Bentinck*; Morley's *Cobden*; Froude's *Beaconsfield* (1890); Croker's *Memoirs, Diaries, and Correspondence* (1884); also CORN LAWS, CATHOLIC EMANCIPATION.

Peel left five sons, the eldest of whom, SIR ROBERT, and the second, SIR FREDERICK, have both held office as ministers; whilst ARTHUR WELLESLEY, the youngest (born 1829), became Speaker of the House of Commons in 1884.

Peel, or PEEL-TOWER, the name given to fortified towers or small castles of the type common on the Scottish border. In the 13th and 14th centuries the word 'peel' was used to denote the earthen works, surmounted by palisades, which surrounded and defended the courtyard and tower; but later on the name was applied to the tower itself. See BORDERS, CASTLE.

Peele, GEORGE, an Elizabethan dramatist, was son of James Peele, Clerk of Christ's Hospital, and was born most probably about 1558. He had his education there, and went up to Oxford in 1571. Next year his name is found on the list of members of Broadgates Hall, now Pembroke College, and from December 1574 to 1579 he was a student of Christ Church. He took his bachelor's degree in 1577, his master's in 1579. He seems to have had a reputation at the university as a poet and arranger of dramatic pageants, but by 1581 he had removed to London, where for seventeen years he lived a roystering Bohemian life as actor, poet, and playwright, dying a discreditable death in 1598. 'As Anacreon died by the pot, so George Peele by the pox,' writes Meres. We know that he married in 1583, and was one of those warned to repentance by the miserable Greene in his *Groatsworth of Wit bought with a Million of Repentance* (1592). Little confidence need be put in *The Merry Jests of George Peele* (1607), which are mostly ancient and borrowed witticisms, representing Peele as a shifty and disreputable trickster and vagabond haunter of taverns. His best work, *The Arraignment of Paris*, a dramatic pastoral containing some exquisite verse and ingenious flatteries of Elizabeth, was published anonymously in 1584. Another pastoral play, *The Hunting of Cupid* (1591), is lost. In 1585 he was employed to write the Lord Mayor Dixi's Pageant, and in 1591 he prepared another for the mayoralty of Sir William Webbe. His fine and spirited *Farewell* to Sir John Norris in his expedition to Portugal in 1589 (eked out by *A Tale of Troy*); his *Eclogue Gratulatory* (1589) to the Earl of Essex on his return; his *Polyhymnia* (1590), on the retirement of Sir Henry Lee from the office of queen's champion (closing with the exquisite song 'His golden locks time hath to silver turn'd,' quoted in *The Newcomes*); his *Speeches* for the reception of Queen Elizabeth on her visit (1591) to Burghley at Theobalds; and his *Honour of the Garter*, written on the occasion of the investiture of the Earls of Northumberland and Worcester (1593), are other examples of the occasional poems that flowed from his fluent pen, and helped him to make a shifty living.

The historical play of *Edward I.* (1593) has descended in a very corrupt text, and is grievously marred by its baseless slanders against the stainless Queen Eleanor, due to the anti-Spanish prejudice of the time. His bombastic and ranting play, *The Battle of Alcazar*, was published anonymously in 1594, and was followed by another now lost, which in the *Merry Jests* is named *The Turkish Mahomet and Hiren the Fair Greek.* It is doubtless this play that is alluded to in Pistol's 'Have we not Hiren here?' His charming play, *The Old Wives' Tale* (1595), which most probably gave Milton the subject for his *Comus*, is well defended by Mr Bullen from the contemptuous criticisms of Symonds and Saintsbury. The latter, however, finds much higher poetic merit in *David and Bethsabe* (1599) than either Mr Bullen or Charles Lamb. The last work assigned to Peele is *Sir Clyomon and Sir Clamydes* (1599), but its authorship is more than doubtful.

Peele's works were first collected by Dyce (2 vols. 1828; 2d ed. 1829; a supplementary 3d volume in 1839). A carefully revised re-issue was published, together with Greene, in 1861. The latest and best edition is that by A. H. Bullen (2 vols. 1888). See vol. i. of Ward's *History of English Dramatic Literature* (1875), and J. A. Symonds' *Shakspere's Predecessors in the English Drama* (1884).

Peep o' Day Boys. See ORANGEMEN.

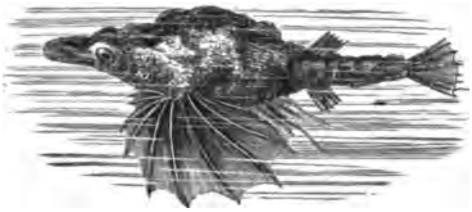
Peepul, or PIPAL (*Ficus religiosa*), also known as the SACRED FIG of India, and in Ceylon called the BO-TREE, a species of Fig (q.v.), somewhat resembling the Banyan, but the branches not rooting like those of that tree, and the leaves heart-shaped with long attenuated points. The tree is held sacred by the Hindus, because Vishnu is said to have been born under it. It is generally planted near temples, and religious devotees spend their lives under its shade. It is also held sacred by the Buddhists of Ceylon (see BO-TREE). It attains a great size and age. The peepul is often planted near houses, and by the sides of walks, for the sake of its grateful shade. The juice contains a kind of caoutchouc, and is used by women as bandoline. Lac-insects feed upon this tree, and much lac is obtained from it. The fruit is not much larger than a grape, and although eatable is not valued.

Peerage. See NOBILITY, PARLIAMENT.

Peewit. See LAPWING.

Peg'asus, in Greek Mythology, a winged horse which arose with Chrysaor from the blood of the Gorgon Medusa, when she was slain by Perseus. He is said to have received his name because he first made his appearance beside the springs (*pēgai*) of Oceanus. He afterwards ascended to heaven to carry the thunder and lightning of Zeus. Some later authors make him the horse of Eos. Bellerophon had in vain sought to catch Pegasus for his combat with the Chimæra, but at length was advised by the seer Polyidus of Corinth to sleep in the temple of Minerva. The goddess appeared to him in his sleep, and gave him a golden bridle with which he caught him, and by his aid overcame the Chimæra. Modern writers ignorant of mythology make Pegasus the horse of the Muses, with whom, however, he had nothing to do beyond having by a kick of his hoof made spring up the inspiring fountain of Hippocrene.

Pegasus, a genus of small fishes of uncertain affinities. The body is covered with bony plates, the pectoral fins are broad and horizontal, the upper part of the snout is prolonged beyond the mouth, which is toothless. Four species are known: *P. draconis*, from the Indian Ocean; *P. volans*, often put inside Chinese insect-boxes; *P. natans* and *P. lancifer*, from Chinese and Australian coasts.



Sea-dragon (*Pegasus draconis*).

Pegmatite, a variety of Granite (q.v.).

Pegu, a town, division, and river of Lower Burma. The *town* stands on the river Pegu, 46 miles NE. of Rangoon. The old city was founded in 573 and was made the capital of a powerful independent kingdom. European travellers in the 16th century speak of its great size and magnificence. It was destroyed in the middle of the 18th century by Alompra; but was rebuilt. A celebrated pagoda still stands within part of the old walls. The place was handed over to the British by the inhabitants both in the first and the second Burmese war. Pop. about 10,800.—The *division* has an area of 9159 sq. m. and a pop. of 1,162,393.—The *river* rises in the Pegu Yoma Mountains, and flows generally south for 180 miles, joining the Rangoon or Hlaing River.

Pehlevi, an ancient West-Iranian (Median and Persian) idiom, in use chiefly during the period of the Sassanides (235–640 A.D.). See PERSIA.

Pei-ho, a river of China, rises near the borders of Mongolia, flows north-east and south-east, past Peking and Tien-tsin, and falls into the Gulf of Pe-chi-li after a course of more than 350 miles. The mouth of the river is defended by the powerful forts of Taku. See CHINA.

Peine Forte et Dure, the 'strong and sore torture,' a species of torture formerly applied by the law of England to those who, on being arraigned for felony, refused to plead, and stood mute, or who were guilty of equivalent contumacy. In the reign of Henry IV. it had become the practice to load the offender with iron weights, and thus press him to death; and till nearly the middle of the 18th century pressing to death in this horrible manner was the regular and lawful mode of punishing persons who stood mute on their arraignment for felony. Latterly a practice prevailed, which had no sanction from the law, of first trying the effect of tying the thumbs tightly together with whipcord, that the pain might induce the offender to plead. Among instances of the infliction of the *peine forte et dure* are the following: Juliana Quick, in 1442, charged with high-treason in speaking contemptuously of Henry VI.; Margaret Clitheron, 'the martyr of York,' in 1586, for her constancy to the Catholic faith; Walter Calverly of Calverly, in Yorkshire, arraigned at the York assizes in 1605, for murdering his two children and stabbing his wife; and Major Strangways, in Newgate in 1657, for refusing to plead when charged with the murder of his brother-in-law. In 1720 a person of the name of Phillips was pressed in Newgate for a considerable time, till he was released on his submission; and the same is recorded in the following year of one Nathaniel Hawes, who lay under a weight of 250 lb. for seven minutes. As late as 1741 a person is said to have been pressed to death at the Cambridge assizes, the tying of his thumbs having been first tried without effect. A statute of 1772 virtually abolished the *peine forte et dure*, by enacting that any person who shall stand mute when arraigned for felony or piracy shall be convicted, and have the same judgment and execution awarded against him as if he had been convicted by verdict or confession. A later statute (1828) made standing mute equal to a plea of 'not guilty.'

Peipus, LAKE, in the north-west of Russia, lies between the government of St Petersburg and the province of Livonia. On the south it is connected with Lake Pskoff by a long, narrow channel, the length of both lakes being 87 miles, the greatest breadth about 30, the area 1356 sq. m., and the depth from 14 to 49 feet. Their waters, which abound in fish, are carried to the Gulf of Finland by the Narova. The shores are marshy and flat.

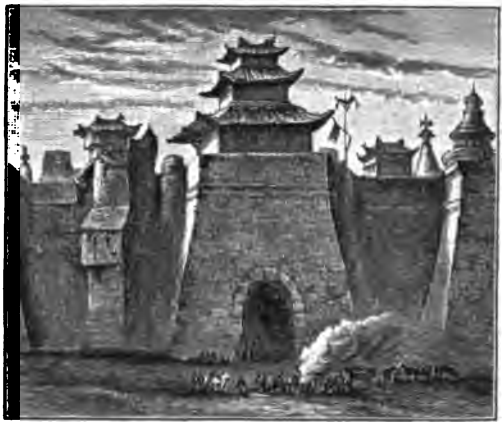
Peirce, BENJAMIN, mathematician, was born at Salem, Massachusetts, 4th April 1809, and studied at Harvard, where in 1833 he became professor. In 1849 he became consulting astronomer to the American Nautical Almanac; and from 1867 to 1874 he was superintendent of the Coast Survey. In 1836–46 he issued an admirable series of mathematical text-books, and he contributed to various mathematical journals. His paper on the discovery of Neptune (1848) attracted universal attention; and his papers on the constitution of Saturn's rings (1851–55) were equally remarkable. His great *Treatise on Analytic Mechanics* appeared in 1857; and he left his mark on various departments of mathematical and astronomical investigation. He died at Cambridge, 6th October 1880.

Peishwa. See MAHRATTAS.

Pekan, or WOOD-SHOCK (*Martes pennanti*), an American species of Marten (q.v.), the largest of all the species, was formerly common in North America from Alaska and the Slave Lake into the central United States, but is now extinct in settled districts. There seems to be nothing in its habits to justify its common name of Fisher or Fisher Marten; by hunters it is called Black Fox.

Pekin, capital of Tazewell county, Illinois, on the Illinois River, 10 miles by rail S. of Peoria. It has several foundries, flour-mills, distilleries, and manufactories of organs, ploughs, wagons, &c. Pop. (1890) 6347.

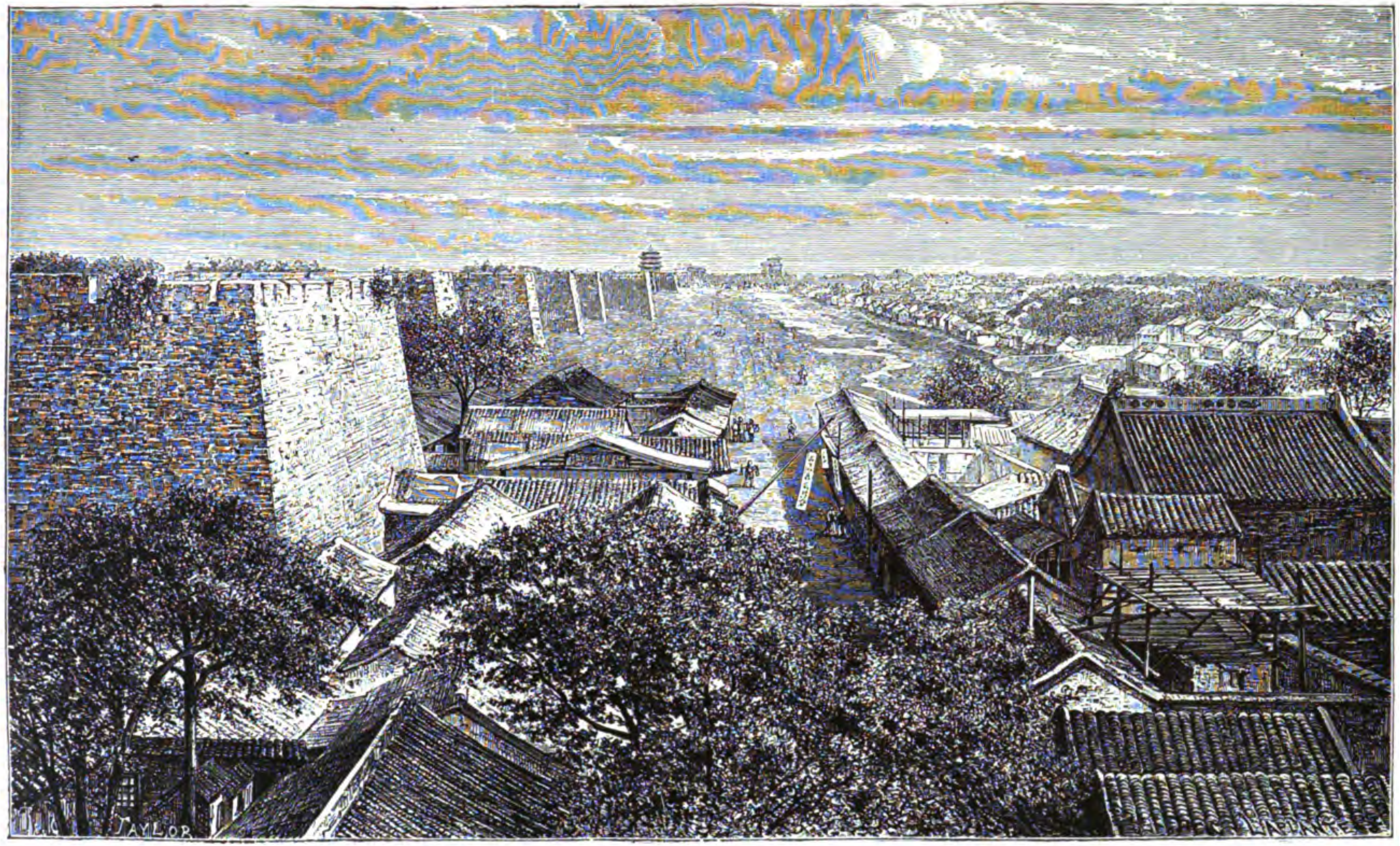
Peking, or, as now often pronounced, PEI-CHING (i.e. 'Northern Capital'), the capital of the Chinese empire, is in 39° 54′ 36″ N. lat. and 116° 27′ E. long. It is situated in a sandy plain, and is surrounded by many-gated walls, with suburbs smaller than most other large cities in the country. The visitor coming to it from Tien-tsin is not prepared for his approach to it by villas and mansions with their parks and gardens, such as greet him in drawing near to the capitals of the West. At a turn in the road the city bursts at once on his view, standing up grand and grim, complete in itself with its lofty walls, and the loftier towers upon them. The city consists, in fact, of two cities—the Inner and the Outer—known also as the Manchu or Tartar and the Chinese, the Northern and the Southern. They are separated by a high wall common to them both, but properly belonging to the former, and giving it the appearance of nearly a square, on which the other partly rests in the form of a rectangle, its southern and northern walls longer than those of the square, but the other two shorter. The walls of the Manchu city average 50 feet in height, and are fully 60 feet wide at the bottom and 40 at the top; the dimensions of those of the Chinese city are less—30 feet in height and 25 and 15 in width. Those of the former measure 14½ miles in circuit, including its part of the cross-wall, and those of the Chinese city 10. Not counting the cross-wall, the whole circuit measures about 21 miles, including altogether an area of nearly 26 sq. m. In all Peking has sixteen gates. Over each is raised a tower about 100 feet high, and of very imposing appearance. All the gates of the Manchu city are guarded by semicircular enceintes, enclosing a yellow-tiled temple to Kwan Ti, a hero of our 2d century, now honoured as the 'god of war.'



Gateway at Peking.

When a stranger has entered by a gate of the Northern City, and rides or drives along the cross-wall to its central gate, he is greatly impressed by the magnificence of the walls and towers, and readily believes Peking is the grandest city in the world. Such was the feeling of the writer when he entered it in 1873; after he had passed through the gate, there stretched before him, as far as his eye could reach, a street about 200 feet across, lined with what seemed to be brilliant shops on each side, with wide spaces for foot-passengers, and between them a carriage-way, raised about two feet, on which a constant stream of vehicles, with horses, mules, camels, and donkeys, was hurrying. But by-and-by this impression of the magnificence of the city was displaced by another of the dilapidation and decay, squalor and filth, which everywhere obtruded themselves.

Peking is one of the most ancient cities of the world. On the same site stood the metropolis of the feudal state of Yen, whose history is traceable back to the 12th century B.C. In our 10th and 12th centuries two Tartar tribes which attempted



GENERAL VIEW OF THE FORTIFICATIONS OF PEKING.

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to impose their sovereignty on the empire made the old metropolis of Yen their capital. The second of them, which had absorbed the other, fell before the invading Mongols in the 13th century, and Kublai, a grandson of Genghis Khan, enters the chronological line as sovereign of all China in 1280. He made Peking his capital, and there he was found by Marco Polo, who styles the city *Khan-baligh*, 'the city of the Khan,' a name frequently corrupted in old narratives into *Cambaluc* and *Cambalu*. Within a century the Mongols were driven out of the empire by the Chinese Ming dynasty, the founder of which at first fixed his capital at what we call Nanking (q.v.). The third Ming emperor, called from the name of his reign Yung-lo, on his accession in 1403 made preparations to transfer the seat of government back to the Kublai site. This movement was carried out in 1421. The south wall of the Inner City was carried half a mile beyond that of Kublai; and a later emperor built in 1552 the wall of the Outer City.

However, the Manchus, when they became masters of the empire in 1643, found this great city ready for them. They had only to maintain it in good condition, and for a time they did so; but for more than a century it has been allowed to go very much to decay. As Dr Williams observes, 'Peking stands to-day, like the capitals of the ancient Roman and Byzantine empires, upon the debris of centuries of buildings.' A new era in its history commenced in October 1860, when it was surrendered to the English and French allies, leading to the establishment of the various foreign legations in the Inner City, and to the reception of the ministers, though not in the Forbidden City, in June 1873 by the emperor in person.

The Manchu or Inner City is divided into three portions, the largest of which by far may be called the General City. But at the heart of it are two enclosures, into the innermost of which entrance is entirely forbidden to foreigners, and also to the Manchus and Chinese themselves, excepting such as have some official connection with the court. It is called the Purple Forbidden City, is very nearly 2¼ miles in circuit, and constitutes in fact the imperial residence. In it are the palaces of the emperor, his empress, and other members of the imperial family. But there are also other palaces and buildings not a few—for instance, several reception halls (*tien*). The one which a visitor, entering by the 'Meridian Gate,' would first approach is the *T'ài Ho*, or 'Hall of Grand Harmony,' built of marble on a terrace 20 feet high, and rising itself other 110 feet. Its principal apartment is about 200 feet long and 90 wide, and is furnished with a throne for the emperor, who holds his levées here on New-year's Day, his birthday, and other great occasions. Here, too, is the 'Palace of Heavenly Purity,' where the emperor meets his cabinet at dawn for the transaction of business. In this enclosure also is one of the four great 'arsenals,' or collections of the works arranged in the Chien-lung period for the Great Library; and here was the Wû-ying printing-office, burned down in 1869.

Surrounding the Forbidden City is the 'Imperial' or 'August,' an oblong rectangle, about 6 miles in circuit, and encompassed by a wall 20 feet in height. In the space between the wall on the south and that of the Forbidden City, on the right or east of the avenue from the front gate of the cross-wall, stands the great temple in which the emperor and the members of the imperial clan worship their ancestors. Opposite to it, on the west or the left of the avenue, is the altar to 'the Spirits of the Land and Grain.' In the corresponding space on the north, between the two enclosures, there is an artificial mound 150 feet high, crowned at five different points with as many Buddhist temples, and well wooded all over. It is called the *King Shan*, loosely translated 'Prospect Hill,' and affords the finest view of the entire city. It is separated from the Forbidden City by a moat, which is crossed by more than one marble bridge. Among the people the common name for it is 'Coal Hill,' their belief being that it was formed by stores of coal, deposited there by way of provision against a siege. The western portion of 'the August City' goes by the name of the Western Park. A principal attraction in it is an artificial lake more than a mile long, though not nearly so wide, fed by a stream brought from the hills to the west of the city, which used also to supply the moat all round the walls. The lake is crossed by a marble bridge of nine arches, and in the proper season its surface is beautiful with the large, brilliant flowers of the lotus. At the south end of the park are the summer-house, the rockwork, the gardens, and the hall for the examination of military candidates, and at the opposite end the copper statue of *Maitreya* (the coming Buddha, 60 feet high, with one hundred arms), the temple of 'Great Happiness,' the altar and temple dedicated to Yüan Fei (2500 B.C.), the discoverer of the uses of the silkworm, with a plantation of mulberry-trees and a cocoon-house near it. The empress annually comes here with her ladies to offer sacrifice to this Yüan Fei, to feed the silkworms, and to unwind some of the cocoons, as an example to the women of the empire.

We now come to the General City. On either side of the avenue leading from the central gate of the cross-wall to the August City are the principal offices of the government—the six boards and the Censorate. In the same neighbourhood are the observatory, the Provincial Hall for literary examinations, the Colonial Office, and the *Han Lin Yüan*, which we call the 'National Academy,' and to belong to which is the highest literary distinction in China. Its members are many and of various grades. All the literary work of the government may be said to pass through their hands.

In the north-eastern corner of the city is the Russian mission, and west from it the *Yung Ho Kung*, or 'Palace of Everlasting Harmony,' a grand lamasery, where more than a thousand Mongol and Tibetan monks dwell, and are provided for, while they study their religion under the rule of a *Gegen*, or 'living Buddha.' At the north end is a lofty building containing a wooden image of Maitreya, 70 feet high. A little farther to the west stands, amidst many cypresses, the temple of Confucius, under the ancient name of *Kwo-tsze Chien*. In the lofty hall are the spirit-tablets of the sage and his most celebrated disciples and followers—nothing else. Close by these rises from a circlet of water the *Pi Yung Kung*, commonly called 'The Hall of the Classics,' from the most remarkable thing about it—182 pillared slabs of granite, reared up in two corridors, and having the text of all the classical books engraved on them, in front and behind, in large characters.

In the western side of the city are the headquarters of the *T'i-tuh*, or 'general-in-chief,' who has the control of the police and garrison of the city, and very much directs its civil administration. Here also are the Drum and Bell Towers, both conspicuous objects. Five great bells were cast in the Yung-lo period, early in the 15th century. One of them is here, another about 2 miles in a north-west direction from the city, in 'The Great Bell Temple.' It is indeed a monster, 14 feet high, 34 feet in circumference at the rim, and 9 inches thick, and is said to weigh 120,000 lb. (see **Bell**). It is covered, inside and out, with myriads of Chinese characters, from the *Fah Hwa* and *Ling Yen*, two Buddhist sutras.

Going towards the south wall, we note two great structures on our way. One is the *Tî Wang Miâo*, or 'Temple of Emperors and Kings,' where the reigning emperor goes to worship the spirits of nearly two hundred sovereigns, who have ruled from Fû-hsî (at least 3000 years B.C.) down to the present dynasty, and with them are associated the spirits of the ablest and best of their ministers. The other structure is the great Tutelary (wall and moat) Temple of the capital, grimy, and full of fortune-tellers and other quacks, like the corresponding temples throughout the country. All the foreign legations and all the Christian missions are situated within the Inner City; conspicuous among the latter is the new Roman Catholic cathedral, a magnificent structure, completed in 1888.

The Chinese or Outer City is very sparsely populated. Much of the ground is under cultivation, large tracts are wooded, green fields show themselves, and other open spaces are occupied with artificial lakes and tanks. Where it is built over, the streets are for the most part narrow, and the people are busy and bustling. There are club-houses not a few, various temples, and charitable institutions for the poor, the aged, and for children, the latter in the shape of foundling hospitals, as in the Inner City. The *T'ien Tan*, or 'Altar to Heaven,' with its adjunct the *Ch'i Kû Tan*, or 'Altar of Prayer for Grain,' and the 'Altar of Agriculture,' dedicated to the ancient sovereign, Shăn Nung, to whom the first teaching of husbandry (about 3000 B.C.) is ascribed, are both near the southern wall, and are reached by a 'great street,' or avenue. The first two altars are enclosed by more than three miles of wall, the space within planted with forest trees. Within a second wall is a grove of fine cypresses encompassing the buildings. The 'Altar to Heaven' stands on a splendid triple circular terrace of white marble, with steps leading from one terrace to the next, each being surrounded by a balustrade of the same marble, richly carved. On the upper terrace, which is 30 feet in diameter and about 20 feet above the ground, the emperor appears to greet the dawning sun on the day of the winter solstice, attended by his grandees and ministers. He has passed the night in the 'Fasting Palace,' which is not far off, in religious vigil. His own place at the altar, where he stands and kneels, is a large circular slab, unflawed and unstained. In front of him is a pavilion containing the tablet for the spirit of *Shang-Tî*, or God, and on either side, in smaller pavilions, are the tablets of his own ancestral line. The religious service that is then celebrated has been performed from time immemorial. The 'Altar of Prayer for Grain,' a similar structure, but of less dimensions, was burned down on 18th September 1889; on its upper terrace there was a triple-roofed circular building, the imposing appearance of which with the splendour of its blue tiles made it be regarded as more important than the other altar and be commonly, though erroneously, styled by foreign visitors 'The Temple of Heaven.' To this altar the emperor comes in the early spring to pray for a blessing on the labours of the year. Here also he repairs in seasons of drought to pray for rain, but without any pomp of state. He must plod his way on foot to the 'fasting place,' and there brood over his own sins and errors of government before he dares to ascend the altar. A short distance to the east stands 'the Altar of Agriculture,' in an enclosure about two miles in circumference. This contains four different altars—to the Spirits of the Sky, of the Earth, of the planet Jupiter, and of the old Shăn Nung. But all these spirits are honoured and sacrificed to, not as independent powers, but as 'servants of *Shang-Tî*,' doing his will for the good of men. The planet has an altar because of the connection which the period of its revolution has with the sexagenary cycle. The chief attraction of the spot is the ceremony of ploughing which takes place there in the spring. The emperor comes to it attended by certain of his great officials, and turns up a few furrows in a portion set apart for him, as an example of agricultural industry to all his people. Some of the provincial magistrates have portions assigned to them for the same purpose. The ceremony is copied and grotesquely performed by the authorities throughout the country. The principal streets of the Chinese city are more than 100 feet wide, but the side streets are mere lanes. The streets are not usually paved, and according to the state of the weather are deep in mud or in dust. In the smaller streets the houses are miserable shanties; in the main streets both private houses and shops are one-story brick edifices, the shops being gay with paint and gilding. The shops are open in front, the goods being often piled up outside; and many trades are carried on in the streets or in tents and movable shops.

Amongst places of interest to visitors are also the various government offices, the old offices for entertaining foreign embassies, and the legations where since 1861 the foreign ministers accredited to China actually reside. There are three Catholic cemeteries (Portuguese, French, and native) and a Russian one; and there are mission buildings, Russian and other, and hospitals. Free schools are not infrequent in the city. The climate of Peking is severe, the temperature in winter being from 25° to 10° F., and in summer the heat is great, the thermometer rising to 105°, though the usual summer temperature is 75° to 90°.

As to the population of Peking, Du Halde estimated it at about three millions two hundred years ago. The writer's impression is that in the last quarter of the 19th century it was under a million. No doubt it has fluctuated considerably with the fortunes of the dynasty. Dr Williams, after living in the city for years and being chargé d'affaires of the American legation, says that the residents most likely to form a correct judgment put down the entire population at a million or somewhat less. 'No census returns,' he adds, 'are available to prove this figure, nor can it be stated what is the proportion of Manchus, Mongols, and Chinese, except that the last outnumber both the others.'

There is a railway from the mouth of the Pei-ho to Tien-tsin, and an extension of this to Tung-chow near Peking was in 1888 decreed by the emperor, but subsequently countermanded. In 1889 a decree was issued for the construction of a railway from Peking to Hankow on the Yang-tze-kiang, but in 1891 no effect had been given to this scheme. But Peking has now fairly extensive telegraph communication with the principal cities of the empire, with Seoul in Corea and the Russian frontiers; and arrangements have been made for connecting the Chinese telegraph system with the Siberian lines in the Amur valley, and so establishing telegraphic communication between Peking and Europe.

Though there is a great central Asian trade route from Peking to Kulja and Semiretchinsk, and though the commerce of Corea is restricted to Peking, the trade of Peking itself is inconsiderable, save in so far as regards supplying the wants of the inhabitants; large quantities of provisions are of course required. These, like other necessaries, are very dear, and (though in the city there is no tax on land, houses, or personal property) many of the people are very poor and miserable. The manufactures are unimportant. The government of the city is distinct from that of the department, and is administered by a superintendent (a high imperial functionary), a mayor, and officers in the several quarters. The police have often trouble in keeping order; some 10,000 soldiers or militia are quartered in the town. The daily *Peking Gazette*, a pamphlet of sixty to seventy pages, is the imperial official journal. Since 1868 there has been an imperial university with American and European professors.

As to the reproach of infanticide which has been current against the population, Dr Edkins says: '*Infanticide is almost unknown in Peking.* The dead-cart which traverses the streets at early morning receives the bodies of poor children dying by ordinary causes and whose parents are not able to bury them. The mothers would rather, if not willing to keep their infants, carry them to the foundling hospitals, which are established in the Inner and Outer Cities, than take their lives. At present the people are not aware of the existence of infanticide, nor is this atrocious custom known in the surrounding country; indeed, it exists only in some provinces, four or five in number. The dead-cart is in connection with the foundling hospitals.'

See Rennie's *Peking and the Pekingese* (1865); Williamson's *Journeys in North China*, especially chapter xvi., which was contributed by Dr Edkins (1870); Martin's *Chinese: their Education, Philosophy, and Letters* (1881); Williams's *The Middle Kingdom* (revised ed. 1883); and other works cited under CHINA.

Pelagius, a celebrated heresiarch of the 5th century. He was probably born about the middle of the 4th century, in Britain, or, according to some, in Brittany, his name being supposed to be a Greek rendering (*Pelagios*) of the Celtic appellative *Morgan* ('sea-born'). He was a monk, but he never entered into holy orders. He settled in Rome about 400, where he seems to have been scandalised by the low tone and morals then obtaining. His views seem to have been early developed; and during his stay in Rome he seems to have given them full expression—especially in his commentaries on the Pauline Epistles, which were published at this time. It has been remarked that his doctrinal tendencies have something in common with those of the Eastern Church, and may therefore be taken as showing that Eastern influences were still alive in the British churches. But more probably his theology was the outcome of his own devout and earnest, but narrow and anti-speculative mind. Jerome and Orosius tell tales to his discredit; but these are refuted by the respect with which Augustine always speaks of his character and conduct. The controversy about Pelagianism was not started by Pelagius, but by a devoted disciple of his. In Rome he had attached to his views a follower of great energy named Cœlestius, probably an Irish Scot, originally a lawyer, who was practising in Rome when Pelagius came thither. He became a monk, and accompanied Pelagius wherever he went. In 410, after the sack of the city by the Goths, the two withdrew to Africa. After some time Pelagius made a pilgrimage to Jerusalem, where he met St Jerome. Cœlestius having remained at Carthage, and sought to be admitted to ordination, his doctrines became the subject of discussion, and in a synod several opinions ascribed to him were condemned—proceedings which introduced St Augustine into the controversy. Meanwhile Pelagius remained at Jerusalem, and news of the proceedings at Carthage having been carried to Palestine, in 415 he was accused of heresy before the synod of Jerusalem. As adopted by Cœlestius, his doctrines seem to have been a reaction against Gnosticism, Manichæism, and Fatalism, in the interest as he conceived of a higher morality than he found in Rome. The Pelagian heresy was held to deny original sin; Adam's sin injured himself only; his posterity are born as innocent as he was before the fall. Adam would have died even if he had not sinned. Children are baptised that they may be united to Christ, not that they may be purged from original sin. It is possible to live without sin. Grace as understood by the Catholic Church was not required; free-will and the teaching of the law may suffice; Pelagius did not grant that the will must be moved by God before a man can take one step onwards towards life eternal. The essence of the doctrine is a view of the freedom of the will that may be called liberty of indifferences; the will is equally free to choose to do good and to do evil. This freedom is found also in heathens; and thus natural ability heightens human responsibility, while it seems to diminish the need of divine grace.

The impeachment failed, and in a synod subsequently held at Diospolis in the same year Pelagius evaded condemnation by accepting the decrees of the synod of Carthage. But a new synod of Carthage in 416 condemned Pelagius and Cœlestius, and wrote to Pope Innocent I. requesting his approval of the sentence, with which request Innocent complied. Zosimus, the successor of Innocent, wavered; but a council of 214 bishops was held in Carthage, in which the doctrines of Pelagius were formally condemned in nine canons; and on receipt of these Zosimus reopened the cause, cited and condemned Cœlestius and Pelagius, and published a decree adopting the canons of the African Council, and requiring that all bishops should subscribe them, under pain of deposition. Nineteen Italian bishops refused to accept these canons and were deposed. Their leader was Julian, Bishop of Eclanum, near Beneventum. Pelagius himself was banished from Rome in 418 by the Emperor Honorius, and he and Cœlestius were again condemned by the Council of Ephesus in 431. The date and place of the death of Pelagius are not known. The most important of the writings on the Pelagian side have been lost. Julian is chiefly known through the replies of Augustine, whose anti-Pelagian treatises are edited by the Rev. Dr W. Bright (1880). Pelagius's *Fourteen Books of a Commentary on St Paul's Epistles*, his *Epistle to Demetrius*, and his *Memorial to Pope Innocent*, included by collectors in the works of St Jerome, are much mutilated, but yet almost certainly genuine. All his other works have been lost, except some fragments.

SEMI-PELAGIANISM was a modification of the doctrine of the Pelagians as to the powers of the human will, and as to the effects to be attributed to the action of the supernatural grace of God, and of the divine decree for the predestination of the elect. The Pelagians, discarding altogether the doctrine of the fall of Adam, and the idea that the powers of the human will had been weakened through original sin, taught that man, without any supernatural gift from God, is able, by his own natural powers, to fulfil the entire law, and to do every act which is necessary for the attainment of eternal life. The condemnation of this doctrine by the several councils held in the early part of the 5th century is capable of various constructions, and has been urged by some to the extreme of denying altogether the liberty of man, and converting the human will into a merely passive instrument, whether of divine grace upon the one hand, or of sinful concupiscence upon the other. The writings of St Augustine on this controversy have been differently construed by the different Christian communions, and the same diversity of opinion existed in his own day. Among those who, dissenting from the extreme view of Pelagius, at the same time did not go to the full length of the Augustinian writings in opposition to Pelagius, were some monks of the southern provinces of Gaul, and especially of Marseilles, whence their school was called Massilian, from the Latin name (*Massilia*) of that city. Of these leaders the chief was a priest named Cassian (Joannes Cassianus), who had been a deacon at Constantinople. Of the system which he propounded it may be enough to say that it upheld the sufficiency of man's natural powers only so far as regards the first act of conversion to God and the initial act of man's repentance for sin. Every man naturally possesses the capability of beginning the work of self-conversion; but for all ulterior acts, as well as for the completion of justification, the assistance of God's grace is indispensable. The Semi-Pelagian doctrine is often confounded with that of the Molinistic (see MOLINA) school of Roman Catholic theology; but there is one essential difference. The latter persistently maintain the necessity of grace for all supernatural acts, even for the beginning of conversion, although they are generally represented as agreeing with the Semi-Pelagians as to the mode of explaining the freedom of the human will acting under the influence of divine grace. The chief writers in the controversy were Prosper, Hilary, and Fulgentius; and the question was referred to Celestine, Bishop of Rome in 431. It continued, however, to be agitated in the West for a considerable time. Faustus, Bishop of Reji (Riez in the Basses Alpes), towards the end of the 5th century revived the error, and it was condemned in a council held at Arles in 475, and still later in a synod (the second) held at Arausio (Orange) in 525, and again in the third council of Valence in 530. The words of Augustine were formally accepted; but the tendency which produced Pelagianism and Semi-Pelagianism has often reappeared.

See works on Pelagius by Wiggers (1832; trans. by Emerson, Andover, 1840); Jacobi (1842); Wörter (1866); Klasen (1882); for Semi-Pelagianism, the monograph of Geffken (1826); also the articles AUGUSTINE, JANSENISM, PREDESTINATION, SIN, WILL.

Pelargonium, a genus of plants of the natural order Geraniaceæ, including many of the most favourite greenhouse flowers, to which the old generic name Geranium is often popularly given. The characters which distinguish pelargonium from geranium, as now restricted by botanists, are given in the article GERANIUM. The species are numerous, and mostly natives of the Cape of Good Hope, of certain other parts of South Africa, and a few are natives of the Canary Islands. Some of them are herbaceous and some are stemless; most of them are half-shrubby. Some have tuberous rootstocks. The leaves exhibit great variety in form, division, &c. The flowers always adhere to a certain type in form, but with great variety in size, colour, &c.; they are always in stalked umbels, which arise from the axils of the leaves, or in the stemless kinds from the midst of the leaves. In no genus has the art of the gardener produced more striking results than in this; and the number of beautiful hybrids and varieties is very great, some of them excelling in beauty any of the original species. Some species not possessing much beauty of flower are cultivated for the grateful odour of their leaves, which in some resembles that of roses, in others that of apples, lemons, &c.; whilst that of many species is rather unpleasant. The cultivation of pelargoniums is similar to that of other Geraniaceæ (see GERANIUM). A few of the species endure the open air in the south of England; many are planted out in summer even in Scotland. Water must be liberally supplied to pelargoniums during the time of flowering; but no plants more strongly require a period of rest, and water must then be very sparingly given. The shrubby and sub-shrubby kinds are easily increased by cuttings either of the branches or the roots, stout pieces of the latter being the most fit for the purpose. Sandy soil and very moderate supplies of water are requisite till the cuttings are rooted, when richer soil and a more liberal supply of water are needed. The tuberous-rooted species are increased by cuttings of the roots and by seed.

Pelasgians, a term somewhat variously used for certain inhabitants of ancient Greece. In Homer the Pelasgi seem to have been an unimportant tribe living in Thessaly. Herodotus seems to regard the Pelasgi not as Hellenic, but as barbarians who had occupied Hellas or parts of it ere the Hellenes came thither (see GREECE, Vol. V. p. 386). Modern students have also interpreted the term differently. Some regard the Pelasgians as the pre-Aryan occupants of Greece, others as the Græco-Italians—i.e. the common ancestors of the Greeks and Italians. The truth is that we know little or nothing of the pre-Aryan occupants of Greece, or of the Græco-Italians, or of the builders of Cyclopean works, and that there are no reasons for identifying any of them with the insignificant tribe of Pelasgi. Then 'Cyclopean' (or less frequently 'Pelasgian') is a name applied to certain architectural works in Greece, which probably date from before 1000 B.C., and are wholly unconnected in point of evolution with any style of Greek architecture subsequently developed. The characteristic which distinguishes Cyclopean work from any other form of architecture is that it consists of huge polygonal stones, which may or may not be so arranged as to fit into one another without interstices requiring lesser stones to fill them up, but which are always hewn and are always kept in their places not by means of mortar or any other binding substance, but by their own great weight. On the other hand, work of this kind is not necessarily ancient: other considerations than the nature of the work itself are requisite to date it. Nor is it confined to Greece: similar remains are to be found in Egypt, Asia Minor, Sicily, Sardinia, Spain, &c., as well as in Greece and Italy. The most important ancient Cyclopean works in Greece are the walls of Tiryns, Psophis, and Mycenæ, the Lion Gate and so-called Treasuries (graves) of the latter place, and a (probable) temple on Mount Ocha. These Cyclopean walls (especially at Tiryns) were so thick as to allow galleries to be run lengthwise through them. At Tiryns window-like openings look down from these galleries on to the town. That these galleries served the purposes of fortification in some way is clear, but in what way is not clear. The walls are broken by gates, of which the best known is the celebrated Lion Gate at Mycenæ. In this form of doorway, in order to relieve the pressure on the lintel (which rests horizontally on the perpendicular stone doorposts), a triangular space is left above the lintel, and this space is filled, in the case of the Lion Gate, with a slab, on which are sculptured the figures of two animals (not lions) rampant, one on either side of a pillar. This quasi-heraldic device is undoubtedly of oriental origin, or imitated from some Assyrian model, but proves nothing as to the origin of the architecture or its builders. The same means for relieving the pressure on the lintel is employed in ancient remains in Cornwall. The Treasuries or tombs are underground chambers in the shape of bee-hives, vaulted with overlapping stones, and approached by a narrow passage through the side of the hill in which they are situated. The interior was ornamented with plates of bronze attached to the masonry. The term Cyclopean was applied by the Greeks to this kind of architecture on the strength of the popular etymology of the term: *cyclopes* = builders of a 'cycle,' or ring-wall. See Cyclopes.

Pelayo, said to have been the first Christian king of Spain, seems to have made head against the Arabs in Asturias (q.v.) in the 8th century. See Spain.

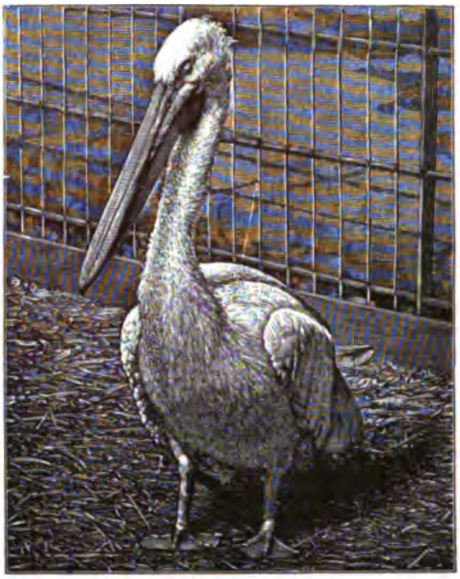
Pelesch, a royal castle of Roumania, built by Doderer of Vienna in 1873–84, in a romantic situation on the south side of the Transylvanian Alps, 70 miles N. of Bucharest.

Pelew Islands, also Palau, a group in the Pacific belonging to Spain, lie south-east of the Philippines, at the western extremity of the Caroline Archipelago, with which they are sometimes classed. There are about twenty-five islands, mountainous, wooded, and surrounded with coral-reefs. Total area, 170 sq. m. The principal is Babelthouap or Babeltop. The soil is rich and fertile, and the climate healthy. Bread-fruit, cocoa-nuts, sugar-cane, palms, areca-nuts, yams, &c. are grown. Turtles, trepang, and fish abound on the coasts. The inhabitants, about 10,000 in number, are of the Malay race. The men go entirely naked and the women nearly so. They are described as being good-natured, and have peculiar social institutions—the women too. The islands were discovered by the Spaniards in 1543, and visited again in 1696. See Semper, *Die Palauinseln* (1873); Kubary, *Die sozialen Einrichtungen der Palauer* (1885); and Marche, *Luçon et Palouan* (Paris, 1887).

Pelham, The Family of, takes its name from a castle and lordship in the north-east of Hereford, and was elevated to the peerage in the person of Sir Thomas Pelham, who in 1706 was created Baron Pelham, and married Lady Grace Holles, sister of the Earl of Clare. His successor, Thomas Pelham Holles, Duke of Newcastle, and minister of the first two Georges, was born in 1693, and educated at Westminster and Clare Hall, Cambridge. In 1711 he succeeded to the vast estates of his maternal uncle the Duke of Newcastle, and next year to the peerage of his father, the first Lord Pelham. George I. rewarded his services by creating him Earl of Clare (1714) and Duke of Newcastle in Northumberland (1715). He was made Lord-lieutenant of Middlesex and Nottingham, and a Knight of the Garter in 1718, and in the same year he married Lady Henrietta Godolphin, granddaughter of the great Marlborough. In 1724 he succeeded Carteret as Secretary of State, and held the office continuously under Walpole and his successors for thirty years, although a man of no particular ability except in parliamentary tactics. In 1754 he succeeded his brother, Henry Pelham, as premier, but retired in November 1756 to give place to the Duke of Devonshire, himself being rewarded with the title of Duke of Newcastle-under-Lyme, with special remainder to the Earl of Lincoln, his niece's husband. In July 1757 he was again premier, and compelled to take the first William Pitt into his ministry and to give him the lead in the House of Commons, and the supreme direction of the war and of foreign affairs. A succession of brilliant victories followed—Newcastle being only nominal head of the administration—and the great commoner had almost brought the war to a successful termination, when the accession of George III. led to the resignation of Pitt, and the replacement of Newcastle, in May 1762, by Lord Bute, as head of the ministry. Newcastle declined a proferred pension, with the remark that if he could no longer serve he would not burden his country. In the Rockingham ministry, formed in 1765, he filled for a few months the office of Privy Seal. He died in August 1768.—His younger brother, Henry Pelham (1696–1754), took an active part in suppressing the rebellion of 1715, became Secretary of State for War in 1724, and was a zealous supporter of Walpole. In 1743 he was made head of a ministry as First Commissioner of the Treasury and Chancellor of the Exchequer. Events during his ministry were the war of the Austrian succession, the Jacobite rebellion of the '45, the successful financial bill of 1750 (see George II.), the reform of the calendar, and Lord Hardwick's Marriage Act. His father's ducal title descended to Henry, ninth Earl of Lincoln, whose great-grandson,

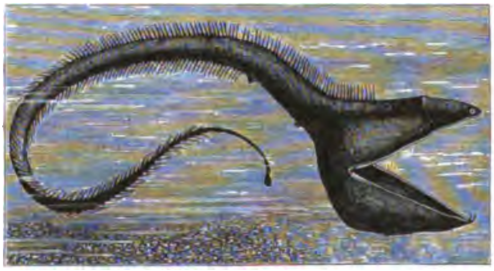
Henry Pelham-Clinton, fifth Duke of Newcastle, and twelfth Earl of Lincoln, was born 22d May 1811, and educated at Christ Church, Oxford. He represented South Notts in parliament from 1832 to 1846, when he was ousted by the influence of his father, the fourth duke, for supporting Sir Robert Peel in his free-trade measures. He was a Lord of the Treasury in the brief Conservative administration of 1834–35, and First Commissioner of Woods and Forests in the Peel administration, 1841–46. He was then made Irish Secretary, but went out of office with his chief a few months afterwards. He succeeded to the dukedom in 1851, and returned to office in 1852, filling the post of Secretary of State for the Colonies in the Aberdeen government. The war with Russia broke out, and in June 1854 it was found necessary to create a Secretary of State for War, and the new office was assigned to Newcastle. The terrible sufferings of the British army before Sebastopol in the winter months of 1854 raised a storm of popular discontent, and when the House of Commons determined to inquire into the conduct of the war the duke resigned. Newcastle was Colonial Secretary in the second administration of Lord Palmerston, and held the seals with general approval from 1859 till his death, 18th October 1864.

Pelican (*Pelecanus*), a genus of birds comprising a family, Pelecanidæ, having a very long, large, flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible a great pouch of naked skin is appended; the tongue is very short, and almost rudimentary; the face and throat are naked, the wings of moderate length, the tail rounded. The species are widely distributed, frequenting the shores of the sea, lakes, and rivers, and feeding chiefly on fish. Although birds of powerful wing, they are seldom seen at a great distance from land. All of them are birds of large size. They take their prey by hovering over the water, and plunging upon it when it appears. They often fly in large flocks, and the sudden swoop of a flock of pelicans at a shoal of fish is a striking and beautiful sight. They store up their prey in their pouch, from which they bring it out at leisure, either for their own eating or to feed their young. The pouch is capable of being wrinkled up into small size, and of being greatly distended. The Common Pelican (*P. onocrotalus*) is as large as a swan, white, slightly tinged with flesh colour, and, in old birds, the breast golden yellow. The quill-feathers are black, but are scarcely seen except when the wings are expanded. It is a native of the eastern parts of Europe and of many parts of Asia and Africa, and frequents both the seacoast and also rivers and lakes. It makes a nest of grass on the ground in some retired spot near the water, often on an island, and lays two or three white eggs. The parents are said to carry water to their young, as well as food, in their pouch. During the night the pelican sits with its bill resting on its breast. The nail or hook which terminates the bill is red; and it has been supposed that the fable of the pelican feeding its young with blood from its own breast originated in its habit of pressing the bill upon the breast in order the more easily to empty the pouch, when the red tip might be mistaken for blood. Another explanation is that the characteristic has been transferred to the pelican from the flamingo, which does discharge into the mouths of its young a bloody-looking secretion which it disgorges (see *Notes and Queries*, 1869, ii. p. 361). And long since Sir Thomas Browne in *Vulgar Errors* pointed out that the carvings and pictures, ecclesiastical and heraldic, of the so-called pelican feeding its young with its own blood were by no means quite like a pelican, and noted that a like tale was told by the Egyptians of the vulture. The story, which was unknown to the classical writers, seems to have originated in Egypt; and the love of the vulture for its young was proverbial there (see *Academy*, 1884, i. p. 97). The Rufous-necked Pelican (*P. fuscus*) abounds in the West Indies and in many parts of America. Other species are found in other parts of the world, and in some places the number of pelicans is prodigious, particularly in some of the most southern parts of the world. See also HERALDRY, Vol. V. p. 664.



Pelican (*Pelecanus onocrotalus*).

Pelican-fish (*Eurypharynx pelecanoides*), a remarkable deep-sea Teleostean fish, described by Vaillant in 1882. The body is somewhat eel-like, and is fringed on the dorsal and ventral middle line with spinous rays. It is the region of the jaws, however, which is most remarkable, the gape is so enormous. The fish probably engulfs small animals in whale-like fashion, but at the bottom of the sea instead of at the surface. Gill and Ryder discovered a similar form, *Gastrostomus bairdii*, in 1883, in which the mouth again suggests a pelican's pouch. The equally strange Saccopharyngidæ are perhaps allied, but the jaws are less enormous, and the animals are notable for swallowing fishes larger than themselves.



Pelican-fish (*Eurypharynx pelecanoides*).

Pelion, the ancient name of a wooded mountain-range in Thessaly, extending along the east coast. According to the myth, the Titans, in order to scale Olympus, the abode of the gods, placed Ossa (q.v.) on the summit of Pelion, the highest peak (5310 feet) of the range. Its sides and summit have always been clothed with forests of oak, chestnut, beech, elm, plane, and pine; it was of Pelion timber that the Argo (see ARGONAUTS) was built. The Centaur Chiron had his home on this mountain.

Pélissier, AMABLE JEAN JACQUES, Duc de Malakhoff, Marshal of France, was born 6th November 1794, at Maromme, near Rouen, and, having passed successfully through the colleges of La Flèche and St Cyr, entered the army. He served on the staff in Spain in 1823, made the campaign of the Morea in 1828, joined the first expedition to Algiers in 1830 as major of cavalry, and in 1839 returned to Algeria with the rank of lieutenant-colonel. In 1845 he acquired an unenviable notoriety by suffocating more than 500 Arabs who took refuge in caves in the Dahra. By 1850 he had attained the rank of General of Division. On the outbreak of the Crimean war in 1855 he was given the command of the first corps, and soon succeeded Marshal Canrobert in the chief command before Sebastopol. On 8th September he stormed the Malakhoff, the key of Sebastopol, for which exploit he was rewarded with a marshal's baton, and on his return to France was created Duc de Malakhoff and a senator, and received a grant of 100,000 francs. In 1858 he came to London as the French ambassador, but resigned his post in the following year, and was named governor of Algeria, where he died on 22d May 1864. See Sir E. Hamley, *The War in the Crimea* (1891).

Pelitic Structure, in Geology, applied to rocks which have a texture like that of dried mud.

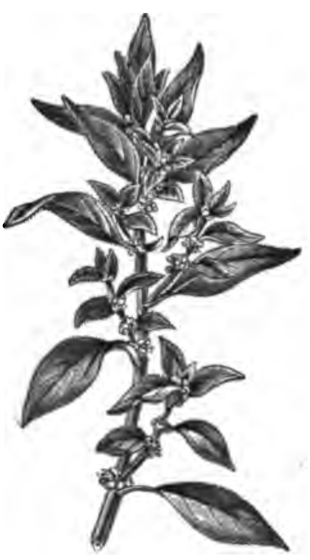
Pella, the ancient capital of Macedonia, and the birthplace of Philip II. and Alexander the Great, was situated in the midst of marshes, a few miles NW. of Thessalonica, which stood half-way between it and the head of what is now the Gulf of Saloniki. Its royal castle had wall-paintings by Zeuxis.

Pel'lagra (Ital. *pelle agra*, 'rough skin'), a disease, unknown prior to the first half of the 18th century, which is common among the peasantry of Northern Italy, and occurs also among the same class in Corfu, Roumania, the Landes and Gironde in France, and Oviedo and elsewhere in Spain. But the headquarters of the disease are in the northern and north central provinces of Italy; it is unknown to the south of Rome and in the islands. It is an error to describe pellagra as the result of poverty alone—to call it *il delirio della miseria;* it is clearly traceable to the use, as the staple diet, of damaged and unwholesome maize, gathered before it is ripe, and stored carelessly—often in cellars or pits—in its wet state. The disease makes its appearance in spring, in the form of a reddish-brown rash, which smarts painfully where exposed to the sun and air, as on the bare hands and feet; towards autumn this disappears, leaving, however, hard, dry spots on the skin, and returning with increased determination in the following spring, and again in each successive year, till the skin becomes shrivelled and yellow, or even black in certain spots, and the body is reduced to a mummified state. A burning feeling in the mouth and bowels is an accompanying symptom, and profuse diarrhœa, along with a rapid wasting, and dropsy, is a frequent cause of death. As the disease progresses disorders relating to the nervous system gradually develop, and culminate in melancholy, imbecility, or mania; death often ensues from delirium, or the wretched patients drag out their life within the walls of an asylum. In Roumania 1·22, and in Corfu 3·2 per 1000 of the population is affected; in Italy in 1887 there were 3688 deaths from pellagra, or 2·04 per 1000 of the estimated population; but in 1881 the proportion was 4·8, and since then it has steadily decreased, in part owing to the number of hospitals built within late years for the special treatment of this disease. See the official report, *La Pellagra in Italia* (Rome, 1880).

Pellegrini, CARLO, caricaturist, was born at Capua in 1838, came to London in 1865, and from 1868 till his death on 22d January 1889 was the 'Ape' of *Vanity Fair*, the delineator of its inimitable series of cartoons of celebrities. Especially good was his statuette in red plaster of Mr Lowe standing on a match-box (1871).

Pell'ico, SILVIO, an Italian poet, celebrated for his long and cruel imprisonment by the Austrians, was born 24th June 1788, at Saluzzo, in Piedmont, and was educated in Pignerol, where his father, Onorato Pellico, a lyric poet, had a silk-factory. In his sixteenth year he accompanied his sister Rosina (on her marriage) to Lyons, where he remained until Foscolo's *Sepolcri* awakened in him a strong patriotic feeling and an irresistible desire to return to Italy. Coming, about 1810, to Milan, he was warmly received by Ugo Foscolo and Vincenzo Monti, and became French tutor in the military school. His tragedies of *Laodamia* and *Francesca da Rimini* gained him an honourable name amongst Italian poets. He also translated the *Manfred* of Byron, with whom he had become acquainted. He lived in great intimacy with the most eminent patriots and authors of liberal views, and took an active part in a periodical called *Il Conciliatore*, which after a time was suppressed on account of its liberal tone. In 1820 he was arrested on a charge of Carbonarism, and sent to the prison of Sta Margherita, and afterwards to the Piombi at Venice. After two years' imprisonment he was condemned to death, but had his sentence commuted to fifteen years' imprisonment, and was carried to the fortress of Spielberg near Brünn; he was, however, liberated in August 1830. During his imprisonment he had written two other dramas; and afterwards he published an account of his sufferings during his ten years' imprisonment, under the title *Le mie Prigioni* (Paris, 1833), which has been translated into many languages, and has made his name familiar where it would not have been known on account of his poetry. Pellico's health, never robust, was permanently injured. The Marchioness of Barolo received him into her house at Turin as her secretary. Pellico subsequently published numerous tragedies and other poems, and a little catechism on the duties of man. He died January 31, 1854. See the Life by Chiala (Italian, 1852) and that by Bourdon (Paris, 7th ed. 1879).

Pellitory, or WALL-PELLITORY (*Parietaria*), a genus of plants of the natural order Urticeæ, having both unisexual and hermaphrodite flowers on the same plant, the perianth of both kinds 4-fid. The Common Pellitory (*P. officinalis*), which grows on old walls and heaps of rubbish in Britain and many parts of Europe and Asia, is a perennial herb, with erect or prostrate stems, ovate leaves, and inconspicuous flowers. It sometimes attracts attention from the manner in which the pollen is copiously discharged in hot summer days by an elastic movement of the filaments. It is an old domestic remedy as a diuretic, emollient, and refrigerant, but only as a diuretic is it really serviceable, a property which depends on the nitre it contains.



Pellitory (*Parietaria officinalis*).

PELLITORY OF SPAIN (*Anacyclus pyrethrum*) is a plant of the natural order Compositæ, of a genus nearly allied to Camomile (q.v.), a native of the Levant and of Barbary, and cultivated to some extent in Germany and other countries. The root is spindle-shaped and fleshy, and when dried is about the thickness of the little finger, inodorous, breaking with a resinous fracture. It has a very peculiar taste, slight at first, but becoming acidulous, saline, and acrid, with a burning and tingling sensation in the mouth and throat, which continues for some time. It is sometimes used in medicine. It is a powerful local irritant. The plant cultivated in Germany has more slender roots than that of the Levant.

Pelop'idas, a celebrated Theban general, of noble descent, noted among his fellow-citizens for his disinterested patriotism. The inviolable friendship between himself—one of the richest men in Thebes—and Epaminondas—one of the poorest—is among the most beautiful things recorded in Greek history. In 382 B.C. he was driven from Thebes by the oligarchic party, who were supported by the Spartans, and was forced to seek refuge at Athens, whence he returned secretly with a few associates, 379 B.C., and recovered possession of the Cadmeia, or citadel, slaying the Spartan leader, Leontiades, with his own hand. Plutarch gives us a vivid picture of the adventurous exiles gliding quietly in disguise into the city on a winter afternoon, amid bitter wind and sleet. Having been elected Bœotarch, in conjunction with Melon and Charon, he set about training and disciplining his troops, so that they soon became as formidable as the Lacedæmonians, and were successful in several small encounters with the latter. His 'sacred band' of Theban youth largely contributed to the victory of Epaminondas at Leuctra (371 B.C.), but failed in a subsequent attack on Sparta itself. In the expedition of the Thebans against the cruel tyrant, Alexander of Pheræ (368 B.C.), Pelopidas was, after several important successes, treacherously taken prisoner, when in the character of an ambassador, but was rescued by Epaminondas in the expedition of the following year. He was then sent to Susa, as ambassador from Thebes, to counteract the Spartan and Athenian intrigues going on at the court of Persia, and bore himself very nobly whilst there. His diplomacy was successful. In 364 B.C.

a third expedition was planned against Alexander of Pheræ, who, as usual, was threatening the Thessalian towns. The command was given to Pelopidas, and in the summer he marched into Thessaly, where he won the battle of Cynoscephalæ, but was himself killed while too eagerly pursuing the foe.

Peloponnesus ('the isle of Pelops'), now called the Morea (q.v.), a peninsula which formed the southern part of ancient Greece, Hellas Proper being situated to the northward of the isthmus on which stood the city of Corinth. See GREECE. The whole area is less than 9000 sq. m. Among its most important cities were Sparta and Argos. Sparta acquired after the Messenian war a decided supremacy over the other states, and disputed the supremacy with Athens in a war of almost thirty years' duration (431-404 B.C.)—the famous Peloponnesian war, of which the history has been written by Thucydides.

Pelops, in Greek Mythology, the grandson of Zeus, and the son of Tantalus, was slain by his father, and served up at an entertainment which he gave to the gods, in order to test their omniscience. They were not deceived, and would not touch the horrible food; but Demeter, absorbed with grief for the loss of her daughter, ate part of a shoulder without observing. The gods then commanded the members to be thrown into a cauldron, out of which Clotho brought the boy again alive, and the want of the shoulder was supplied by an ivory one. According to the legend most general in later times, Pelops was a Phrygian, who, being driven by Ilos from Sipylos, came with great treasures to the peninsula which derived from him the name of Peloponnesus, married Hippodamia, obtained her father's kingdom by conquering him in a chariot-race, and became the father of Atreus, Thyestes, and other sons. But in what appear to be the oldest traditions he is represented as a Greek, and not as a foreigner. He was said to have revived the Olympic games, and was particularly honoured at Olympia.

Pel's Fish-owl (*Scotopelia peli*), so named from having been first discovered by Mr Pel, the Dutch commandant at Elmina, is found in West Africa from Senegambia to Gaboon, and in the Zambesi region in South-east Africa. It measures about 2 feet in length; its wing is 16½ inches long. Its colour above is a deep rufous bay crossed with numerous irregular bars of black; the wing is similarly barred; the under surface of the body is light bay with heart-shaped bars of black; the bill is of a dark-blue lead colour, and the iris is dark brown. The birds from the Zambesi are a little larger than those from West Africa. The natives regard this owl as a fetish bird possessing the power of destroying whatever it looks on; and curiously enough its presence in more than one locality has been followed by an outbreak of disease among domestic animals. See the *Ibis* for 1859, p. 445.

Peltier Effect. See ELECTRICITY, Vol. IV. p. 276.

Peltry, a general term applied to the trade in skins of wild animals, and to the skins themselves. It is understood to mean only skins undressed, except by drying, and chiefly those which, when dressed, are called furs. See FURS.

Pelusium, the Greek name of an ancient Egyptian city, situated at the north-eastern angle of the Delta, and important as the key of Egypt on the Asiatic side. The eastern mouth of the Nile derived from it the epithet Pelusiac. Its identity with Sin of the Old Testament and the Greek Saïs is doubtful. The *Ostium Pelusiacum* was choked up with sand as long ago as the 1st century B.C., and the whole district is a wilderness of sand and marshes.

Pelvis. This term is used to indicate one of the chief divisions of the skeleton. It consists of the sacrum, coccyx, and the innominate or haunch bones. Each of the latter originally consisted of three parts—ilium, ischium, pubis—which have become fused together. By the articulation of the pubic bones in the middle line anteriorly the innominate bones form the anterior and lateral aspects of the pelvis. Wedged in between them posteriorly are the sacrum and coccyx. Various powerful ligaments give support to and maintain the pelvic bones in position. Notwithstanding the importance of this part of the skeleton, the ancient Greek physician had no word whereby to designate it, and both Greek and Roman associated the sacrum and coccyx with the vertebral column, and the innominate bones with the lower extremities.

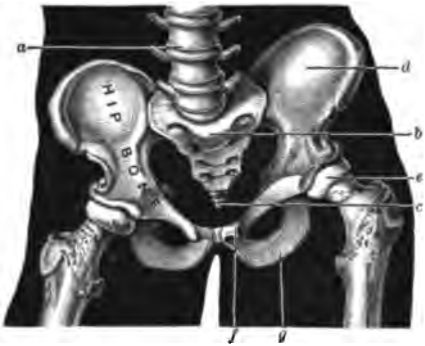


Fig. 1.—Adult Human Pelvis, *in situ*:
a, lumbar vertebra; *b*, sacrum; *c*, coccyx; *d*, ilium; *e*, head of femur in acetabulum; *f*, pubis; *g*, ischium.

The pelvis is divided into two parts by a plane which extends from the upper margin or promontory of the sacrum to the upper margin of the articulation between the two pubic bones—i.e. the symphysis pubis. On the inner surface of each innominate bone a line may be traced from the sacral promontory to the symphysis pubis. This is named the ilio-pectineal line, and it helps to complete the circumference of the plane which divides the pelvis into two parts. The space *above* this plane lies mostly between the expanded iliac bones. It belongs to the abdomen proper, and is named the *false* pelvis. The space below the level of the sacral promontory and ilio-pectineal lines is called the *true* pelvis, and certain descriptive terms are employed in connection with it. Thus the plane which separates it from the false pelvis is called the *inlet* or *brim* of the true pelvis. Its inferior circumference or *outlet* extends from the tip of the coccyx to the inferior border of the pubic symphysis, and from the one ischial tuberosity to the other. Between the ischial tuberosities in front and extending forwards to the symphysis there is the *subpubic* arch. The space between the *inlet* and the *outlet* is named the *cavity* of the true pelvis. The measurements of the true pelvis are made along certain definite lines which are applicable to the brim, the cavity, or the outlet. These are (1) the *antero-posterior* or conjugate diameter—i.e. from the mesial line in front to the mesial line behind; (2) the *transverse* or widest diameter; (3) the *oblique* diameters—right and left. These extend from the articulation between sacrum and ilium on one side to the farthest point on the opposite side of the mesial plane. In the erect attitude of the body the plane of the brim of the true pelvis forms an angle with the horizontal which varies from 60° to 65°. Thus the weight of the upper part of the body which is communicated to the sacrum is directed downwards and transmitted through the innominate bones to the heads of the femora, and so to the inferior extremities. In addition to the ligaments, muscles, blood-vessels, and nerves which constitute the soft parts of the pelvis, there are certain special organs which are present in both sexes, and others which are peculiar to each sex. Thus, of those common to both sexes, there are the urinary bladder and the rectum. The urinary bladder is placed behind the symphysis pubis, and only rises out of the pelvis into the abdomen when considerably distended. The rectum—a name applied to that part of the alimentary canal which passes through the pelvis—is placed on the front of the sacrum and coccyx, a short distance below which it terminates in the anus. The lower end of the rectum is supported by two muscles—the *levatores ani*—which surround it so completely as to form a floor or diaphragm for the pelvis. In addition to these organs there are others which are characteristic of the sexes. In the male we have the *vesiculæ seminales* and the *prostate gland*—the latter surrounding the outlet of the urinary bladder. In the female we have the *uterus*, *ovaries*, and their various appendages. The diverse functions of these organs have led to corresponding and well-marked differences in the size and form of the osseous pelves of the sexes. In the female the bones are more slender, and the muscular impressions less distinct. The true pelvis has a greater breadth and capacity, but its perpendicular depth is less. The *inlet* is more nearly circular; the ischial tuberosities are wider apart, and the subpubic arch is much wider. All of these differences indicate special modifications in connection with the necessities of child-bearing. Although the depth of the cavity of the true pelvis steadily increases from childhood to puberty, yet the characteristics of the sexes are discernible even at birth.

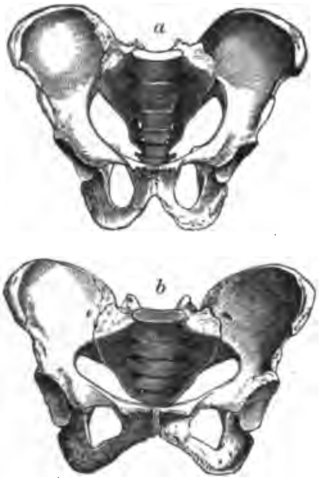


Fig. 2.
a, adult male, and *b*, female pelvis.

But not only does the pelvis display features which are characteristic of sex; it also presents characters which are peculiar to individual races of mankind. In this field of study a great amount of valuable work has been contributed by Sir William Turner of Edinburgh University, and embodied in the reports of the *Challenger* expedition. In determining those features peculiar to race numerous measurements have been made, mostly in relation to the cavity of the true pelvis with its brim and outlet; but many of the external dimensions of the entire pelvis have also been noted, as well as the dimensions of individual bones. One of the most valuable of the external measurements is the comparison between the maximum height and breadth of the entire pelvis. A common result is obtained by the following formula, $\frac{\text{height} \times 100}{\text{breadth}}$, which establishes what is called a *breadth-height index*. Another index of great importance is the result of a comparison between the *conjugate* and *transverse* diameters at the brim of the pelvis. This is named the *pelvic* or *brim index*, and is obtained by the formula, $\frac{\text{conj. diam.} \times 100}{\text{transverse diam.}}$. The measurements are usually recorded in millimètres. As the result of numerous measurements Sir William Turner has devised a classification of pelves based upon the relation of the conjugate and transverse diameters at the brim of the true pelvis —i.e. upon the *brim index*. Thus, those pelves in which the conjugate diameter of the brim is either longer than the transverse or closely approaches it are named *dolichopellic* (*pellis*, the Greek equivalent of the Latin *pelvis*, 'a basin;' and *dolichos*, 'long'), and in these the brim index is above 95. When the transverse diameter of the brim greatly exceeds the conjugate they are named *platypellic* (*platys*, 'wide'), and the brim index is below 90. In cases where the transverse diameter is not greatly in excess of the conjugate—i.e. where the brim index varies between 90 and 95, both inclusive—the term *mesatipellic* (*mesaitatos*, 'middlemost') is applied. Grouping the pelves under these headings we find that such races as Australians, Bushmen, Hottentots, Kaffirs, Malays, Andaman Islanders, &c. are *dolichopellic*. Negroes, Tasmanians, New Caledonians, &c. are *mesatipellic*. British, French, Germans, Europeans generally, natives of India, Chinese, American Indians, &c. are *platypellic*. These results are obtained from the examination of male pelves, since, as we have already seen, the female pelvis is modified in its diameters in relation to the special requirements of sex.

If now we compare the human pelvis with that of the lower mammalia, we shall find that the human pelvis is characterised by breadth and shallowness and the great capacity of the true pelvis. When, therefore, the conjugate diameter at the brim of the pelvis is longer than the transverse—i.e. when the pelvis is dolichopellic—an approach is made to the condition which prevails even to a greater extent among the lower animals, and it is 'a degraded or animalised arrangement' as compared with platypellic pelvis of Europeans.

We have seen that in man the weight of the trunk is transmitted to the lower limbs through the pelvis, whereas in quadrupeds the downward pressure of the weight of the trunk is differently disposed. Doubtless, therefore, the *attitude* has great influence in controlling the expansion of the pelvis in the transverse diameter when the parts are young and plastic. It may therefore be owing to the habits and mode of life of the black races in their aboriginal state that their pelves approach the lower type. Take, for example, the aboriginal Australian who sits on the ground embracing his knees with his arms, or any of the savages whose favourite attitude is 'squatting'—i.e. sitting down with the body bent forward and the buttocks resting on the heels; or again, when in pursuit of game a stooping or crouching attitude is adopted. In all these positions the pressure upon the sacrum and pelvis is diminished, and there is a tendency to approximate the conditions to those of the anthropoid apes, while the white man on the other hand preserves the erect attitude whether standing, sitting, or walking.

Pemba, a coral island off the east coast of Africa, lies 50 miles NE. of Zanzibar Island, has a length of 46 miles and a breadth of 4½; area, 372 sq. m. There are numerous bays on the east coast; on one of them stands the chief town, Chaka. The inhabitants, 10,000 in number, rear cattle and trade in rice, cloves, and ebony, all products of the island. It was transferred by the sultan of Zanzibar to the British East Africa Company in 1891.

Pembina, a small village, the capital of Pembina county, North Dakota, on the Red River of the North, at the mouth of the Pembina River. By rail it is 68 miles SW. of Winnipeg and 293 NW. of St Paul; and its position makes it worthy of notice, as on the north it marks the boundary line between Manitoba and the United States, while on the east only the Red River separates it from Minnesota. Pop. (1890) 670.

Pembroke, the county town of Pembrokeshire, on a navigable creek of Milford Haven, 9 miles W. of Tenby and 80 W. by N. of Cardiff. On the extremity of the ridge on which the town is built stands Pembroke Castle, founded in 1094 by Arnulf de Montgomery, a very imposing ruin, with a Norman keep 75 feet high and 52 in diameter. Beneath is a huge natural cavern, 70 by 50 feet. The birthplace of Henry VII., this castle in 1648 was taken by Cromwell after a six weeks' siege. Monkton Priory, with its roofless Decorated choir, is another interesting structure. The Pembroke district of boroughs, returning one member, comprises Pembroke, Milford, Tenby, Wiston, and also (since 1885) Haverfordwest, Fishguard, and Narberth. Pembroke for more than four centuries has given the title of earl to the House of Herbert (q.v.). At Pembroke Dock, or Pater, 2½ miles north-west, is the naval dockyard and arsenal, established in 1814. It embraces an area of 70 acres, and since 1861 has been fortified at a cost of more than a quarter of a million. Pop. of Pembroke (1861) 15,071; (1881) 16,339; (1891) 14,978; of Pembroke Dock (1861) 10,190; (1891) 10,481.

Pembrokeshire, a maritime county of South Wales, the westernmost of the Principality. Measuring 30 by 25 miles, it has an area of 611 sq. m., or 391,181 acres, of which three-fourths is arable. The coast-line is much of it rugged and precipitous; and inland the surface is undulating, green hills alternating with fertile valleys, and attaining a maximum altitude of 1754 feet in the Precelly range, which traverses the north of the county from east to west. Rivers are the Teifi, separating Pembrokeshire from Cardigan, and the East and the West Cleddau. The rocks are largely Silurian; the soil varies much in quality; and coal, slate, lead, and iron have been worked. St David's Cathedral and half-a-dozen mediæval castles make up the antiquities with Ogam inscriptions, neolithic implements, and Roman coins. At Haverfordwest and Tenby a colony of Flemings was established in 1107. They adopted the English tongue; and Pembrokeshire, or 'Little England beyond Wales,' is now over more than half its area inhabited by an English-speaking population, although it is the remotest of all the Welsh counties. It was harried by Owen Glendower in 1405; and on 22d February 1797 it witnessed the last French invasion, when 600 regulars and 800 gaol-birds landed near Fishguard, only to surrender unconditionally to some militia and yeomanry under Lord Cawdor. Pembrokeshire returns one member. Pop. (1801) 56,280; (1841) 88,044; (1881) 91,824; (1891) 89,125. See Fenton's *Historical Tour through Pembrokeshire* (1811).

Pemmican. This was originally a North American Indian preparation only, but it was introduced into the British navy victualling-yards in order to supply arctic expeditions with an easily-preserved food, containing the largest amount of nutriment in the smallest space. As made by the Indians, it consists of the lean portions of venison dried in the sun, or wind, and then pounded into a paste and tightly pressed into cakes; sometimes a few fruits of *Amelanchier ovata* are added to improve the flavour. It will keep for a very long time uninjured. That made for the arctic voyagers was chiefly of beef. In making pemmican it is necessary to remove the fat completely.

Pemphigus, or POMPHOLYX, belongs to that order of skin diseases which is characterised by an eruption of large vesicles, filled with serous fluid, and known as *bullæ*. The disease occurs both in the acute and in the chronic form. In a mild case of acute pemphigus, bullæ, or blisters, from the size of a pea to that of a chestnut, appear in succession (chiefly on the extremities), and having continued three or four days break, form a thin scab, and soon heal, unaccompanied with febrile or inflammatory symptoms. In severe cases there is considerable constitutional disturbance, the bullæ are larger, and the scabs heal with difficulty. The chronic form differs mainly from the acute by its prolonged continuance. The acute variety chiefly affects children, and has been ascribed to dentition, errors of diet, &c.; while the chronic form chiefly attacks aged persons, and is probably due to debility and impaired nutrition. The acute form usually requires nothing but cooling medicines and diet, and mild local dressings, such as simple cerate, to protect the raw surfaces from exposure to the air. In the chronic form a nutritious diet, with the judicious use of tonics (iron, bark, &c.), is most commonly successful. In obstinate cases arsenic is sometimes of use.

Pen, an instrument for writing with a fluid ink. When the Egyptians, Greeks, Romans, and some other ancient nations wrote upon papyrus or parchment they used a reed pen (Lat. *calamus*), and when they used tablets of wood or stone covered with wax they wrote upon them with a pointed stylus of bronze, bone, or other material. Some of these ancient reed pens have been preserved. One, now at Naples, was found in a papyrus at Herculaneum. Reed pens are still the only kind used by the natives of Persia and some neighbouring countries. A metal pen does not suit their mode of writing. These reed pens are pointed much in the same way as quills, and are made from the reeds or stems of *Phragmites communis*, which is also a British plant, *Erianthus Ravennæ*, and probably other species of this genus. The Chinese and Japanese write with a small brush or hair-pencil. Quills are known to have been used for writing with as early as the 7th century of our era, but long after that reed pens also were employed in European countries.

Metal pens were in use, but probably only to a very limited extent, among the ancient Romans. In the museum at Naples there is a bronze pen, nibbed like a modern steel pen, which was found at Pompeii. Another of a somewhat different shape was discovered at Herculaneum. Bronze and silver writing pens appear to have been occasionally made in the middle ages, but there is little doubt these were more curiosities than articles in general use, and the same may be said of all metallic pens of more recent date, sometimes referred to in books, until we come to the beginning of the 19th century. For centuries before that quills were universally employed among western nations, and in schools steel pens were only very partially substituted for them till about 1840.

Perhaps the earliest English metallic pens of which we have any certain knowledge were some made in 1780 by Mr Harrison, split-ring maker, Birmingham, for Dr Priestley. They were of sheet-steel, formed into a tube and filed into shape, the joining of the metal making the slit. Brass pens were also made in England before the end of last century; one of these seems to have been in the Strawberry Hill collection of art objects and curiosities (Walpole's), which was sold in London in 1842. In the early part of the century various plans were tried to produce pens more lasting than ordinary quills. The quills were pointed with metal, and pens constructed of horn and tortoise-shell had small pieces of diamond and other hard gems embedded in them by pressure. Another plan was to attach gold to their points. Such pens were of course too costly for general use. Barrel pens of steel made by Mr Wise were on sale in London in 1803, but these, too, were high in price, and did not take the market. The first English patent for the manufacture of steel pens is that of Bryan Donkin in 1803. A patent, the first of its kind in America, was granted in 1810 to Peregrine Williamson of Baltimore for the manufacture of metallic pens. Steel pens of the barrel type were being made in 1815 by Sheldon of Sedgley, the price being 18s. per dozen. By 1820 the number of manufacturers had increased. To Mr James Perry belongs the credit of bringing steel pens into general use. He began pen-making at Manchester in 1819, using the best Sheffield steel (from Swedish charcoal iron) for the purpose. Perry removed to Red Lion Square, London, and had developed the pen trade with remarkable energy before the prominent Birmingham makers, Mitchell, Gillott, and Mason, caused a revolution in the trade by machine-made pens. He took out a patent for a new method of making pens in 1830, from hard, thin, elastic metal, and a 'length of slitted or cleft space' scarcely exceeding that of quill-pens; and he made other improvements in 1832. The greatest improvement in the manufacture was the adoption of the screw handpress for the cutting out of pens, enabling the manufacturer to supply them cheaply and in quantities. At first the method of slitting pens by means of a press was kept a profound secret by Gillott and Mason. To Mr John Mitchell, Birmingham, has been assigned priority in this invention. Sir Josiah Mason made barrel pens in 1828, and 'slip' pens for Perry in 1829. At the end of 1875, when Sir Josiah Mason retired from his business, his output exceeded 32,000 gross weekly. To Mitchell, Gillott (whose patent is dated 1831), and Sir Josiah Mason chiefly belongs the credit of first making steel pens by machinery, thus enabling them to be sold cheaply and to become articles of common use.

An ordinary pen looks a simple enough instrument, but before it assumes its present appearance it has to go through some sixteen different processes. Birmingham is the great seat of the steel-pen trade. The steel of which the pens are made comes from Sheffield, and is in sheets 6 feet long and 1 foot 5 inches wide. It is first cut into strips of convenient width; next it is annealed, and rolled to the requisite thickness, when it is found to have trebled its original length and to have acquired a bright surface from the action of the rollers. The 'blanks' or first shape of the pen are now cut out by means of a press; next comes the operation of *marking* or stamping the name on the pen, then *piercing;* but before they can be formed into the shape of a pen they require to be softened by *annealing*. They are freed from dust and grease, placed in round pots, which are again enclosed in larger ones, are covered with charcoal dust, put into a muffle or iron box, heated to a dull red, and then allowed to cool. The pens are next *raised* or formed into the required shape by a blow from a screw-press fitted with a punch and a die. Then they are *hardened*. This is done by arranging them in thin layers in covered iron pans of a round shape, which are heated to a bright redness in a muffle. The contents of the pans are next emptied into a bucket, immersed in a tank of oil, and transferred to a perforated cylinder, which, being quickly rotated, drains off the oil. The pens are still greasy and as brittle as glass, and in order to cleanse them they are again placed in perforated buckets and plunged into a tank of boiling soda-water. They are next tempered, or softened, by enclosure in an iron cylinder which is kept revolving over a charcoal fire until the requisite degree of softness is attained. The pens have been blackened by this operation; they are next *scoured* by being dipped into a tub of diluted sulphuric acid, and then put into iron barrels containing water and material made from broken and finely-ground annealing pots. The barrels are kept revolving for five, or sometimes eight, hours; then the pens are subjected to a second process of scouring in barrels filled with dry material of the same kind; and then to a third process in which dry sawdust is the scouring or cleaning agent. The pens have now acquired a bright, silver tone, and the points have been rounded. They have then to be ground between the pierced portion and the point; this is done on a small revolving solid wheel or 'bob' made of wood, covered with leather, and coated with emery-powder. Next comes the operation of *slitting*, which is cleverly accomplished by a cutting-press, but, the edges of the slit being sharp, the pens are again polished in revolving barrels. They are now coloured and varnished; the colouring is done in a copper or iron cylinder over a coke fire; if to be lacquered they are placed in a solution of shellac. Afterwards the spirit is drained off, the pens are placed in wire cylinders, and kept revolving until the lacquer is dry. Next the pens are spread on iron trays and put into an oven, the heat of which spreads the lacquer evenly over the surface. Girls now look over the pens, throw aside the faulty ones, and the good ones are packed into boxes ready for sale.

How the trade has grown may be seen from the fact that in 1839 steel pens were almost unknown; in 1849 the trade was a leading industry in Birmingham; there were twelve factories employing about 2000 men, women, and girls, the weekly output of pens being stated at 65,000 gross. The output in 1866 had increased to 98,000 gross weekly; and about 4000 people were employed in all departments. In 1886 the weekly average of pens manufactured was about 160,000 gross, or twenty-two million pens. There were four pen-works in the United States at the same date, only one of which was of importance; three in France; and one in Germany. The most successful recent patents in connection with pens have been those dealing with points which are turned up or turned down, thickened or 'planished,' for smooth writing. A leading pen-maker has a catalogue containing 5000 varieties of pens, while it has been estimated that no fewer than 100,000 different shapes and sizes are in the market. All the pen-makers now make pen-holders, and Josiah Mason has related that he made the first stick pen-holders for Perry in 1832, and for Gillott in 1835.

Pens are also made of silver, platinum, and aluminium bronze. They have also been made of vulcanite. The gold pen, which is incorrodible with ink, was also made in Birmingham for Mordan and others. Made in the United States as early as 1836, it has become a speciality there: one American firm manufactures 100,000 every year. The gold pen goes through no less than forty-five different processes, from the gold-bar, purchased from the United States Assay Office, which is alloyed, to the highly-finished article of commerce. To give firmness to the point of the pen it is pointed with iridium. The United States imports over half a million gross of steel pens annually, and manufactures one and a half million gross, at Camden, Meriden, and Philadelphia. The steel used is mostly imported from Birmingham. In the stylograph, or fountain pen, the nib is dispensed with, a finely-tapered point connecting with the barrel containing the ink; the first fountain pen was brought out in 1848. See Bunce's *Josiah Mason* (1890), which contains a sketch of the history of the steel-pen trade.

Penal Laws. See CATHOLIC EMANCIPATION, IRELAND.

Penal Servitude is a sentence for criminal offences which has been introduced in lieu of the sentence of transportation beyond the seas. See PRISONS.

Penance (Lat. *pœnitentia*), in Roman Catholic theology, means both the sorrow for sin and also the sacrament by which absolution is conveyed. It means also the voluntary or accepted self-inflicted punishment by which a repentant sinner manifests his sorrow for sin, and seeks to atone for the sin, and to avert the punishment which, even after the guilt has been remitted, may still remain due to the offence. Penance is believed in the Roman Catholic Church to be one of the sacraments of the New Law. It will be necessary to explain it briefly both under its relations as a sacrament and as a private personal exercise.

Penance as a state of mind is simply sorrow for evil-doing, accompanied with a purpose of amendment. Penance is the fruit or the manifestation of this sorrow, and it is commonly accompanied or expressed by some of those external acts which are the natural manifestations of any deep sorrow, either negative, as the neglect of ordinary attention to dress, to the care of the person, to the use of food, or positive, as the direct acts of personal mortification and self-inflicted pain, such as fasting, wearing haircloth, strewing the head with ashes, watching of nights, sleeping on hard boards, &c. Such manifestations of sorrow, whether from motives of religion or from merely natural causes, are common among the Eastern races, and are frequently alluded to in the Scriptures. In the personal practice of the early Christians penance found a prominent place, and the chief and acknowledged object of the stated Fasts (q.v.), and other works of mortification which prevailed, was that of penitential correction, or of the manifestation of sorrow for sin.

A still more striking use of penance, however, in the early church, was the disciplinary one; and this, in the Roman Catholic view, is connected with the sacramental character of penance. Any discussion of this purely theological question would be out of place here, and it will be enough to state briefly that Roman Catholics number penance among the Seven Sacraments, and believe it to be of direct divine institution (Matt. xviii. 18; John xx. 23; 1 Cor. v. 5). The *matter* of this sacrament consists, in their view, of the three acts of the penitent—contrition, or heartfelt sorrow for sin, as being an offence against God; confession, or detailed accusation of one's self to a priest approved for the purpose; and satisfaction, or the acceptance and accomplishment of certain penitential works, in atonement of the sin confessed. The *form* of the sacrament is the sentence of absolution from sin pronounced by the priest who has received the confession, and has been satisfied of the penitential disposition of the self-accusing sinner. In all these points, of course, they differ from Protestants. Even in the apostolic times the practice prevailed of excluding persons of scandalous life from the spiritual fellowship of the Christian community (see EXCOMMUNICATION); and, without attempting to fix the date, it may be stated as certain, from the authority of Tertullian and other writers, that from a very early time the persons so excluded were subjected to certain penitential regulations. The class of offenders so treated were those who had been notoriously guilty of the grievous crimes of idolatry or apostasy, murder, adultery, and other scandalous offences. The period of penitential probation differed in different times and places, but in general was graduated according to the enormity of the sin, some going so far in their rigour (see NOVATIAN) as, contrary to the clearly-expressed sense of the church, to carry it even beyond the grave. In the earlier ages much depended upon the spirit of each particular church or country; but about the 4th century the public penitential discipline assumed a settled form, which, especially as established in the Greek Church, is so curious that it deserves to be briefly described. Sinners of the classes already referred to had their names enrolled, and were (in some churches, after having made a preliminary confession to a priest appointed for the purpose) admitted, with a blessing and other ceremonial, by the bishop to the rank of penitents. This enrolment appears to have commonly taken place on the first day of Lent. The penitents so enrolled were arranged in four grades, called—1. (Gr. *prosklaiontes*, Lat. *flentes*) 'Weepers;' 2. (Gr. *akroōmenoi*, Lat. *audientes*) 'Hearers;' 3. (Gr. *hypopiptontes*, Lat. *prosternentes*) 'Prostraters;' 4. (Gr. *systantes*, Lat. *consistentes*) 'Standers.' Of these classes the first were obliged to remain outside of the church at the time of public worship, and to ask the prayers of the faithful as they entered. The second were permitted to enter and to remain in the place and during the time appointed for the Catechumens (q.v.), but, like them, were required to depart before the commencement of the solemn part of the Liturgy (q.v.). The third were permitted to pray with the rest, but kneeling or prostrate, and for them were prescribed many other acts of mortification. The fourth were permitted to pray with the rest in a standing posture, although apparently in a distinct part of the church; but they were excluded from making offerings with the rest, and still more from receiving the communion. The time to be spent in each of these grades at first differed very much according to times and circumstances, but was afterwards regulated by elaborate laws, called penitential canons. Still it was in the power of the bishop to abridge or to prolong it; a power the exercise of which is connected with the historical origin of the practice of Indulgence (q.v.). Of these four grades the first two hardly appear in the Western Church. It is a subject of controversy whether, and how far, this discipline was extended to other than *public* sinners; but it seems certain that individuals, not publicly known as sinners, *voluntarily* enrolled themselves among the penitents. All four grades wore a distinguishing penitential dress, in which they appeared on all occasions of public worship, and were obliged to observe certain rules of life, to renounce certain indulgences and luxuries, and to practise certain austerities. In some churches they were employed in the care of the sick, the burial of the dead, and other of the more laborious works of charity. The penitent, in ordinary cases, could only be restored to communion by the bishop who had excluded him, and this only at the expiration of the appointed time, unless the bishop himself had shortened it; but in case of dangerous illness he might be restored, with the condition, however, that if he recovered from the illness the whole course of penance should be completed. The reconciliation of penitents took place commonly in Holy Week, and was publicly performed by the bishop in the church, with prayer and imposition of hands. It was followed by the administration of communion. If any of the clergy were guilty of a crime to which public penance was annexed, they were first deposed from the rank of the clergy, and then subjected to the ordeal, like the laity themselves. This public discipline continued in force with greater or less exactness in the 5th, 6th, and 7th centuries, gradually, however, being replaced by semi-public, and ultimately by private penance. In the 11th and 12th centuries the public penance had entirely disappeared. The nature and origin of *private penance* is a subject of controversy between Catholics and Protestants; the former contending that it had existed from the first, and that it held the same place even in the ages of public penance for *secret sins* which the public penance did for public offences. At all events, from the date of the cessation of the public discipline it has existed universally in the Roman Church. The priest, in absolving the penitent, imposes upon him the obligation of reciting certain prayers, undergoing certain works of mortification, or performing certain devotional exercises. These acts of the penitent are held to form an integral part of the sacrament of penance. See CONFESSION; and Morinus, *De Pœnitentiâ* (1651).

By Protestant churches penance is not recognised; yet a confession was made and a penance inflicted publicly in a church at East Clevedon in Somersetshire in 1882; and there is a curious letter from Dr Pusey to Mr Hope-Scott, then abroad (1844), desiring him to procure a 'discipline' and 'send it by B. What was described to me was of a very sacred character: five cords each with five knots, in memory of the five wounds of our Lord. . . . I should be glad to know also whether there were any cases in which it is unsafe—e.g. in a nervous person.' An approach to the Roman Catholic polity on the subject was in use among the English Puritans of the 17th century, and more particularly in the Church of Scotland during that and the succeeding century, when it was common 'to make satisfaction publicly on the Stool of Repentance' (q.v.). In Ayrshire the kirk-sessions were accustomed regularly to provide sackcloth suits for ecclesiastical offenders as late as 1781; a heinous breach of the seventh commandment might involve the penitents' standing in the 'public place of repentance' in church, arrayed more or less completely in sackcloth, every successive Sunday for six months on end (see Edgar's *Old Church Life in Scotland*, 1885). It does not seem to have occurred to the Reformers or their more immediate successors in the Protestant churches that their system of discipline, with its public rebukes and enforced humiliations of various kinds, was liable to be interpreted in a sense very different from that of a mere expression of sorrow for sin; but the belief is now very general among the most zealous adherents of their doctrinal opinions that in all this they adopted practices incongruous with their creed, and in harmony rather with that of the Church of Rome. Nor do they seem to have perceived that Church Discipline (q.v.), in its proper sense, as relating to ecclesiastical rights and privileges, is wholly distinct from the imposition of penalties by churches or church courts. Penitential humiliations, imposed by ecclesiastical authority, are now no more in favour where church discipline is most strict than where the utmost laxity prevails. The commutation of penalties deemed shameful, for a fine to the poor of the parish, was an abuse once prevalent in Scotland, but never sanctioned by the higher ecclesiastical authorities.

Penang (*Pulo Pi'nang*, 'Betel-nut Island'), the official but less used name of which is PRINCE OF WALES ISLAND, one of the British Straits Settlements (q.v.), lies at the northern extremity of the Strait of Malacca, 2 to 10 miles from the west coast of the Malay Peninsula, and 360 miles NNW. of Singapore. Length, 15 miles; breadth, 5 to 10 miles; area, 107 sq. m., three-fifths being hilly. A sanatorium crowns the highest point, 2920 feet above sea-level. The whole is covered with forest and vegetation, cocoa-nut and areca palms predominating. In the low lands the thermometer ranges from 70° to 95°, and at the sanatorium from 60° to 75°. The rainfall averages 111 inches a year. Penang is a great shipping centre for the products of the native states of the Malacca Peninsula. Its shipping in 1888 measured close upon 3,000,000 tons, an increase of 50 per cent. since 1878. The commerce shows an even greater advance: in 1888 the imports and exports combined reached a total value of £15,425,458, as against £8,238,064 in 1882. The exports, mostly commodities in transit, averaged £7,110,000 during the three years ending 1889—tin, £2,157,100; spices, £402,000; sugar, £217,500; and tobacco, £80,300, being the principal items. Pop. (1880) 90,951, of whom one-half were Chinese, nearly one-fourth Malays, and one-sixth Tamils and others from India. Several thousand Chinese and Indians arrive and depart every year. Georgetown, the capital, is situated at the north-east extremity of the island, and is defended by forts. Pop. about 25,000. Province Wellesley, on the peninsula opposite, forms part of this same settlement administratively. It is 45 miles in length by 4 to 11 in breadth, and has an area of 270 sq. m. It produces tapioca, sugar, rice, and cocoa-nuts. Pop. (1881) 97,324, of whom 58,723 were Malays, 21,637 Chinese, and 10,616 Indians. Another dependency of the settlement is the Dindings, including the island of Pangkor, situated about 80 miles S. of Penang. Pop. 2322. The native raja of Kedah ceded Penang to the English in 1785 in return for an annual pension of £1000. Thirteen years later the same power acquired what is now Province Wellesley, for the purpose of putting down piracy. In 1805 the East India Company, the proprietors of the settlement, made Penang a presidency of equal rank with Bombay and Madras. From 1826 Singapore and Malacca were united with it, but in 1831 the seat of government was transferred from Penang to Singapore.

PENANG LAWYERS is the commercial name for the stems of a species of palm imported from Penang for walking-sticks. They are small and hard, and have a portion of the root-stock attached, which is left to form the handle.

Penarth Beds. See TRIASSIC SYSTEM.

Penates. See LARES.

Pencils. A slender stick of black lead, slate, or coloured chalk, encased in a small round piece of wood, is called a pencil; but the term is also applied to small hair-brushes used by artists, and it was to these that the name was originally given. Some early manuscripts have lines upon them ruled with ordinary metallic lead. When pencils of Black Lead (q.v.), called also graphite and plumbago, were first used is uncertain, but Beckmann points out that they are distinctly mentioned in a book on fossils by Conrad Gesner, printed at Zurich in 1565. The discovery of the use of black lead as a material for writing or drawing with was an important one, since for work where words or lines may require to be frequently rubbed out no other substance has such valuable properties.

For a long time the plumbago from the Borrowdale mines in Cumberland furnished the 'leads' for the best pencils ever made. These mines have been exhausted since 1850; but when the graphite from them was available it had, in the case of the larger and purer pieces, only to be cut into square rods of the proper size for pencils. In order to work up the smaller bits, cuttings, and dust of this precious material, Mr W. Brockedon, in 1843, patented a method by which he first reduced these small pieces to powder, and then, by subjecting it to great pressure in dies from which air is exhausted, produced a cake as solid and compact as the natural graphite, and equally suitable for cutting into leads. For a considerable number of years past, owing to the Borrowdale plumbago being worked out, black-lead pencils, as well as coloured pencils or crayons, have been made by the process invented about the close of the 18th century by Conté of Paris, which consists in thoroughly mixing the black lead with clay, both being first reduced to a state of fine division and most carefully purified. The proportions of graphite and clay vary from two of the latter to one of the former (for light hard pencils) to equal parts of the two ingredients (for the dark soft kinds). Water is added to the mixture, which is repeatedly ground, and then placed in canvas bags and squeezed in a hydraulic or steam press till it acquires the consistency of stiff dough. In this state it is placed in a strong metal cylinder, whose bottom is perforated with apertures of the proper size for the section of the pencil leads. The black-lead mixture, being in a plastic state, is then squeezed out through the apertures by a plunger into continuous strips or threads, which are arranged in straight lengths on a board to dry. After being exposed to a slight artificial heat, the strips are cut into the usual lengths for pencils, and placed in a covered crucible, which is raised to a red heat. When cooled they are ready for use.

An extensive mine of fine graphite was opened at Bogodolsk in eastern Siberia about 1850. Much of this black lead is scarcely if at all inferior in quality to that formerly obtained in Cumberland. Pencils have been made from this graphite in the unmixed state, and Faber of Nuremberg still makes fine pencils of it. These have the words 'Graphite de Siberie' stamped upon them. Dixon's American graphite pencils are made from the plumbago found at Ticonderoga on Lake George, but it is mixed with clay as above described. Workable deposits of graphite are found at several places in Canada. A good deal of what occurs in the township of Buckingham, in the province of Quebec, is almost pure, and is made into pencils. For other localities, see BLACK LEAD.

The wood used for pencils is invariably that of the Virginian or Florida cedar (see JUNIPER), which, being straight grained and easily cut, is remarkably well suited for the purpose. Two rectangular pieces of the proper size, cut out by machinery, go to make a pencil, the one containing the groove for the lead being thicker than the other. After the lead is inserted the two pieces are glued together, and then cut to a round shape by revolving cutters. The operations of cutting out the square fillets of wood and rounding them after they are glued are very rapidly performed. Pencils are sometimes cut in a hexagonal shape. Besides the maker's name, letters indicating the character of the lead are stamped upon pencils. For Great Britain these are H, HH, HHH, B, BB, BBB, HB, and F. H signifies hard; once and twice repeated it means harder and very hard. B stands for black (and soft), and, when repeated, for still blacker. HB, the most generally useful, means hard and black; while F signifies firm. In the United States the letters used differ somewhat. They are H, hard; VH, very hard; VVH, still harder; S, soft; VS, very soft; VVS, still softer, for deep black shading; M, medium; MH, medium hard; MB, medium black.

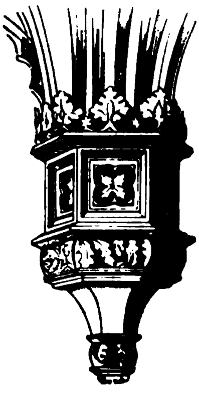
Owing to the multiplicity of processes for reproducing pen-and-ink drawings (see ILLUSTRATION), and the cultivation of that method for book illustration, the black-lead pencil is much less used now than in the earlier half of the 19th century. Drawings in chalk or charcoal, since either material makes a much blacker line, have usually deeper and more effective shading than can be given with pencil. Still, a finished drawing in black lead by a skilled hand has charms of its own, and it is to be regretted that so few of these of any importance are now made by artists of high standing.

Coloured pencils are made with ordinary pigments—e.g. Prussian blue and chrome yellow for their respective colours—mixed with white wax and tallow or with gum and tallow, clay being sometimes added; but none of these coloured preparations are heated like those made of graphite and clay. Copying and ink pencils are made of a concentrated solution of an aniline violet added to a mixture of graphite and China clay. For some kinds gum is added, and in such cases graphite is sometimes omitted.

The arrangement of a small rod of black lead, which is kept projecting as it wears away from a tube fitted to a metal pencil-case, and which has since been so much used, was patented by Hawkins and Mordan in 1822. An alloy of lead, antimony, and a little mercury is made into ever-pointed pencils for writing on paper prepared with a suitable surface.

The manufacture of black-lead and coloured pencils is carried on most extensively at Nuremberg, where there are more than a score of factories, employing in all nearly 6000 hands, and producing annually some 250 million pencils, worth about £420,000. Faber founded a branch in New York in 1861. Four years later the Eagle and American Pencil Companies were established, and the other surviving firm, the Dixon Crucible Company, in 1872.

Pendant, a hanging ornament, used in ceilings, vaults, staircases, timber-roofs, &c. It is sometimes a simple ball and sometimes elaborately ornamented, and is chiefly used in the later Gothic and Elizabethan styles.



Pendant.

Pendant. See FLAG.

Pendennis Castle. See FALMOUTH.

Pendle Hill. See CLITHEROE.

Pendleton, a north-western suburb of Manchester, wholly within the borough of Salford. Pop. 40,246.

Pendragon. See DRAGON.

Pendulum. The two chief varieties are the *simple* pendulum and the ordinary or *complex* pendulum. Examples of the latter occur in all the forms of clockwork where a balance-wheel has been dispensed with (see HOROLOGY). A small leaden or golden bullet, when suspended from a fixed point by an extremely fine thread, may represent a simple pendulum, provided it vibrates in a small circular arc. Once set in motion, this instrument will move in the same arc for ever unless interfered with, because at each swing, when descending through the first half of its circular path, it acquires energy enough to raise it to an equal height on the opposite side. In ordinary experiments the bullet will perform many thousand oscillations by itself alone, before the resistance of the air and other interferences cause the movement to subside and at last cease, by imperceptibly diminishing the length of the arc.

This long-continued and self-sustaining action is manifestly due to the attraction of the earth, the force that causes a stone to fall to the ground, because at the end of each swing of the bullet its weight tends to pull it vertically downwards, and the string constrains it to repeat its course along the circular arc. A most interesting and valuable application of the pendulum, therefore, is for measuring the acceleration of velocities of falling bodies. For that purpose it is much superior to Atwood's Machine (q.v.) or any other method which has yet been devised.

If the circular path or swing is short—not exceeding, for example, that of a clock pendulum which beats seconds—there are two results to be remembered. First, that so long as the length of thread is unchanged, it matters not how far the bullet may swing on each side, the time or duration of each oscillation is also unchanged. This 'pendulum-law' was discovered by Galileo in the church of Pisa, as he watched a lamp swinging by a chain. The quality that each swing occupies the same time is so important in horology that the introduction of the pendulum by Huygens as a time-measurer formed the principal epoch in the history of that science. The term *isochronism* ('equal-timeness') was invented to mark this property of the pendulum. The second law of the pendulum is that to make the bullet move faster we must shorten the thread in the following proportion: for twice as many oscillations take a quarter the length of string; for thrice as many take one-ninth the length; for four times as many take one-sixteenth the length. That law is otherwise expressed by saying the length of the thread is inversely as the square of the number of oscillations made in a given time. See (under Centre, Vol. III. page 66) CENTRE OF OSCILLATION.

These and other properties of the pendulum are wrapped up in the formula: $t^2 : \pi^2 :: l : g$, which mathematicians have established: where t = time in seconds of one oscillation, l = length (in inches) of the thread, $\pi = 3{\cdot}1415927$, a well-known ratio; and g = the accelerating force of gravity, or twice the space through which a heavy body falls in one second. When $t = 1$ in that formula —i.e. when our pendulum beats seconds, a result easily attained at any part of the world—then immediately we have $g = \pi^2 l = 9{\cdot}8696l$. In other words, multiply the length of the seconds pendulum in any latitude or longitude by the fixed number 9·8696 to find the value of g. By this valuable and simple result it has been shown that the force of gravity slightly and gradually increases as we travel from the equator towards either pole, the length of the seconds pendulum diminishing in the same proportion. The poles are therefore nearer to the centre than the equator is, which is an independent proof that our planet is spheroidal, and resembles in shape an orange rather than a lemon.

The following table readily gives the length of the seconds pendulum at any of the stations by dividing the corresponding number in the third column by the fixed number 9·8696. At London, for example, 32·191 ÷ 9·8696 = 3·262 feet, length of seconds pendulum. Dent's clock in the tower of the House of Commons beats once in two seconds, and must therefore have a pendulum 13·046 feet long.

The table also shows the acceleration (feet per second) due to gravity, as ascertained from observations made by means of the seconds pendulum. The results are arranged in the order of their latitude.

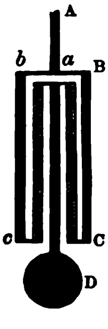
Station.	Observer.	Force of Gravity. Feet.
Rawak (between Jilolo and New Guinea)	Freycinet.	32·088
Sierra Leone	Sabine.	32·093
Ascension	Sabine.	32·096
Jamaica	Sabine.	32·105
Rio de Janeiro	Freycinet.	32·112
Cape of Good Hope	Freycinet.	32·140
Bordeaux	Biot, Mathieu.	32·169
Paris	Borda.	32·182
Dunkirk	Biot, Mathieu.	32·190
London	Sabine.	32·191
Edinburgh	Kater.	32·204
Unst, Shetland	Biot, Mathieu.	32·217
Spitzbergen	Sabine.	32·258

Since the length of the seconds pendulum is due entirely to natural causes, and can always be easily verified, it was chosen as a standard of the British measures of length. Experience has taught, however, that these are more easily known by preserving an artificial standard.

The universal application of the pendulum for time-measurement and ascertaining the local value of g has been followed by some special uses of it which are of interest. Thus, Sir G. B. Airy, the late astronomer-royal, applied it to form an estimate of the earth's mean density by observations taken at a coal-pit, 1200 feet deep, near South Shields. One pendulum being stationed at the surface and another at the bottom of the pit, their oscillations were exactly compared by means of an electric wire, with the result that a clock at the mouth of the pit would gain 2¼ seconds per day if removed to the bottom. From these data (*Phil. Trans.* 1856, p. 297) the density of the earth was estimated to be 6·565.

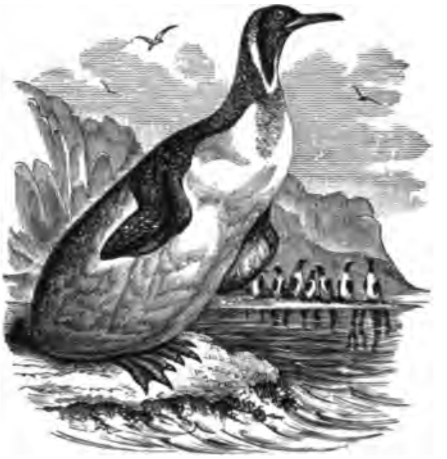
By the Foucault experiment the pendulum was utilised in a striking manner to prove the perpetual rotation of our planet round its axis. A globe of metal is suspended by a long wire to a lofty roof, the point of suspension being vertically over the centre of a round table; and after being drawn aside from the position of rest this pendulum is allowed to begin its vibrations, but so as to have no tendency to right or left. Students of dynamics know that it must continue swinging to and fro in the *same plane* unless interfered with from without. Owing to that the table beneath the pendulum, when carefully observed, is seen to revolve very slowly in a direction contrary to the hands of a watch; but since the floor and whole building revolve with the table, the observers naturally refer the relative motion to the pendulum, still swinging in its original plane. By marking twenty-four equal divisions round the edge of the table the spectators would be furnished with a good clock, the pendulum pointing out the hour at the point where it first began its oscillations, and apparently revolving in the usual direction.

The pendulum, in Horology, is absolutely accurate as a time-keeper, if only the proper length is preserved. That is mainly done by means of a screw turning on the rod, under the 'bob' or ball, so as to push it up and therefore shorten the pendulum, or let it fall lower down and lengthen the pendulum. It was found in winter that clocks went too fast, and at midsummer too slow, because cold shortened the metallic rod and heat lengthened it. A further refinement was therefore devised to secure a uniform length without the screw adjustment, the result being what are known as 'compensation pendulums.' Both the common methods of these depend on the same principle. (A simple and practically accurate form of pendulum is made with a wooden rod, which is less liable to expansion and contraction than metal.) The 'mercurial pendulum' carries within it a glass cylinder nearly full of mercury, so proportioned in quantity to the weight of the pendulum that when the latter expands downwards by the heat the change is counterbalanced by the upward expansion of the liquid in its jar. In winter, of course, the pendulum and the quicksilver are similarly contracted in opposite directions, to secure a good average length and mark better time. The second form of compensation pendulum is called the 'gridiron,' because it consists of several upright bars, as in the diagram. If the black bars be, for example, steel, and those between be brass or copper, then by a proper adjustment of their lengths any change of temperature will not materially affect the time-keeping property of the pendulum. Brass is much more subject to extension and contraction than steel. It is obvious from the figure that when the heat dilates the brass bars they must raise the bob D, and therefore counteract the downward extension of the steel bars, such as BC or *bc* and A*a*. For accurate and uniform time-measurement the gridiron has, in the experience of some astronomers, proved superior to the mercurial pendulum.



Penelope, in Homeric legend, the wife of Ulysses (Odysseus), and mother of Telemachus, who was still an infant when Ulysses went to the Trojan war. During his long wanderings after the fall of Troy he was generally regarded as dead, and Penelope was vexed by the urgent wooing of many suitors, whom she put off on the pretext that she must first weave a shroud for Laertes, her aged father-in-law. To protract the time she undid by night the portion of the web which she had woven by day. When the suitors had discovered this device her position became more difficult than before; but fortunately Ulysses returned in time to rescue his chaste spouse from their distasteful importunities. Later tradition represents Penelope in a very different light, asserting that by Hermes (Mercury), or by all her suitors together, she became the mother of Pan (q.v.), and that Ulysses, on his return, divorced her.

Penguin. This name is applied to a group of birds containing three genera, Spheniscus, Eudyptes, and Aptenodytes—the largest species, the 'Emperor' (*A. forsteri*, 50 inches in height) and 'King' (*A. pennantii*) penguins, belonging to the latter genus. The most remarkable peculiarity of these birds is the flattened wing, which is clad with flat scale-like feathers; the whole limb, unfit for flight, is admirably suited for swimming. The feathers of the penguin—instead of being disposed in feather-tracts, separated by intervals (*apteria*) upon which no feathers grow, as is the case with all other birds, not excepting even the ostrich and cassowary—form a continuous covering to the body. These peculiarities, coupled with some others in internal structure, mark off the penguins as a very distinct group of birds. By some they are placed in the same group with the auks, or put in a special group (*Impennes*) by themselves. The penguins are entirely confined to the Antarctic and to the south temperate regions (Patagonia, Cape Colony, Australia, New Zealand), and are aquatic in their habits, as is shown by the webbed feet as well as by the remarkable modification of the wings already referred to. In some situations they are extremely abundant, and make their nests in a common area; the nest is nothing more than a hole in the sand in which the female deposits a single egg. The stupidity of these birds is perhaps due to the inaccessibility of the rocks and shores where so great a number live and breed: having been comparatively little interfered with by man, they show no terror at the sight of him. When intruders invade their breeding-places they can and do, however, inflict severe wounds with their sharp bills. The plumage of the neck is valued by furriers for collars and tippets; and large numbers of 'Johnnies,' as the sailors call them, are slaughtered annually. The flesh though dark is wholesome food, and makes excellent 'hare-soup;' the belly is loaded with fat. That the penguins are not altogether a modern race of birds is shown by the remains of a species—*Palæeudyptes antarcticus*—which existed in New Zealand in late Eocene or early Miocene times. This bird differed from existing penguins in having rather longer wings, and may therefore conceivably have possessed the power of flight; it was a large form like the King Penguin of to-day.



King Penguin (*Aptenodytes pennantii*).

Penicillaria. See Guinea Corn, and Millet.

Penicuik, a town of Edinburghshire, on the left bank of the North Esk, 10 miles S. of Edinburgh by road, but 16 by a branch line (1872). It has a Romanesque church-tower and large paper-mills, dating from 1709; whilst 2 miles NNE. are Glencorse barracks (1804–82), originally a depôt for French prisoners. Pop. (1841) 907; (1891) 4914. See Wilson's *Annals of Penicuik* (Edin. 1891).

Peninsular and Oriental Company carry mails and passengers between Great Britain and India, China, and Australia. The company in its present form was incorporated by royal charter in 1840, although it had then had an existence of three years' duration as the Peninsular Company, which carried mails to Portugal and the south of Spain, and afterwards to Egypt. The 'P. & O.' own a fleet of between fifty and sixty vessels, with an average of 3890 tons each. They carry mails from Brindisi to Bombay, weekly, in the contracted time of 16½ days, from Brindisi to Shanghai, fortnightly, in 37½ days, and from Brindisi to Sydney, fortnightly, in 35½ days. The company also maintains a fortnightly service between Venice, Brindisi, and Alexandria, and run to Naples and Marseilles, whilst in Asia they maintain lines from Bombay to Colombo, thence to Madras and Calcutta, and to Singapore, Hong-kong, and Japanese ports. See the company's *Pocket-book* and *Monthly Handbook*.

Peninsular War (1807–14). The dissensions between Charles IV., king of Spain, and his son Ferdinand gave the Emperor Napoleon I. an opportunity of interfering in the affairs of that country. In pursuance of a treaty ratified on 29th October 1807 with the Spanish king, he had sent an army into Portugal under Junot, by whom Lisbon was seized, and the members of the royal house of Braganza obliged to flee to the Brazils. Ostensibly with the object of supporting Junot's army, other French troops gradually occupied Salamanca, Valladolid, and other important positions in Spain, including Madrid, where Murat was in command. A popular outbreak against the king and his favourite, Manuel Godoy, caused the former to abdicate and his son Ferdinand to assume the crown. But the latter was induced to meet the French emperor at Bayonne, and by him held a prisoner, while his father was again proclaimed king. Riots at Madrid, Toledo, and other places during the spring of 1808 caused the feeble king such alarm that he surrendered his crown to Napoleon, by whom it was bestowed upon his brother Joseph Bonaparte, then king of Naples. He was proclaimed in Madrid on 24th July 1808.

Owing to the large powers of the local junta, and to a decentralised form of government, the action of the capital of Spain had little effect upon that of her provinces, which rose against the French and those who favoured them in all directions. The organised forces of Spain amounted at this time to about 127,000 of all arms, while the French army in the Peninsula, exclusive of Junot's troops in Portugal, consisted of some 80,000 conscripts of various nations, French, Swiss, Italians, Poles, and even Portuguese, soon reinforced by 23,000 fresh troops. Arms, clothing, and money were freely supplied by Great Britain to the patriots of Spain and Portugal, whose numbers rapidly increased. The first operations of the French under Marshal Bessières in the north were uniformly successful, except at Saragossa, which Palafox gallantly held against Lefebvre-Desnouettes. In Catalonia they suffered several defeats, and in Andalusia their general, Dupont, surrendered at Baylen with 18,000 men. The first armed interference of the British in the affairs of the Peninsula was the despatch on 12th July 1808 of Sir Arthur Wellesley with some 30,000 men to Portugal. Landing these troops in Mondego River, he defeated Laborde at Roriça and Junot at Vimiera, but then handed over the command to Sir Harry Burrard, who had been sent out to supersede him, to be himself superseded within a few hours by Sir Hew Dalrymple. The latter officer concluded the convention of Cintra with the French commander, who evacuated Portugal by 30th September 1808. The three English generals were examined before a court of inquiry as to this convention, but no further steps were taken.

Sir John Moore, appointed to the command of the British troops (some 30,000) in Portugal on 6th October, had moved to Valladolid by 22d December, effecting a junction with Sir David Baird's division from Coruña. But the Spanish troops had in the meantime suffered a succession of defeats. The French had received large reinforcements; Napoleon himself was in Madrid; and Soult with 60,000 men was in his front. Moore therefore executed a rapid and masterly retreat to Coruña, and there fought a successful battle to cover the embarkation, being mortally wounded himself at the moment of victory. For three months no further steps were taken by the British government, but in December Sir John Cradock was sent out to take command in Portugal, and he took up a position covering Lisbon from the French, now under Marshal Victor. In this position Sir Arthur Wellesley, who was again sent out, found matters on 22d April 1809. The French armies in Spain now numbered nearly 400,000 men, divided into eight corps d'armée, under six marshals and Generals Junot and St Cyr, and operating in the north, south, east, and west. So long as Napoleon himself was able to direct operations they were characterised by unity of purpose and consequent success. Saragossa, attacked for the third time, after a memorable defence of sixty-three days, surrendered to Marshal Lannes on 21st February 1809, and many victories were gained over the Spanish levies; but in Catalonia St Cyr effected comparatively little. The outbreak of war in Germany drew Napoleon to that country in April, and the operations in Spain were somewhat neglected in consequence. The jealousies of the French commanders too prevented any unity of action there.

Sir A. Wellesley first marched against Soult with 20,000 British and 40,000 Spanish under Cuetla, and drove him out of Portugal. King Joseph, with 80,000 men under Marshal Victor, attacked at Talavera on 26th July and suffered a severe defeat. For this victory Sir A. Wellesley was created Viscount Wellington, but, being left without reinforcements, he was obliged to retire to Almeida, while the defeat of the Spanish at Ocana (November 20) enabled the French to overrun the whole of Andalusia, except Cadiz, which still held out. Wellington, foreseeing the impossibility of taking the offensive at that time, prepared during the winter a triple line of earthworks, 29 miles long, from Torres Vedras on the Zizandra to Alhandra on the Tagus, thus covering his base at Lisbon. The French, 65,000 strong, under Masséna, moved against him in the spring of 1810, captured the fortress of Ciudad Rodrigo on the 11th July, and attacked him in the position of Busaco on 29th September. The attack was beaten off, and Wellington, carrying out his preconceived plan, retired slowly into the lines of Torres Vedras, carrying with him as much of the resources of the country as possible, and directing the Portuguese troops to harass the flanks and rear of the French. To avoid starvation Masséna, finding himself unable to attack Wellington's fortifications, and having lost 30,000 men, began to retire on 14th November. Reinforcements having reached Wellington early in 1811, he followed, defeated Masséna at Sabagal on 3d April 1811, and drove him out of Portugal. Soult in the meantime had defeated the Spaniards at Gebora (February 19), and captured the fortress of Badajoz. He also invested Cadiz, but General Graham with a force of 12,000 men attacked and defeated Marshal Victor's covering force at Barrosa on 5th March, which checked his further movements. Wellington, now designing to march on Madrid and thence against the French line of communications with Bayonne, found it necessary to capture Badajoz and Almeida. Masséna, at the head of 50,000 men, marched to the relief of the latter place. He was checked at Fuentes de Oñoro on 5th May, where a hard-fought battle caused him to retreat and abandon Almeida to the British. Wellington then turned towards Badajoz, which Soult endeavoured to relieve with a force of 23,000 men. The British (7000) and Spaniards (25,000) engaged him on the 16th May in the bloody battle of Albuera, compelling him to retire, which he did in a southerly direction.

Matters were, however, in a very critical state for the British, for the whole of Valencia, Asturias, and Galicia was in the hands of the French, who still had nearly 300,000 men in Spain, and had received no other check except from General Hill in Estremadura and at Tarifa, which fortress repelled Soult. Napoleon, too, threatened to take the field again in person. But this was prevented by the outbreak of war between France and Russia, and early in 1812 Wellington commenced his well-matured plan for freeing Spain from the invader. He captured Ciudad Rodrigo on 19th January, stormed Badajoz on 6th April, and called in Hill's division from the south. Marmont, who had collected his troops about Salamanca, found his flank threatened, and had at first to retire; but on 22d July he turned upon the British, and fought the battle of Tormes, where he was wounded and his army defeated. Wellington entered Madrid on 12th August. King Joseph then withdrew Soult from Andalusia to Valencia, where they joined Suchet. But the Spanish army neglected to guard the British line of communications, and Clausel, who succeeded Marmont, proved so formidable a general that Wellington again found himself obliged to retire towards Salamanca and Portugal.

Events elsewhere, however, lessened the power of his enemies, reducing their numbers to 197,000 men. Jealousy existed between Joseph and his generals; and Wellington's position was strengthened by his appointment as commander-in-chief of the Spanish and Portuguese armies. These now amounted to 200,000 men, of which 70,000 Anglo-Portuguese had been brought into a good state of discipline. He again advanced eastward in the spring of 1813, obliging the French to evacuate Burgos and the line of the Ebro. They attempted to withstand him at Vittoria on 21st June, but sustained a crushing defeat, abandoning all their artillery, stores, and baggage. The blockades of Pampeluna and St Sebastian followed. Joseph, who had quarrelled with Soult, was superseded in the command, which was given to the latter. In spite, however, of great skill on his part, a series of terrible battles in the Pyrenees were uniformly disastrous to him. St Sebastian was taken on 7th October, the victory of Nivelle won on 10th November, and Wellington enabled to base himself on the northern ports. In February 1814 Bayonne was invested, on 27th Soult was defeated at Orthes, and again at Toulouse on 10th April, which city was occupied by the British. But Napoleon had already abdicated, having, after the disastrous Russian campaign, been overpowered by the allied forces of Russia, Prussia, and Austria, by whom France was invaded and Paris taken. See also articles on France, Spain, Portugal, Wellington, Napoleon, Soult, Masséna, Sir John Moore, Vittoria, Badajoz, Torres Vedras, Coruña, Busaco, &c.; and Sir W. Napier's *History of the Peninsular War* (6 vols. 1828–40).

Penitential Psalms, seven of the Psalms of David, so called as being specially expressive of sorrow for sin, and accepted by Christian devotion as forms of prayer suitable for the repentant sinner. They are Psalms vi., xxxii., xxxviii., li., cii., cxxx., and cxliii. according to the Authorised Version, which correspond with vi., xxxi., xxxvii., l., ci., cxxix., and cxlii. of the Vulgate. These Psalms have been set apart from a very early period, and are referred to as such by Origen. Pope Innocent III. ordered that they should be recited in Lent. They have a special place in the Roman Breviary, and more than one of the popes attached an indulgence to the recital of them. The most deeply penitential, and the most frequent in use, both public and private, is the 51st Psalm, or the *Miserere* (50th in the Vulgate).

Penitentiary, the name given to one of the offices of the Papal court, and also to the dignitary (a cardinal, called *Penitentiarius*) who presides over it. The subjects which come under the notice of the penitentiary are all matters relating to the confessional, especially the absolution from sins and from canonical censures, reserved to the pope, and in certain cases dispensations from the impediments of marriage. See Prisons.

Penkridge, a town of Staffordshire, on the Penk, 6 miles S. of Stafford by rail, in an agricultural district. Pop. 3134.

Penmaenmawr, a watering-place of Carnarvonshire, 4 miles SW. of Conway by rail. The mountain of Penmaenmawr, the northern extremity of the Snowdon group, is 1553 feet high; on its summit are the remains of a great British fort, Dinas Penmaen.

Penn, William, the founder of the colony of Pennsylvania, was the son of Admiral William Penn, and was born at London, 14th October 1644. His early years were spent partly in Essex and partly in Ireland, where his father had several estates, the gift of Cromwell. Penn studied at Christ Church, Oxford, and while there was converted to Quakerism by the preaching of a disciple of George Fox, named Thomas Loe. His enthusiasm for his new faith assumed a pugnacious form. Not only did he object personally to attend the services of the Church of England, and to wear the surplice of a student—both of which he considered eminently papistical—but, along with some companions who had also become Quakers, he attacked several of his fellow-students, and tore the obnoxious robes from their backs. For this unseemly procedure Penn was expelled from the university. His father was so excessively annoyed at his conduct that he gave him a thrashing, and turned him out of doors; but he soon afterwards relented, and sent his son to travel on the Continent, in the hope that change of scene and the gaiety of French life would alter the bent of his mind. They failed, however, to effect this, but the youth certainly acquired a grace and suavity of address that he did not before possess. In 1666 the admiral sent him to Ireland to look after his estates in the county of Cork, which Penn did to his father's complete satisfaction; for in matters of business he was as practical an Englishman as in religion he was an out-and-out mystic. In the city of Cork, however, he again fell in with Thomas Loe, and for attending a Quaker meeting was, along with others, imprisoned by the mayor, but was immediately afterwards released on appealing to the lord president of the Council of Munster, who was personally acquainted with him. On his return to England, Penn and his father again quarrelled, because the 'conscience' of the former would not allow him to take off his hat to anybody—not even to the king, the Duke of York, or the admiral himself. Penn was again turned out of doors by his perhaps testy, but assuredly provoked parent. The mother, however, stepped in, and smoothed matters so far that Penn was allowed to return home, and the admiral even exerted his influence with the government to wink at his son's attendance at the illegal conventicles of the Quakers, which nothing would induce him to give up. In 1668, however, he was thrown into the Tower, on account of a publication entitled *The Sandy Foundation Shaken*, in which he attacked the ordinary doctrines of the Trinity, God's 'satisfaction' in the death of Christ, and justification by the imputation of Christ's righteousness. While in prison he wrote the most famous and popular of his books, *No Cross, no Crown*, and *Innocency with her Open Face*, a vindication of himself that contributed to his liberation, which was obtained through the interference of the Duke of York. In September 1670 Admiral Penn died, leaving his son an estate of £1500 a year, together with claims upon government for £16,000. In 1671 the upright but incorrigible sectary was again committed to the Tower for preaching; the Conventicle Act did not touch the case, but, as he refused to take the oath of allegiance, he was sent to Newgate for six months. Here he wrote four treatises; one of them, entitled *The Great Cause of Liberty of Conscience*, is an admirable defence of the doctrine of toleration. After regaining his liberty he visited Holland and Germany for the advancement of Quakerism. The Princess-Palatine Elizabeth, the granddaughter of James I., showed him particular favour. On his return he married, in the beginning of 1672, Gulielma Maria Springett, daughter of Sir William Springett, and for some years thereafter continued to propagate, by preaching and writing, the doctrines of his sect.

Circumstances having turned his attention to the New World, he in 1681 obtained from the crown, in lieu of his monetary claim upon it, a grant of territory in North America. Penn wanted to call it Sylvania, on account of its forests, but the king (Charles II.) insisted on the prefix Penn in honour of his father. His great desire was to establish a home for his co-religionists in the distant West, where they might preach and practise their convictions in unmolested peace. Penn, with several friends, sailed for the Delaware in September 1682, was well received by the settlers, and in October held his famous interview with the Indian tribes, under a large elm-tree at Shackamaxon, afterwards Kensington, and now a part of Philadelphia. He planned and named the city of Philadelphia, and for two years governed the colony in the wisest, most benevolent, and liberal manner. Not only Quakers, but persecuted members of other religious sects sought refuge in his new colony, where from the first the principle of toleration was established by law.

Towards the end of the reign of Charles II. Penn returned to England to exert himself in favour of his persecuted brethren at home. His influence with James II.—an old friend of his father's—was so great that many people have never felt quite satisfied about the nature of their relations. The suspicion, however, that Penn allowed himself to be used as a tool by the court is not justified by any known facts, and Macaulay—who with an ungracious animosity has urged the view of his complicity in some of the disgraceful incidents that followed Monmouth's rebellion—has been convicted of haste and inaccuracy in several important particulars. At anyrate, his exertions in favour of the Quakers were so far successful that in 1686 a proclamation was issued to release all persons imprisoned on account of their religious opinions, and more than 1200 Quakers were set free. In the April following James issued an edict for the repeal of all religious tests and penalties, but the mass of Nonconformists mistrusted his sincerity, and refused to avail themselves of it. After the accession of the Prince of Orange as William III. Penn was twice accused of treason, and of corresponding with the exiled monarch, but was acquitted. In 1690 he was charged with conspiracy, but was not arrested. Nevertheless, in the following year, the charge was renewed. Nothing appears to have been done for some time, but Penn at last, through the kindly offices of his friends, Locke, Tillotson, and others, had the matter thoroughly investigated, and he was finally and honourably acquitted in 1693. In 1692 he had been deprived of his government, but it was restored to him in 1694. In the latter year his wife died, and Penn published a memoir testifying to her great virtues; but in less than two years he married again, his second wife being Hannah Callowhill, of Bristol, a Quaker lady. In 1699 he paid a second visit to the New World, where Pennsylvania required his presence to restore peace and order after the arbitrary behaviour of his deputy. His stay, which lasted two years, was marked by many useful measures, and by efforts to ameliorate the condition of both the Indians and Negroes. He departed for England towards the end of 1701, leaving the management of his affairs to an agent named Ford, whose villainy virtually ruined Penn. When the rogue died he left false claims against his master, which Penn refused to pay, allowing himself to be thrown into the Fleet in 1708. His friends afterwards procured his release, but not till his constitution was fatally impaired; for the last five years of his life his memory and understanding were greatly weakened. He died at Ruscombe, in Berkshire, July 30, 1718. The proprietary claims of his descendants were bought up by a pension of £4000, which in 1884 was commuted (see PENSIONS).

See Macaulay's *History of England*, and J. Paget's *Inquiry into the Evidence of the Charges brought by Lord Macaulay against William Penn* (1858); the Life prefixed to his collected works (2 vols. 1726), and to later issues of 'select works;' and Lives by Clarkson (1849), Hepworth Dixon (new ed. 1856), Robert J. Burdette (New York, 1882), and Stoughton (new ed. 1883).

Pennalism. See FAGGING.

Pen-names. See PSEUDONYM.

Pennant, THOMAS, traveller, was born of a good old Welsh family at Downing, near Holywell, Flintshire, 14th June 1726, and was educated at Wrexham, Fulham, and Hadley. In 1744 he went up to Queen's College, Oxford, but he left without taking a degree, having meanwhile, in 1746, ridden down into Cornwall—the first of his many tours. These included visits to Ireland (1754); the Continent (1765), where he made the acquaintance of Buffon and Voltaire; Scotland (1769 and 1772), which 'was then,' he says, 'almost as unknown as Kamchatka, but ever since has been *inondée* with southern visitants;' and the Isle of Man (1774), besides rambles through England and his native principality. He married twice, in 1759 and 1777; was made member of the Royal Society of Upsala, an F.R.S., and an LL.D. of Oxford; and died at Downing, 16th December 1798.

From boyhood a naturalist, for years a correspondent of Linnæus, Pennant published *British Zoology* (1765–77), *British Quadrupeds* (1771), *Arctic Zoology* (1785), *History of London* (1790), &c.; but to-day he is chiefly remembered by his *Tours* in Scotland (3 vols. 1771–75) and Wales (2 vols. 1778–81), the former of which works extorted from Johnson the admission: 'He's a *Whig*, sir, a *sad dog;* but he's the best traveller I ever read; he observes more things than any one else does.'

See the amusing *Literary Life of the late Thomas Pennant, Esq., by Himself* (1793), and the memoir prefixed to Professor Rhys's edition of the *Tours in Wales* (3 vols. Carnarvon, 1883).

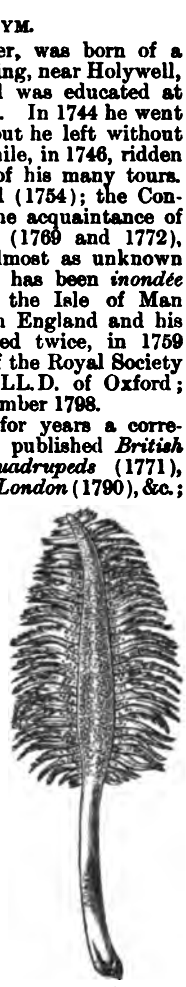


Fig. 1.
Ventral View of *Pennatula phosphorea* (about one-half natural size).

Pennat'ula, an interesting animal whose quill or feather-like appearance is suggested by the title and by the popular name Sea-pen. It is one of the Alcyonarian Actinozoa, in the same sub-class as Dead-men's Fingers, Red Coral, Gorgonia, &c. One species (*P. phosphorea*) is not uncommon at moderate depths (e.g. 20 fathoms) round British coasts. It consists of a basal stalk, by which the animal is probably fixed upright in the mud, and of a free axis bearing numerous polypes. The whole length is about 4–6 inches; the colour is deep red, and due to pigmented spicules of lime; the living animal is brightly phosphorescent. The stalk is really a tube, and can be somewhat inflated; the polypes are fused together in sets of a dozen or so up each side of the axis. These fused sets form a series of parallel leaves, somewhat like the barbs of a feather. The median part of the axis also bears rudimentary asexual polypes ('zooids') which are not fused. The whole axis is supported by a firmly-calcified internal stem.

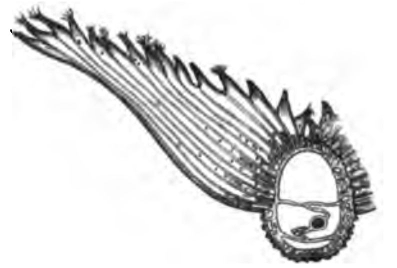


Fig. 2.

Cross section of the axis and one 'leaf' set of fused Polypes (after Marshall). The most ventral polype is longest and oldest.

The sexes are separate. Among related forms Virgularia, Funiculina, and Renilla are important. See *Report on Pennatulida*, by A. Milnes Marshall and W. P. Marshall (Birmingham, 1882).

Pennine Alps. See ALPS.

Pennine Chain. See GREAT BRITAIN, Vol. V. p. 373.

Pennon, a small, pointed or swallow-tailed flag, borne by a mediæval knight on his lance. For pennant, as well as pennon, see FLAG.

Pennsylvania, since 1830 the second in population of the United States of America, is in shape a parallelogram, lying almost entirely between 42° and 39° 43′ 26″ N. lat. (Mason and Dixon's Line, q.v.), and between the irregular W-shaped Delaware River and 80° 31′ 36″ W. long. It is about 160 miles wide and 302 miles long from east to west; in area (45,215 sq. m.) it is the twenty-eighth state of the Union. In the north-western corner a triangular section extends to 42° 15′ N., forming part of the western boundary of New York, and giving Pennsylvania about 45 miles of coast on Lake Erie, with an excellent harbour at Erie.

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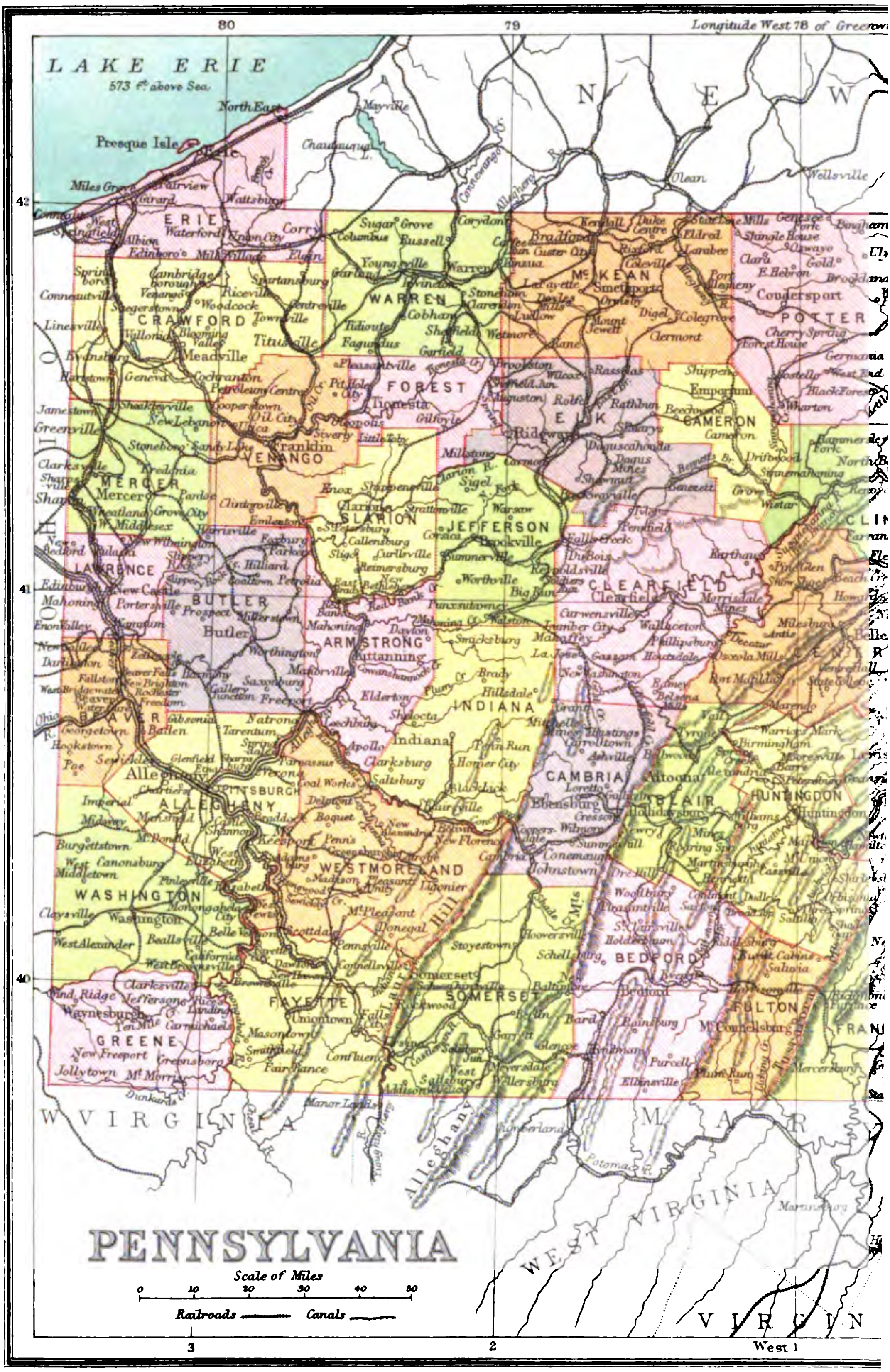
The Appalachian (q.v.) system of mountains crosses Pennsylvania from north-east to south-west. It here attains its greatest breadth, but none of the ridges reach any great altitude, though a few peaks among the Alleghanies attain a height of more than 2500 feet. Between the Blue or Kittatinny Mountains on the east and the higher Alleghany range on the west lie numerous minor forest-clad chains, interspersed with picturesque valleys, many of them rendered exceedingly fertile by the limestone bed which produces their soil. The surface of the state is naturally divided into three sections, the low district south-east of the mountains, the mountainous region, and the broken hilly plateau in the west. The triangular south-eastern part of the state consists of a narrow level plain near the Delaware River, with an elevation of not more than 100 feet above the sea, merging into a higher rolling region which extends to the base of the mountains. From Canada to the southern limit of the Appalachians extends an almost continuous valley, lying east of the main ranges, and separated from the coast region by the skirting south-eastern ridge. This 'great valley' is throughout its whole extent protected by a southern or eastern wall, except in Pennsylvania, where, through a break of about 50 miles, the Cumberland Valley is without a barrier toward the sea, and the fertile calcareous soil spreads out over Lancaster and parts of York, Berks, and Chester counties, making this one of the best farming regions of the country. The mountain region covers a belt which in places is more than 100 miles in width, and embraces about one-fourth of the area of the state. More than twenty ranges have been named, and the whole region is justly celebrated for its scenery. The rivers have in various places cut gaps through the ridges, thus affording passages for travel and commerce. Many of these water-gaps are exceedingly picturesque, and are much visited by tourists. The western plateau region comprises about one-half the area of the state; it is crossed by a few ridges, contains some isolated peaks, and is deeply furrowed by watercourses. Much of this section is heavily wooded.

The geology of Pennsylvania is particularly remarkable on account of the great development of the different periods of the Palæozoic era. The formations in the south-eastern part of the state are in dispute, but the vicinity of Philadelphia is generally admitted to be Archæan, and a little farther north is a belt of Quaternary alluvium. The Silurian deposits, which extend along the Hudson River in New York, continue into Pennsylvania and form the Kittatinny Mountains. The Devonian area of New York also covers a large part of the northern and north-eastern portion of Pennsylvania. West of the Kittatinnies the mountains present alternate Silurian and Devonian formations. West of the Alleghanies, throughout the great bituminous coalfields, the rocks are mainly conglomerate. The mountains and the western plateau region were originally highly elevated tracts, and have suffered to a vast extent from erosion. They have contributed nearly all the material for building up the lowland regions of New Jersey, Delaware, Maryland, and Virginia, and for the formation of the Lower Mississippi valley. The geological disturbances have been greatest and most frequent in the eastern part of the state, where the beds of anthracite coal occur at all angles and in some cases in a vertical position, whereas the bituminous coal-beds of the western field are nearly horizontal. The breaking of the strata and the enormous pressure to which the eastern coal-deposits have been subjected has resulted in giving Pennsylvania the most valuable anthracite basins of the country. It is a notable fact that the percentage of gas in the coal regularly increases from the eastern ranges to the western coal-measures. Although Pennsylvania is one of the richest mineral regions of the world, there is no department of her mineral wealth in which she exercises such exclusive control as in her deposits of anthracite coal. The bituminous coal is excellent in quality and variety, and the amount is practically inexhaustible, but the western coalfields are only part of a vast deposit which extends westward and southward into adjoining states. The iron ore which has contributed so materially to her wealth and prosperity is mined from an extensive belt which reaches on the north to Canada and on the south to Alabama. Even the petroleum and natural gas which are such important products of western Pennsylvania are found in other sections; but as yet her anthracite coal-basins are without a rival. The anthracite tract covers an area of 472 sq. m., and is situated in the highland district between the Delaware and Susquehanna rivers. The most important deposits lie in three great fields, known as the southern, middle, and


PENNSYLVANIA
Scale of Miles
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Railroads
Canals
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80
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LAKE ERIE
573 ft. above Sea
Presque Isle
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ERIE
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WARREN
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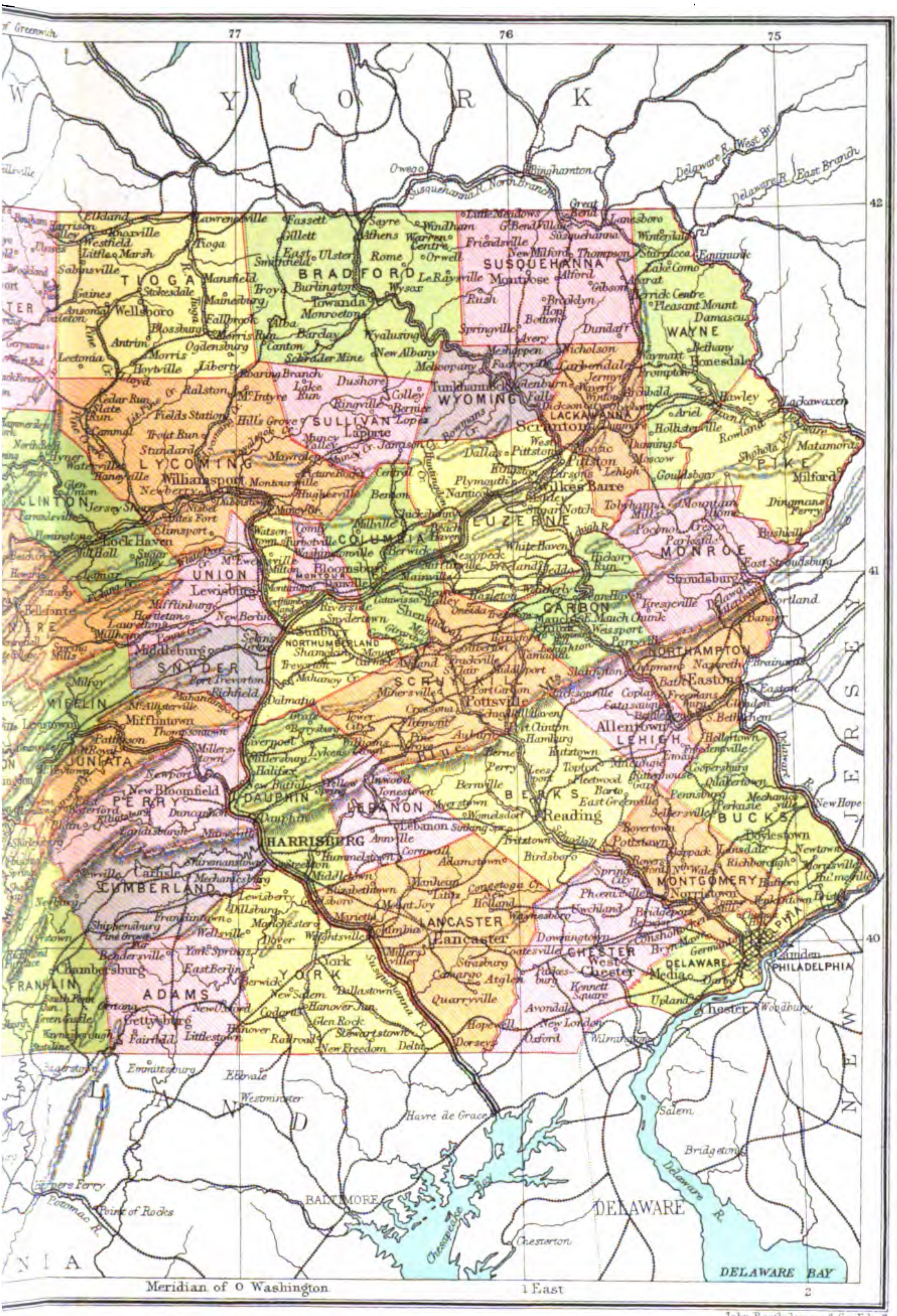
of Greenwich
77
76
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N E W Y O R K
Owego
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Susquehanna R. North Branch
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TIOGA
BRADFORD
SUSQUEHANNA
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PIKE
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SULLIVAN
WYOMING
LACKAWANNA
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CLINTON
COLUMBIA
MONTOUR
UNION
SNYDER
NORTHUMBERLAND
CARBON
MONROE
NORTHAMPTON
LEHIGH
SCHUYLKILL
MIFFLIN
JUNIATA
PERRY
DAUPHIN
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BERKS
BUCKS
MONTGOMERY
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DELAWARE
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LANCASTER
YORK
ADAMS
CUMBERLAND
FRANKLIN
Wellsboro
Towanda
Montrose
Honesdale
Milford
Williamsport
Lock Haven
Laporte
Scranton
Wilkes Barre
Pittston
Tunkhannock
Bloomsburg
Danville
Sunbury
Lewisburg
Middleburg
Mifflintown
New Bloomfield
Pottsville
Mauch Chunk
Stroudsburg
Easton
Allentown
Reading
Lebanon
Harrisburg
Carlisle
Lancaster
York
Gettysburg
Chambersburg
Norristown
West Chester
Media
Chester
Doylestown
Camden
Wilmington
Havre de Grace
Baltimore
Harpers Ferry
Point of Rocks
Potomac R.
Chesapeake Bay
DELAWARE
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DELAWARE BAY
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Bridgeton
Woodbury
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M A R Y L A N D
N E W J E R S E Y
Meridian of 0 Washington
1 East
2
John Bartholomew & Co. Edin.

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northern fields. It is estimated that with an output of 100,000,000 tons per year the anthracite mines would not be exhausted for two centuries. At present the production is about one-third of that estimate. Pittsburgh is the centre of the bituminous region, and the annual production is about 25,000,000 tons. The proximity of coal and iron in such vast quantities has made Pennsylvania a great mining and manufacturing state. Though equalled or surpassed by Michigan in the mining of iron ore, Pennsylvania still leads in the manufacture of pig-iron.

The successful boring for Petroleum (q.v.) in 1859 produced an excitement which was not surpassed even by the discovery of gold in California. Fortunes were made and lost in a day. The mining of petroleum and the manufacture of the various articles produced from it have created new and important industries. The utilisation of natural gas for heating and manufacturing purposes has also greatly modified methods of living in western Pennsylvania. Gold, silver, copper, and tin exist in Pennsylvania, but not in paying quantities, though copper is mined to a limited extent in Montgomery county. There are large zinc-works at South Bethlehem, and nickel is obtained in Lancaster county.

The eastern part of the state is drained by the Delaware and its tributaries the Schuylkill and Lehigh. The Susquehanna, with its affluents the North Branch, the West Branch, and the 'beautiful Juniata,' occupies the central drainage area. The Susquehanna is too rapid and too shallow for navigation, but it is used for floating quantities of timber, and coal, lumber, and other products are carried by the canals along its banks. A portion of the north-western region belongs to the valley of the Genesee, but the greater part of western Pennsylvania is drained by the Alleghany and Monongahela rivers, which, uniting at Pittsburgh to form the Ohio, furnish the state with a great highway of inland navigation. Pennsylvania has now in operation 8500 miles of railroad, and nearly 800 miles of canals.

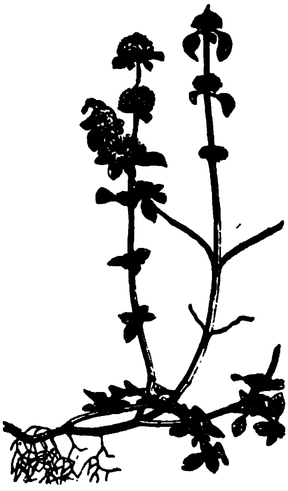
In the mountains and wooded sections the smaller wild animals are still abundant. The panther, wild cat, and black bear are occasionally seen, and in some places the deer and wild turkey are not uncommon. The climate is healthful, but subject to extremes, and much modified by differences of elevation. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in spring and summer (see e.g. JOHNSTOWN). Nearly one-fourth of the state is wooded; lumbering is one of the sources of wealth in the north, and farther south and west are great forests of hemlock, which maintain some of the largest tanneries in the world. In the Pocono swamps and plateaus, between the Wyoming and Kittatinny Mountains, the virgin growth of beech is known as the 'Shades of Death.' The soil, except in the mountains, is rich and fertile. Agriculture is a leading occupation, and in many crops Pennsylvania holds a high rank. The mountain regions and the western plateau are well suited for grazing, and the horses, cattle, sheep, and dairy products are noted for their excellence. The most important industries of Pennsylvania are mining and manufacturing. The amount of capital invested is greater than in any other state, and in the value of her manufactured products Pennsylvania is surpassed only by New York. Her commerce, both foreign and domestic, is very extensive. Shipbuilding is an interest of importance; river-steamers are built at Pittsburgh, and the perfection reached in the construction of iron steamships on the banks of the Delaware has given to that stream the title of the 'Clyde of America.'

History.—The first permanent settlement in the state was made in 1643 by Swedes, at the present site of Chester. Their colony of New Sweden was twelve years later conquered by the Dutch. In 1664 the English obtained possession, and the territory now called Pennsylvania was in 1681 granted by Charles II. to William Penn (q.v.). The friendly relations already existing between the whites and the Indians were re-established by Penn by a treaty, which was faithfully observed by both parties for more than fifty years. During the French and Indian wars, however, and again during the war of the revolution, the frontier settlements were attacked. In the struggle for independence and in the civil war Pennsylvania took a prominent part, and witnessed a number of the most famous battles and events connected with each. Schools were established by the earliest settlers, and a system of education formed part of the original scheme of government prepared by William Penn. The public schools now are attended by over a million pupils, and there are more than twenty universities and colleges in the state. A system of Soldiers' Orphan Schools was established in 1865, and there are numerous other charitable and educational institutions. There is a large foreign element in the population; many of the miners and ironworkers, especially, are of Irish, Hungarian, and Italian birth, and serious riots have not seldom occurred (see also MOLLY MAGUIRES). Among the farmers a very large proportion are of German descent, and still speak the *patois* known as 'Pennsylvania Dutch.' This belongs to the South German dialects, and is most closely related to the Pfälzisch; it preserves many old and curious German words, but is also interspersed more or less with Germanised English words, according to the locality. There are perhaps two million people around Philadelphia and New York who speak the *patois;* and in the country south-east of the Alleghanies they have their own dialectal newspapers. Specimens (spelt phonetically) of the dialect may be given: 'Ich trink tschenerli rooter wei' (I generally drink red wine); and ''s wetter iss d'r gants daak schee gwest' (the weather has been fine the entire day). See Prof. S. S. Haldeman's *Pennsylvania Dutch* (1872); also A. J. Ellis's *Early English Pronunciation* (part iv. 1875).

The state contains sixty-seven counties, and returns twenty-eight members to congress. Philadelphia, the metropolis of the state, is the leading manufacturing city of the Union and ranks third in population. Among other important cities, besides Pittsburgh and Alleghany, which form in all their interests a single community, are Harrisburg, the capital (pop. 1890, 39,385), Scranton (75,215), Reading (58,661), Erie (40,634), Wilkes Barre (37,718), Lancaster (32,011), Altoona (30,337), Williamsport (27,132), Allentown (25,228), York (20,793), Chester (20,226), &c. Pop. of the state (1800) 602,365; (1840) 1,724,633; (1880) 4,282,891; (1890) 5,258,014.

Penny (A.S. *pening* or *pending;* apparently from *pand*, 'a pawn,' Ger. *pfand*, Lat. *pannus*), a British coin, first mentioned in the laws of Ina, king of the West Saxons, about the close of the 7th century. It was at this time a silver coin, and weighed about 22½ troy grains, being thus about $\frac{1}{240}$th of the Saxon pound-weight. This relation to the pound-weight is evidently derived from the usage of the early Franks, who retained the Roman division of the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii* (the denarius being thus the 240th part of the libra or pound). See MARK. Halfpence and farthings were not coined in England till the time of Edward I., but the practice previously prevailed of so deeply indenting the penny with a cross mark that the coin could be easily broken into two or four parts as required. Silver farthings ceased to be coined under Edward VI., and silver halfpennies under the Commonwealth. Up to this time the penny had steadily decreased in weight; and under Elizabeth it was finally fixed at $7\frac{23}{31}$ grains, or $\frac{1}{62}$ of an ounce of silver, a value to which the subsequent copper pennies closely approximated. In 1672 an authorised copper coinage of pence, halfpence, and farthings was established. In 1797 twopenny pieces were coined, but were soon withdrawn. The penny of the present bronze coinage, first issued in the end of 1860, is of only about half the value of the old copper penny and as metal is worth only about one-seventh of a penny. The German *pfennig* was also originally a silver coin, bearing the same relation to the German pound of silver as the English penny to its pound. Now the nickel ten-pfennig piece is the $\frac{1}{10}$th of the mark. The old Scots penny was only $\frac{1}{12}$th of the English one, as the pound Scots and the Scots shilling were also $\frac{1}{12}$th of the English coins of the same name. In the 12th century it was made very broad and thin.

Pennyroyal (*Mentha pulegium*), a species of Mint (q.v.), a native of Europe and western Asia, abundant in England and in some parts of Ireland, not found wild in Scotland, though sometimes grown there in gardens for its reputed medicinal qualities. It enjoys a high popular reputation as an emmenagogue, but no dependence may be placed in its efficacy. The name pennyroyal is given in North America to a small plant, *Hedeoma pulegioides*, allied to the mints, and having, like them, a pleasant aromatic smell and a warm pungent taste. It is much in use in domestic medicine, in the form of a warm infusion, to promote perspiration and as an emmenagogue.



Pennyroyal (*Mentha pulegium*).

Penny Weddings was the name given to festive marriage ceremonials in Scotland at which the invited guests made contributions in money (seldom more than 1s. each), to pay the general expenses, and leave over a small sum, which would assist the newly-married pair in furnishing their dwelling. This practice, now largely disused, was prevalent in the 17th century; and, as leading to 'profane minstrelsing and promiscuous dancing,' was denounced by an Act of the General Assembly, 1645, as well as by numerous acts of presbyteries and kirk-sessions about the same period.

Pennywort, a trailing herb (*Linaria cymbalaria*), with roundish reniform leaves, often cultivated in hanging-baskets. Marsh or Water Pennywort is a name used for any species of the umbelliferous genus Hydrocotyle, low herbs with roundish leaves, growing in marshy places.

Penob'scot, a river of Maine. The West Branch rises near the Canadian frontier, and flows east and south-east to where it meets the East Branch or Seboois River. Afterwards its course is south-south-west to Penobscot Bay, a broad and sheltered inlet of the Atlantic Ocean, 35 miles long and 20 wide, with numerous islands. It is tidal and navigable for large vessels to Bangor, 60 miles from its mouth. The chief trade is in lumber.

Penrhyn, in Carnarvonshire. See BETHESDA, and SLATE.

Penrith, a market-town of Cumberland, in a picturesque and fertile valley, on the outskirts of the Lake District (q.v.), 18 miles SSE. of Carlisle. It has a fine old ruined castle, where Richard III. (then Duke of Gloucester) is said to have resided, and a grammar-school (1395; refounded 1564). In the churchyard are two ancient monuments, the 'Giant's Grave' and the 'Giant's Thumb,' often visited by Sir Walter Scott; and north-east of the town is the wooded Beacon (937 feet). There are sawmills, tanneries, and breweries. See works by J. Walker (1856) and G. Watson (1893). Pop. (1851) 6668; (1881) 9268; (1891) 8981.

Penryn (Corn., 'head of the river'), a town of Cornwall, at the head of a creek of Falmouth harbour, 3 miles NW. of Falmouth town, with which it returns one member to parliament (till 1885 two). Scarce a trace remains of Glasney College, founded in 1264 for thirteen Black Augustinian Canons; and none of a palace of the bishops of Exeter. Neighbouring quarries supply the famous Penryn granite—the material of Waterloo Bridge, the Chatham Docks, and other great public works; and the town has besides some manufactures of paper, woollen cloth, gunpowder, &c. Incorporated by James I., it was taken by Fairfax in 1646. Pop. (1851) 3959; (1881) 3466; (1891) 3256.

Pensacola, a port of entry and the capital of Escambia county, Florida, is 244 miles by rail ENE. of New Orleans, on the west shore of a deep bay opening into the Gulf of Mexico. The entrance is defended by Fort McRee and Fort Pickens, the latter on Santa Rosa Island; and near by is the Pensacola navy-yard, with a marine hospital and barracks. Pensacola contains foundries and lumber and planing mills, and ships large quantities of yellow pine. It was settled by the Spaniards before 1700, occupied by the British from 1763 to 1781, and afterwards during the wars with Napoleon, taken by Andrew Jackson from the British in 1814 and the Spaniards in 1818, and passed with the rest of Florida to the United States in 1819. Pop. (1880) 6845; (1890) 11,751.

Penshurst, a village of Kent, 4 miles SW. of Tunbridge; pop. 1673. Penshurst Place was the birthplace of Sir Philip Sidney and Algernon Sidney.

Pensionary, the name formerly given to the syndic or legal adviser in every important town of Holland, because receiving a salary or pension; and, during the republic of the United Netherlands, the state secretary for the province of Holland was called *Raadspensionaris*—Englished by State Pensionary, or, more commonly, Grand Pensionary. The Grand Pensionary had no vote in the assembly of the states, and could only bring forward the subjects of discussion. He, however, collected the votes, wrote the decrees, read the letters addressed to the states, conducted negotiations with foreign ambassadors and ministers, and took charge of the revenues of the province, and whatever else pertained to its welfare. The office was abolished in 1795, after the conquest of Holland by the French revolutionists. Olden Barneveldt, De Witt, and Heinsius were the most celebrated holders of this office.

Pensions may be broadly divided into two classes—superannuation allowances and rewards for special services. In Great Britain a sum of £1,500,000 per annum is required for superannuation in the various departments of state, including the consular, diplomatic, and colonial services. The number of these pensioners in 1889–90 was 3258, and the grants for them are in the estimates classed among 'Non-effective and charitable services.' The pensions granted from the Civil List (q.v.) are altogether on a different footing from those in the civil service, which last are part of the condition of employment, and are thus somewhat in the nature of deferred pay. Of the same nature is the retired pay of army and navy officers, as well as the service-pensions to soldiers and seamen. Pensions to the widows and children of deceased servants of the state are often granted under the term of 'compassionate allowances.' The enormous character of the burden of the non-effective services has given occasion for much discussion, and has called forth many suggestions. Thus, in the session of 1888 a motion was carried in the House of Commons, the effect of which is to restrict the system of compulsory retirement on pension of civil servants. The principle has been laid down that officials no longer required in their own departments who are still able and willing to render service for the public money should be provided with employment in other departments, instead of being forced to become useless burdens upon the country. Perpetual pensions must be regarded as somewhat of an abuse of the principle upon which a state rewards good and faithful servants. The matter became the subject of a parliamentary inquiry on the initiation of Mr Bradlaugh in 1887. A select committee was appointed, which, after taking evidence of a curious and interesting kind, recommended that no more pensions or allowances should be granted in perpetuity. This committee also reported in favour of the abolition of all sinecure offices with salaries but no duties, and recommended that all existing perpetual pensions, allowances, and payments, and all hereditary offices, should be determined and abolished. In commuting such pensions it has been laid down as necessary to differentiate cases of grants for actual services by the original grantees, and cases of mere gratuity. Where no service or merely nominal service was rendered either by the present holder or the original grantee it was proposed that the payment should in no case continue beyond the life of the present holder. In former commutations of perpetual pensions a scale of twenty-seven years' purchase was usually adopted. On or about this scale there were, between 1881 and 1887, 330 pensions and allowances of the annual value of £18,957 commuted for a sum total of £527,933. The rate was reported to be too high, and in the session of 1888 a motion was passed for giving effect to the recommendation of the select committee, and for a return in detail of all outstanding hereditary pensions and the circumstances in which they were granted. Pensions such as those of £4000 per annum to the Duke of Marlborough, and of £5000 to Lord Nelson, and to their heirs in perpetuity, are, of course, well understood as in return for 'value received' in special services to the state. The objection to the principle of them is that it is a burdening of posterity with payment for services rendered to one generation. The rewards for distinguished services should be defrayed by the generation receiving the benefit of them, and should be conferred upon the persons who actually render them, either in the form of a capital sum down, or of a life-pension only.

There are, again, a number of hereditary pensions conferred not for services, but as *solatium* for the loss of the fees of abolished offices. Thus, when the offices of Custos Brevium and Clerk of the Juries were abolished in 1837 the holders were compensated with hereditary pensions of £786 each. These were commuted on a basis of twenty-seven years' purchase. One of the numerous perquisites conferred by Charles II. on his illegitimate son, the Duke of Grafton, was that of Officer of the Pipe, or Remembrancer of First Fruits and Tenths of the Clergy in the Court of Exchequer. This office was sold by the duke in 1765, and when the fees were abolished the holder was compensated with a perpetual pension of £62, 9s. 8d. A still more remarkable case was that of the hereditary office of Master of the Hawks, granted by James II. to the Duke of St Albans and his heirs for ever. The emoluments consisted of £391, 1s. 3d. as salary, £200 for four falconers, £600 for provision of hawks, and £182, 10s. for other provisions—together, £1373, 11s. 3d. This total was subsequently reduced to £965, at which it stood until commuted, in 1891, for £18,335, although there had been neither hawks nor falconers for many generations. A pension of £4000 per annum granted in 1779 to William Penn, the founder of Pennsylvania, and his heirs for ever, was in 1884 commuted for a ten years' annuity of £12,796, considered equivalent to twenty-seven years' purchase. In 1676 Charles II. granted to the Duke of Richmond and his heirs for ever a duty of one shilling per ton on all coals exported from the Tyne for consumption in England. One hundred years later that charge was converted into a perpetual pension of £19,000 (chargeable on the Consolidated Fund), which, again, was afterwards redeemed for £633,333, and invested in lands settled upon the duke and his heirs. The Duke of Hamilton, as Hereditary Keeper of Holyrood, has an hereditary pension of £45, 10s., and the descendants of the Heritable Usher of Scotland enjoy one of £242, 15s. These are a few of the examples of a wholly indefensible system. There are also limited hereditary pensions granted for a certain number of lives, which are not so unjustifiable, as, for instance, the pension of £4000 to the Duke of Wellington and two successors, and the pension of £2000 to Lord Napier of Magdala and one successor. In 1891 there were eight of these limited hereditary pensions in existence (viz. Lords Combermere, Gough, Hardinge, Keane, Napier, Raglan, Seaton, and the Duke of Wellington), most of which were in the possession of the last holder. It is probable that this system of reward for military services will also be discontinued. Pensions, but for life only, may be claimed by ministers who have held office under the crown (not necessarily continuously) for four years in the first class (£2000), six years in the second class (£1200), or ten years in the third class (£800). The following is a summary of the total amount paid by Great Britain in pensions, superannuations, and compassionate allowances: we take the figures for the fiscal year 1887–88, because that period coincides with the movement to terminate perpetual pensions:

Department.	No. of Pensioners.	Amount of Payments.
Civil Service	3,164	£467,582
Army	97,004	3,789,282
Navy	38,366	2,040,659
Perpetual and Civil List	1,072	431,608
Departmental	16,886	1,086,444
Total	156,492	£7,815,575

In round numbers the present outlay of the government of the United Kingdom in pensions and superannuations is 7½ millions per annum, of which quite 5½ millions go to the army and navy, and form a proper item in the cost of the national defence, although probably capable of better distribution. It is an open question how far the remaining 2 millions may be wisely expended, but for hereditary allowances the national accounts will not incur fresh charges, and existing charges are being equitably extinguished.

The Indian List shows in the year 1887–88 10,500 pensioners drawing £6,000,000, of which £2,500,000 belongs to the civil and £3,500,000 to the military department.

Army Pensions are temporarily granted to officers of the army severely wounded in action at the following rates, and if the wound entails the loss of an eye or limb, or an equivalent injury, the pension may be made permanent: Field-marshal, general, or lieutenant-general commanding-in-chief, a special rate; lieutenant-general, £400 a year; major-general or brigadier, £350; colonel or lieutenant-colonel, £300; major, £200; captain, £100; lieutenant and second-lieutenant, £70. These pensions may be held together with retired pay (see **Retirement**). If an injury of similar character is received on duty, but not in action, a general officer receives a special rate of pension; a colonel or lieutenant-colonel, £250 a year; a major, £150; a captain, £75; and a lieutenant or second-lieutenant, £50. Pensions are also granted to the widows of officers dying in the service, at rates varying from £40 a year in the lowest rank to £120 in the highest, subject to an increase of 50 per cent. if the officer is killed in action. Compassionate allowance (£10 to £20, according to rank) is granted to their sons if under eighteen, and to their daughters if under twenty-one, increased by 25 per cent. if the father is killed in action. On remarriage a widow forfeits her pension, but on again becoming a widow it may be restored if she is left in need. If the mother or sisters of an officer killed in action were dependent upon him, compassionate allowances may be granted to them.

Warrant officers, after more than twenty years' service, may receive a pension varying from 3s. 6d. to 5s. a day, according to length of service, their widows £20, and their children £5 a year, with certain limitations.

Non-commissioned officers and *soldiers*, whether European or natives, are classed for pension according to rank and service in that rank, the highest daily rate being 2s. 9d. and the lowest 6d. No soldier of less than fourteen years' service is entitled to a pension, except for injuries sustained in action or on duty, when the rates vary from 6d. to 3s. a day, according to rank, service, extent of the injury, and other considerations, and the pension is not made permanent until a medical board has pronounced the injury to be a permanent disability. A special pension, in addition to any other, of £10 a year is granted to every soldier who has gained the Victoria Cross, and an addition of £5 is granted for each further act of bravery. Medals, with annuities not exceeding £20, are granted to soldiers above the rank of corporal who have performed distinguished or meritorious services, and are selected by the commander-in-chief. These annuities are in addition to pension.

Navy Pensions were first instituted in the reign of William and Mary; those for officers may be classed as follows: Good-service pensions, Greenwich Hospital pensions, pensions for wounds, and the ordinary pension to which an officer may be entitled on retirement, now known as retired pay. No officer is entitled to a retiring pension until he is forty years of age; should he retire earlier he receives merely the half-pay of his rank. The amount of the retired pay depends upon an officer's rank, length of service, and age. The maximum retired pay of an admiral is £850 a year, for which thirty years' sea-service as a commissioned officer is requisite; he may in addition hold a good-service pension of £300 a year. The maximum retired pay of vice-admirals, with twenty-nine years' service, is £725 a year; that of rear-admirals, with twenty-seven years' service, £600; of captains, with twenty-seven years' service, £600; of commanders, with twenty-one years' service, £400; and of lieutenants, with nineteen years' service, £300. The retired pay of officers of other branches of the service is calculated in the same way, on length of service and age. The good-service pensions, so-called, consist of ten of £300 a year for admirals, which may be held after retirement, and of twelve of £150 a year for captains; these last are conferred on captains on the active list, and are relinquished when their holders are promoted to rear-admiral or retire. Pensions for wounds are conferred on officers and men; they range from small yearly sums, according to rank of holder and nature of wound, to a maximum of £200 a year.

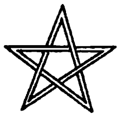
All seamen and marines are entitled to a pension after twenty-one years' service from the age of eighteen, or from the date of enlistment; this pension ranges from 10d. a day to a maximum of 1s. 2d. a day, the increase depending upon the number of good-conduct badges a man may have; of these he may have three, and he receives an additional 1d. a day for each, and, if he holds a good-conduct medal, an additional penny for that. Petty officers, in addition to the rates of pension awarded them as seamen, are allowed for each year's service in the capacity of superior petty officer 15s. 2d. a year, as junior petty officer 7s. 7d. There still remain the Greenwich Hospital pensions, which are held in addition to the ordinary pensions. The idea of establishing a hospital for infirm and disabled seamen originated with Mary, the consort of William III., and Sir Christopher Wren was employed to build an additional wing to Greenwich Palace. The king granted £2000 a year towards it, large subscriptions were added by noble and wealthy people, forfeited and unclaimed prize-money and various grants were given, and finally the forfeited estates of the Earls of Derwentwater were added to the endowment. The revenue of the hospital is now about £167,000 a year. The Greenwich Hospital pensions are divided as follows: Ten of £150 a year for admirals, six of £80 a year for captains, twenty-three of £65 for commanders, and forty-six of £50 a year for lieutenants; three of £80 and seventeen of £50 a year for officers of the old navigating branch, and fifty-seven varying from £100 to £50 a year for officers of the civilian branches of the service. There are fifty-two of £35 and £25 a year for warrant officers. The Greenwich Hospital pensions for the men are termed 'age' and 'special' pensions. They are given entirely at the discretion of the Admiralty, and are not granted to any person whose character whilst in or after leaving the navy has not been good. A naval pensioner is eligible for the age pension of 5d. a day on attaining the age of fifty-five, if he has been in receipt of his pension for five years; and for the increase of such age pension to 9d. a day at the age of sixty-five, if he has been in receipt of his naval pension for ten years. Age pensions are given to naval pensioners only, and the number of pensions in force at any one time is not to exceed 7500; the vacancies to be filled by those whose health renders them completely incapable of earning a living.

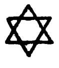
Special pensions are given at the discretion of the Admiralty to men unable to contribute materially to their own support, and vary in amount and duration according to each man's degree of disability and the other circumstances of his case; the amount of the fund from which these pensions are given is limited to £22,000 a year. They are tenable in addition to naval and age pensions; these pensions range from 6d. to 1s. 3d. a day.

Widows of officers of royal navy and marines are allowed pensions, and their children compassionate allowances. These cannot be claimed as a right, and, except in the case of pensions conferred on widows of officers killed in action or dying from wounds or other special causes, are not granted to widows whose private incomes may exceed a certain scale which is fixed by the Admiralty. These pensions in ordinary cases range from £120 to £40 a year. In the case of officers killed in action their widows, however, may receive a maximum pension of £200 a year. Compassionate allowances to children may be continued in the case of sons until they attain the age of eighteen, and of daughters until they marry or attain the age of twenty-one, but no longer, except in very special cases. These allowances vary from £5 to £20 a year. Gratuities, pensions, and compassionate allowances are made to widows and children of petty officers and men at the discretion of the Admiralty, but there is no fixed scale.

The Pension System of the United States presents two peculiar features, in the almost entire absence of a civil list, and the non-recognition of long service as a ground for pension. Generally speaking, pensions are granted only for active service in time of war, and therefore the beneficiaries are the survivors (or their widows and children) of the armies of volunteers and conscripts who took part in the country's several wars. What are called 'service pensions' have been granted to survivors of the War of the Revolution (under Act of 1818; the last pensioner under this act died in 1867, aged 101, but the last Revolutionary pensioner under a special act, not till 1869, aged 109), the War of 1812 (under Act of 1871), and the Mexican War (under Act of 1887), or to their widows (37 survived in 1888). But the bulk of the United States pensions are 'invalid pensions,' for total or partial disablement from wounds or disease contracted in the military or naval service; the widows and minor children under sixteen years of age of those who have died from such wounds or disease; or, in the event of no such widows or minor children surviving, then the dependent mothers, fathers, or minor brothers and sisters of officers or men so dying. The pensions, which range from $24 to $2000 per annum, are graded, and many specific wounds and disabilities are scheduled and priced. Thus, where the regular aid and attendance of others is required, from $50 to $72 a month is paid; where the beneficiary is incapacitated for manual labour, $30 a month; for the loss of a hand or foot, or total deafness, $30, but of both feet or hands, or both eyes, $72 a month; and for amputation at the shoulder or hip joint, $45. Widows of privates receive $12 a month; dependent relatives the same; children $2 each, but if the widow does not survive they receive their pension jointly. Widows or dependent relatives of officers receive from $15 to $30 a month. The pension of widows ceases when they marry. For the administration of the pension system an independent bureau was created in 1833; since 1849 it has been a bureau of the Department of the Interior. Under the commissioner, who is appointed by the president, there are nearly 2000 persons employed in the settlement of claims for pensions; and besides there are nearly 3000 surgeons throughout the country engaged to examine applicants. The following figures show plainly enough the enormous growth of the American pension system. In 1862 the disbursements slightly exceeded $790,000, in 1872 they exceeded $30,000,000, in 1882 $54,000,000; while in the year ending June 30, 1888, they were over $82,000,000, in the next year over $87,000,000, and in the year ending June 30, 1890, $109,357,534. Moreover, in June 1890 a Dependent Pension Law was passed, under which in three months 460,282 claims were received. In 1890 the pensions swallowed up more than one-fourth of the entire revenue of the republic, and represented a greater cost than the British or the German imperial army.—It may be added that, by an Act of 1882, widows and minor children of keepers or crew of a life-saving or lifeboat station who perish in or from injuries received through the life-saving service are given the full pay of the deceased for two years.

Pentacle, or PENTAGRAM, a five-pointed figure of the form shown on the annexed illustration, which occurs on old Greek coins, and was used as a symbol of mystery, perfection, or of the universe by Pythagoreans, Neoplatonists, and Gnostics. It occurs on Abraxas Stones (q.v.), and was used as the device of various secret societies, some of them masonic, and hence appears in ecclesiastical architecture (as at Rouen). The 'wizard pentagram' was, in the middle ages, a symbol powerful in repelling evil spirits, and is familiar to readers of Goethe's *Faust.* On the doors of cow-houses it was held to keep off witches. The pentacle, also called *pentalpha*, is often confused with the hexagram, composed of two equilateral triangles, which was also used as a magic symbol in astrology, alchemy, and cabalistic lore. See CIRCLE (MAGIC).





Penta'crinus. See CRINOIDEA.

Pentamerone, a famous collection of fifty folk-tales (Naples, 1637), written in the Neapolitan dialect, by Giambattista Basile, which are supposed to be told during five days by ten old women for the entertainment of a Moorish slave who has usurped the place of the rightful princess. An admirable German translation (enriched by notes) by Felix Liebrecht appeared at Breslau in 1846. Thirty-one of the stories were translated by J. E. Taylor (Lond. 1848). The style is marred by conceits, but the stories are of the greatest value to the student of folk-tales. The name *Giambattista Basile* was adopted by an Italian folk-lore journal (1883–89).

Pentamerus Beds, in Geology, a name formerly applied to the upper and lower Llandovery rocks, owing to the abundance of the brachiopods called Pentamerus. See SILURIAN SYSTEM.

Pentapolis. See CYRENAICA.

Pentateuch, a Greek word (*pentateuchos*) meaning 'the five-volumed (book),' is the name used by Origen to denote what the Jews of his time called 'the law' (*Torah*) or, more fully, 'the five-fifths of the law.' The same word was adopted into the Latin by Tertullian. 'The five books of Moses' as a designation of the Pentateuch was first made current in the Western Church at a considerably later period by Jerome and Rufinus; but a Jewish writer (Josephus) had long before stated that the first five books of the Old Testament canon 'belong to Moses.' The Greek names by which the five books are now known—Genesis, Exodus, Leviticus, Numbers (Arithmoi), Deuteronomy—have come to us from the Septuagint through the Vulgate Latin. Along with the book of Joshua these five really form one continuous work, now usually referred to by modern scholars as the Hexateuch, the present division of the Hexateuch having been made by a comparatively late editor. The Mosaic authorship of the Pentateuch is nowhere affirmed in the books themselves, but it is suggested by certain obvious phenomena in various parts of them, though contradicted by others; and it had begun to be held before the Jewish canon was closed ('the law of Moses,' Dan. ix. 11, 13; 'the book of Moses,' 2 Chron. xxv. 4, xxxv. 12). It soon became a fixed ecclesiastical tradition and a tacitly established point of Christian orthodoxy, and those who doubted or denied it were generally held to be, and in fact often were, hostile to Christianity (Hobbes, Spinoza), though this cannot be said of Leclerc, Simon, or Morinus. The facts which have generally led scholars with steadily increasing unanimity to a contrary conclusion have already been indicated under BIBLE, where the leading documents—JE (Jahvist + Elohist), D (Deuteronomy), and P (Priestly history and Priestly legislation)—have been named and characterised. The present article will seek to describe these documents with rather fuller detail and to indicate briefly what is maintained by many modern critics as to the nature of the somewhat complex process by which they have reached their present state of combination.

(I.) *JE.*—This is compounded mainly from two older parallel narratives, both of which embodied in writing current oral tradition relating to the origin of the world and of man, and to the patriarchal and heroic periods of Hebrew history. The extent of the document as we now have it may be ascertained roughly by deducting D and P (see below) from our present Hexateuch, allowance being also made, however, for editorial additions and glosses. The separation of its two constituent elements is a problem of greater delicacy and difficulty. (1) The work of the Jahvist, which employs the name Jahweh (see JEHOVAH) throughout, is distinguished also, on the whole, by other well-marked characteristics, especially a naïve anthropomorphism, which appears more particularly in its frequent accounts of Divine appearances under the form of 'the angel of Jehovah,' as, for example, to Abraham, to Lot, and to Moses at the inn and also on Pisgah. The style is lively, vivid, and popular. The author shows special interest in the local sanctuaries which were still recognised in his own time, showing that they owed their origin to theophanies in the pre-Egyptian period. His decalogue is that ancient and simple form of the law contained in Ex. xxxiv. He introduces, at various places, extracts from older poetical works, such as Gen. xlix. and the quotations from 'the book of the wars of Jehovah.' For minute details as to the limits of his work reference must be made to some of the books mentioned in the bibliography appended to this article; among the more important passages in Genesis which can with considerable certainty be attributed to him are the account of the creation and fall in ii. 4*b*–iv. 26; portions of vi.; one of the two parallel accounts of the flood contained in vii., viii.; the history of Abraham in xii., xiii., xv., xvi., xviii., xix., xxiv., and xxv. 1–6; of Isaac in xxv. 21–34, and xxvi.–xxvii.; considerable portions of the history of Jacob, including one of the narratives which make up chap. xxxiv.; portions of xxxvii., the story of Judah (xxxviii.); the story of Joseph in xxxix., xliii., xliv., xlvii. and l. (also some fragments in the intervening chapters). (2) The Elohist, who in the book of Genesis invariably employs the name Elohim, has several distinguishing characteristics. He shows some beginnings of a tendency to remodel the ancient traditions in a less anthropomorphic sense. He does not speak of objective manifestations of the Deity under human form as the angel of Jehovah, but prefers rather to represent divine communications as being by dreams, visions, and voices. It has been remarked that he takes a special interest in the sanctuary of Beersheba. His decalogue, if later expansions be left out, is that contained in Ex. xx. He no doubt originally had an account of the creation and fall parallel to that of the Jahvist; but the earliest extant fragment of his work is probably that preserved in Gen. xv. 5. To him are attributed Gen. xx. 1–17, xxi. 6*a*, 8–32*a*, the greater part of xxii., considerable portions of xxvii., xxix., and xxx.–xxxii., xxxv. 1–8, almost the whole of xl.–xlii. and some portions of the remaining chapters; Ex. i. 6, 8–12, 15–22, ii. 1–10, 15, iii. 1–6, 9–16, iv. 17–23, v. 1, 3, 5–23, vi. 1, vii. 17, 18, 20, 21, ix. 22–26, 31, 32, x. 12, 13*a*, 14*a*, 21–29, a few verses of xi. xii., xiii. 17–19, xiv. 7, 9, 16, 22, xv. 20–25, xvii. 3–16, xviii., xix. 2, 3, 10, 13–17, 19, xx. 1–23 (with later additions), xxiv. 3–8, 12–14, 18*b*, xxxi. 18, xxxii. 15–20, 25–29, xxxiii. 1–3, 5–11; Numb. x. 33–36, xi. 1–3, 7–10, 30–34, xii. 1–15, xiii. 20, 23, 24, 30–33, xiv. 39–45, portions of chap. xvi., xx. 3–11, 13–21, xxi. 12–30, portions of the story of Balaam, xxv. 3, 5, xxxii. 16, 17, 24, 34–39, 41, 42; Deut. xxxi. 14–23, xxxii. 44, xxxiii., xxxiv. 10.

That J and E once existed as separate narratives is now unanimously agreed, and that their dates must be sought somewhere between 900 B.C. at the earliest and 750 at the latest may also be regarded as settled. Within these limits there is considerable diversity of opinion. It is agreed on the whole that E belonged to the northern kingdom, and many hold this of J also, but some of the strongest critics think of the Jahvist as having been a Judæan. There is disagreement also as to the relative ages of the two, some thinking E the older, but the preponderance of argument seems to be in favour of J. The two were brought together into the document now known as JE by a redactor (sometimes called for convenience' sake the Jehovist, as distinguished from the Jahvist) towards the end of the 7th century. His aim was to embrace the two parallel histories; and his method was simple. Where the two were closely parallel he seems to have chosen the one he thought the preferable and to have cancelled the other (saving occasionally a word or clause); when he found the same incident related of different persons and in very different forms, such as the incident of Abraham and Sarah at Pharaoh's court, and Isaac and Rebekah at Abimelech's, he gave both, introducing some reconciling notes (e.g. Gen. xxvi. 18). A good example of his manner of combination is afforded by the narrative of Jacob's dream. JE also introduced new matter. In particular, the legislative portion of his work, usually spoken of as the Book of the Covenant (Ex. xx. 24–xxiii. 33, xxiv. 28), shows the influence of the Assyrian period, and (it is held) cannot be earlier than the 7th century (but prior to the publication of Deuteronomy).

(II.) *D.*—Deuteronomy also is a composite work, and its various elements are not all of the same date. In structure it consists of a legislative kernel (xii.–xxvi.), to which are prefixed two separate introductions (i. 1–iv. 44, and v. 1–xi. 32) and two separate epilogues or concluding narratives (xxvii. and xxviii.–xxx.). Finally, the last four chapters form an appendix containing some materials from J and E. Critics are now generally agreed that the original Deuteronomy to which reference is made in 2 Kings is what we have spoken of as the legislative kernel. The date of its publication we know to have been 621 B.C. That of its composition is less certain, but no one now proposes to carry it back to an earlier date than the reign of Hezekiah. There is difference of opinion as to the authorship of the prologues and epilogues. The second introduction and first epilogue, if by the author of the central portion of the book, were probably written at least at a later date. The first introduction, recapitulating portions of the history of JE, and the second epilogue, containing unmistakable allusions to the exile, are believed to have been the work of a second Deuteronomistic writer about the beginning of the 6th century. A third Deuteronomistic redactor towards the close of the exile (about 536 B.C.) combined JE with D, and gave what is known as the Deuteronomistic redaction to the historical books 1 Samuel to 2 Kings. But the so-called Deuteronomistic redaction was perhaps not a single or final act; some think it did not wholly cease till the beginning of the Grecian period. Considerable portions of the Book of Joshua are probably due to one of the Deuteronomists—e.g. i., iv. 21–24, viii. 30–35, xi. 10–23, xii. 1–24, xiii. 1–14, xiv. 6–15, xxii. 1–6, xxiii.

(III.) *P.*—Of all the elements of the Hexateuch by far the bulkiest (see BIBLE, Vol. II. p. 120, and add Josh. xiii. 15–33, xiv. 1–5, xv. 1–12, 20–62, xvi. 4–8, xvii. 1–9, xviii. 11–28, xix.–xxi.–xxii. 9–34) is that supplied by the so-called Priestly document. It is also the most easily distinguishable, and even those critics who differ most widely as to its age are agreed almost to a verse as to its extent. The criteria which they apply are certain well-marked features in its highly developed and esoteric ritual legislation, and, as regards its narrative portions, a certain mechanical precision with which it follows a formal arrangement of its matter, and heads each section with a title, the apparent accuracy of its chronological, genealogical, and statistical details, and, along with that, an almost entire absence of the picturesque elements which give their chief literary charm to J and E. In the opinion of a rapidly increasing number of critics the evidence for its relatively late origin is overwhelming. The argument is drawn not only from the characteristics of its legislation and history already alluded to, but also from its language and phraseology, from the fact that it is never alluded to in what are certainly known to be the pre-exilic books of the Old Testament canon, and from the absence of Deuteronomistically revised passages. As Deuteronomy is associated with Josiah's reformation, so is the Priestly legislation with that of Ezra. It, however, contains some elements which are earlier than that event (444 B.C.) and others which are later. Of an earlier date, in particular, is what critics call the Law of Holiness contained in Lev. xvii.–xxvi., presenting affinities with the last chapters of Ezekiel. The cessation of the temple functions with the beginning of the exile naturally led to a desire and effort on the part of zealous priests to preserve some memorials of the pre-exilic temple practice apparently threatened with oblivion; but further, it would seem, the lapse of time gave scope for a good deal of reflection and discussion about questions of detail with a view to possible improvements, and this was especially the case when it became plain that in the restored community the priesthood were destined to hold a much more prominent position than at any period of the monarchy. With the practically new detailed code which resulted was associated a brief summary of general history and of the history of Israel, the result being a work of combined legislative and narrative character similar to the previously existing JE + D which it was designed to supersede. Critics also discern further modifications of ritual which must be assigned to a later date than that of Ezra (see NEHEMIAH); but the investigation of these is still being carried on, and cannot be regarded as completed. When it was found that the Priestly document was only very slowly, if at all, superseding JE + D as an authoritative history and law book, the important step of incorporating it with that document was next taken. The work thus produced, probably before 400 B.C., was substantially our present Hexateuch. But it continued to undergo a process of editorial change and revision till a much later date. The division of the Hexateuch into the six books with which we are now so familiar is probably one of the last editorial operations it underwent, and carries us back, as we have seen, to at least the date of the LXX. translation.

The gradual ascertainment in modern times of the different sources of the Hexateuch has been described by Stade with hardly undue exaggeration as one of the most brilliant triumphs of human sagacity. The investigation of the problem on scientific lines may be said to have begun with Astruc (1753), who was the first to point out the value of the 'Jehovah' and 'Elohim' criteria in seeking to trace the authorship of different parts of Genesis. His hypothesis was introduced into Germany by Eichhorn, and was the beginning of a long discussion which has lasted till the present day, producing an immense literature, now for the most part quite out of date, and a vast variety of conflicting and, as was sometimes imagined, mutually destructive theories. The first cardinal fact to emerge from the chaos with clearness was the late date of Deuteronomy as being the new law book which formed the basis of Josiah's reformation. The credit of having established beyond doubt the post-Mosaic authorship of Deuteronomy belongs chiefly to De Wette, whose activity dates from 1805. The next thing to be satisfactorily proved was the existence of two independent Elohists. The existence of two authors sharing the feature in common had been divined by Ilgen (1798), but it was always supposed that the one merely supplemented the other, till Hupfeld (1853) proved their complete independence. In other words, four distinct sources were now completely made out. Finally, Graf (1866) proved the post-exilic character of the legislative portion of the Priestly document (hitherto spoken of as the 'Grundschrift' or older Elohist), and it was further shown by Kuenen to the satisfaction of Graf himself that the same character belongs to the Priestly document as a whole. This indeed had been seen and argued for at an earlier date by Vatke (1835) and George (1835), but partly through defects in their manner of presenting their views, and partly because scientific and theological opinion was not yet sufficiently educated to receive it, it failed to make any impression. Reuss, Graf's teacher, claims to have publicly taught the Grafian theory as early as 1833; but he did not publish it till 1879.

As a manual of modern Pentateuch criticism Kuenen's masterly *Historico-critical Inquiry into the Origin and Composition of the Hexateuch*, translated from the Dutch by Wicksteed (1886), is indispensable to the student, and will probably hold a permanent place as a classical example of the application of modern methods in biblical criticism. The 'Introduction' prefixed to it, containing an outline of the history of Hexateuch criticism since 1861 will serve as guide to the older literature. Along with Kuenen's great treatise ranks Wellhausen's equally admirable *Composition des Hexateuchs* (2d ed., with appendices, 1889). Only the appendices to this work are new, the papers on the composition of the Hexateuch having appeared originally in the *Jahrbücher f. deutsche Theol.* in 1876–77, and having been reprinted without modification in 1885.

Valuable assistance of a typographical or mechanical kind is to be had from Kautzsch and Socin's little work entitled *Die Genesis mit äusserer Unterscheidung der Quellenschriften* (2d ed. 1891), in which the various sources and the work of editors and glossators are indicated by the use of differential types. In Kautzsch's new translation of the Old Testament (*Die Heilige Schrift des A. T.*, 1890–91), P, J, E, D, Dt, and R in the Hexateuch are indicated by letters on the margin. See also Lenormant's *Genèse* and Reuss's *Bible*. The critical views indicated in the foregoing article are more or less fully discussed, and the results reckoned with, in the histories of Israel by Wellhausen (*Prolegomena to the History of Israel, with reprint of article 'Israel' from Ency. Brit.*, 1885), Stade (*Gesch. d. V. Isr.*, 1887), Renan (*Hist. du Peuple Isr.*, 3 vols. 1887–91; Eng. trans.), and Kittel (*Gesch. d. Hebräer*), whose first half-volume (1888) gives in a very instructive way the stories of the patriarchal age according to E, J, and P respectively, in three separate sections, followed by estimates of the historical meaning of each narrative. Dillmann placed P two centuries before the exile; Nöldeke and Schrader still argue for its comparatively early date; Baudissin dates it about thirty years before D. See also Holzinger's *Einleitung in den Hexateuch* (1893). For a fuller bibliography Reuss's *Gesch. der heiligen Schriften Alten Testaments* (2d ed. 1890) may be consulted; see also article BIBLE, Vol. II. p. 128–9; and SAMARITAN PENTATEUCH.

Pentecost (Gr. *pentēcostē*, 'fiftieth') was the name given to the Jewish feast held on the fiftieth day after the Passover, in celebration of the 'ingathering,' and in thanksgiving for the harvest (see FESTIVALS). From the Jewish use it was introduced into the Christian, and with special solemnity, as being the day of the descent of the Holy Ghost on the apostles, and of the first solemn preaching of the Christian religion. From early times pentecost has been regarded as one of the great festivals of the Christian year, and it was chosen as one of the times for the solemn administration of baptism; and the English name of the festival, *Whit-Sunday*, is derived from the *white* robes in which the newly-baptised were clad. It is regarded as specially sacred to the Third Person of the Blessed Trinity. Many curious usages were anciently connected with the celebration. The figure of a dove (an emblem of the Holy Ghost) suspended by a cord from the ceiling was in some churches lowered so as to alight on the high altar during the service; in others figures of cloven tongues were similarly introduced. In some places in the East, and in the West too, the practice prevails of decorating the churches with evergreens and flowers, as is done in England at Christmas.

Pentelicus. See ATHENS (p. 536), and MARBLE.

Pentland Firth, a channel between the Atlantic and German Oceans, separating the mainland of Scotland from the Orkney Islands. It is 14 miles long and 6¼ miles broad at the narrowest. The Pentland Skerries, 5 miles north-east of Duncansbay Head, consists of two islets and of several contiguous rocks. On the larger of the islets is a lighthouse (1794). The navigation of the Pentland Firth is more dangerous than that of any other portion of the Scottish seas, a current from west to east flowing through it with a velocity of from 3 to 10 miles an hour, and causing numerous eddies and whirlpools. Yet over 5000 vessels with cargoes pass through the Firth annually.

Pentland Hills, in the Lowlands of Scotland, extend 16 miles south-westward from a point 3 miles south of Edinburgh, through the counties of Midlothian, Peebles, and Lanark, have a breadth of 4 to 6 miles, and attain a maximum height in Carnethy (1890 feet) and Scald Law (1898). In the battle of the Pentlands or Rullion Green, 2 miles NNW. of Penicuik, Sir Thomas Dalyell routed 900 westland Covenanters, 28th November 1666.

Pentonville, a populous district in London in the parish of St James's, Clerkenwell, the first buildings in which were erected in 1773 on fields belonging to Henry Penton, Esq. The name has since been extended to part of the parish of Islington, in which stands the *Pentonville Prison*. This, the *Model Prison*, as it was at first called, in the Caledonian Road, was built in 1840–42, and constructed on the radiating principle, so as to admit of thorough inspection, and contains accommodation for 520 prisoners. The treatment is designed to 'enforce strict separation, with industrial employment and moral training.' See *Report of the Directors of Convict Prisons* (1887–88).

Pentremites, fossil Crinoids common in the Carboniferous System (q.v.).

Pentstemon, a genus of plants belonging to the natural order Scrophulariaceæ, consisting of herbaceous or sub-shrubby species mostly yielding flowers of great beauty. The genus is wholly American, mostly belonging to the warmer states, and few of them are hardy enough to endure the winter climate of Britain, where consequently they are propagated annually by cuttings, which are protected in frames during winter and planted in the flower-garden in March or April. The general character of the inflorescence of Pentstemon is so well known as to require no description here. The numerous garden varieties of *P. gentianoides*, *P. Hartwegii*, and others are among the most popular of garden flowers. But there are many species even more beautiful than these, which are occasionally to be met in collections of rare plants. Of such may be mentioned *P. Jeffreyanus*, *P. Secundiflorus*, *P. Murrayanus*, *P. miniatus*, and others, as being exceptionally beautiful in colour.

Penumbra. See ECLIPSES.

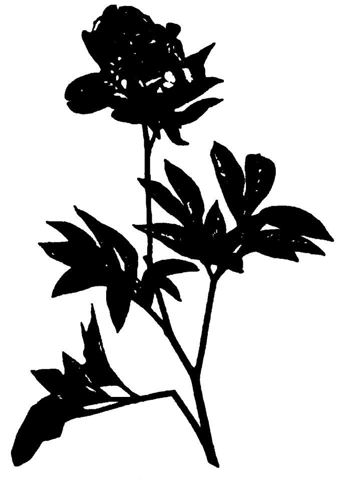
Penza, a large rural town of Russia, 330 miles by rail SE. of Moscow, has a cathedral (17th century), a botanical garden, and manufactures of paper, soap, &c. Pop. 47,701.—The *government* has an area of 14,997 sq. m., and its population of a million and a half are chiefly engaged in agriculture.

Penzance (Corn., 'holy headland'), a town of Cornwall, the most westerly in England, at the head of Mount's Bay, 10 miles ENE. of Land's End, 80 W. by S. of Plymouth, and 328 (by road 281) WSW. of London. Standing on a finely-curved shore surrounded by rocky eminences, it is famous for its mild, equable climate, though the annual rainfall is heavy (43 inches). Its fine esplanade commands splendid land and sea views; and its chief buildings, constructed largely of granite, include a market-hall (1837) with a statue before it of Sir Humphry Davy (q.v.), an infirmary (1874), a post-office (1883), and public rooms (1867), Italian Renaissance in style, and comprising a guildhall, museum, library, &c. The harbour has two piers (1772–1845) half a mile long, forming a tidal basin of 21 acres; and docks have been added since 1882. Penzance is a headquarters of the mackerel and pilchard fisheries; market-gardening is an important industry; and of recent years the place has grown much in favour as a watering-place. Burned by Spaniards in 1595, and sacked by Fairfax in 1646, it was incorporated in 1614, and from 1663 to 1838 was one of the five 'coinage towns.' Pop. (1881) 12,409; (1891) 12,448. See works by Lach-Szyrma (1878) and Millett (1876–80).

Peonage, a system of agricultural servitude common in Mexico (q.v.) and some other parts of Spanish America. The peon in debt to his employer was by the Spanish colonial system bound to labour for his employer till the debt was paid. Peonage in New Mexico was abolished by act of congress in 1867: it was also abolished in the Argentine Republic.

Peony (*Pæonia*), a genus of plants of the natural order Ranunculaceæ, having large showy flowers composed of five leafy herbaceous sepals, 5 to 10 petals, numerous stamens, and 2 to 5 carpels, each with numerous round, black, shining seeds. The leaves are compound, the leaflets variously and irregularly divided. The fibres of the root are often thickened into tubers. The species are large herbaceous perennials, or rarely half-shrubby, natives of Europe, Asia, and the north-west of America. None of them are truly indigenous in Britain, although one (*P. corallina*) is undoubtedly naturalised on Steep Holme Island in the Severn. On account of the beauty of their flowers, some of them are much cultivated in gardens, particularly the Common Peony (*P.*

officinalis), a native of the mountain-woods of the south of Europe, with carmine or blood-red flowers. A variety with double flowers is common. The White Peony (*P. albiflora*) is another favourite species, of which there are now many beautiful varieties which have originated in French and Belgian gardens. It is a native of the central parts of Asia. Its flowers are fragrant. The Tree Peony, Chinese Peony, or Moutan Peony (*P. Moutan*), is a half-shrubby plant, a native of China and Japan. In favourable circumstances it attains a very large size, and a height of 12 feet or more. It has long been cultivated in China and Japan; and is now also a favourite ornamental plant in the south of Europe, but is too tender to endure the climate of Britain, except in the most favoured parts; it is, however, often to be met with in conservatories, being of a very distinct and ornamental character when in flower. It flowers in spring. The varieties in cultivation are numerous. It is propagated by cuttings and also by grafting. The roots of most of the peonies have a nauseous smell when fresh, and those of the Common Peony were in high repute among the ancients as an antispasmodic—hence the name Peony, from *Paion*, a Greek name of Apollo, the god of medicine; but their medicinal properties are now utterly disregarded. The globose, shining black seeds of peonies were formerly, in some countries, strung into necklaces, and hung round the necks of children, as *anodyne necklaces*, to help them in cutting their teeth.



Peony.

People's Palace, an institution at Mile End Road, intended as a centre for amusement and recreation, and of association as well, for the inhabitants of the East End of London. It comprises a large hall, technical schools, art-galleries, concert-rooms, a library, reading and recreation rooms, swimming-bath, gymnasium, &c. It is the revival and development of an idea of the Beaumont Philosophical Institute; but the idea was first amplified and made really popular in Mr Besant's novel, *All Sorts and Conditions of Men* (1882). The buildings were inaugurated by the Queen, May 14, 1887, and work was begun on 3d October. The Queen's Hall, which is 130 feet long by 75 feet wide, can seat 2500 people. Around the hall are the statues of twenty-two queens, and a large organ at the north end. The technical and handicraft schools in 1890 were attended by 5000 pupils; they owe their foundation to the Drapers' Company of London, which has contributed in all about £60,000 to the People's Palace. Cheap concerts, at from 1d. to 3d. admission, have been well patronised, as also the picture exhibitions, swimming-bath, gymnasium, and dances. In the course of 1888–89 there were 110,000 Sunday visitors; whilst the attendance from October 1887 to 1889 was over 2½ millions.

See Besant's *All Sorts and Conditions of Men; Sir* E. Hay Currie's *Working of the People's Palace; Nineteenth Century*, February, 1890; *Century*, June 1890.

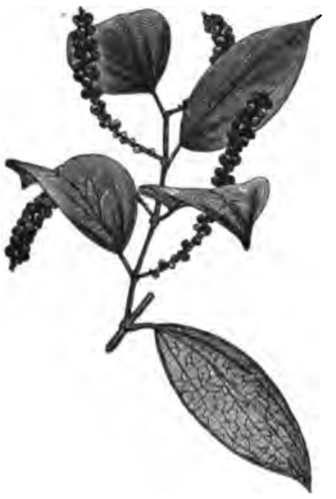
Peoria, capital of Peoria county, Illinois, on the west bank of the Illinois River, at the outlet of Peoria Lake, 161 miles by rail SW. of Chicago. It is an important railway centre—the Union Depôt accommodates ten of the railways that meet here—and is connected by steamboat navigation with the Mississippi and by canal with Lake Michigan. It contains a Roman Catholic cathedral, a high school, a medical college, and three hospitals. The streets are wide, and there are ten parks, the largest Jefferson (35 acres). Mines of bituminous coal supply the city's numerous manufactories. These include especially the great distilleries, for which the place is noted, and breweries, foundries, and manufactories of flour, oatmeal, and starch, glucose, pottery, &c. In the lower city are large stockyards. Pop. (1880) 29,259; (1890) 41,024.

Peperino, a variety of tuff, met with in the Alban Hills near Rome. It is dirty grayish brown to white, earthy, and granular, and contains crystals of mica, leucite, augite, &c., with fragments of limestone, basalt, and leucite-porphyry.

Pepin, or PIPPIN, surnamed 'the Short,' king of the Franks, was the son of Charles Martel and the father of Charlemagne, and founder of the Frankish dynasty of the Carlovingians (q.v.). Charles Martel shortly before he died divided his kingdom between his two sons, Carloman and Pepin, Carloman taking the German part, and Pepin the Neustrian or territories in northern France; still they were only rulers (dukes) in the name of the Merovingian king. Carloman, after six years of office or rule, was persuaded by the English monk Boniface to enter (747) the monastery of Monte Cassino; his duchy passed over to Pepin. St Boniface in 751 crowned Pepin king of the Franks at Soissons, Childeric, the last of the *fainéant* Merovingians, having been deposed and his very able substitute chosen king in his stead. Pepin rested his power in great part upon the bishops and monks; accordingly, when Pope Stephen III. was hard pressed by the Longobards (Lombards) under Aistulf, he came (754) to France to solicit help from the new king of the Franks. Pepin led an army into Italy, compelled Aistulf to become his vassal, gave to the pope the title of exarch (of Ravenna), a title of the Roman empire, and so, by this 'Donation of Pepin,' laid the foundation of the temporal sovereignty of the popes; himself he made 'patrician of the city of Rome'—all this in 756. The church in his own dominions he placed under the supremacy of the pope. The rest of his life was spent in semi-crusading wars. Before going to Italy he had already attempted to convert the heathen Saxons at the sword's point; he went on with the 'holy' work in 757. Then he drove the Saracens back over the Pyrenees (758) and made (760–768) repeated incursions into Aquitania, though he never permanently conquered it. He died in 768, and his sons Carloman and Charlemagne divided his territories between them.—There were other rulers of this name amongst the Carlovingians. PEPIN OF LANDEN (died 639), with the help of Bishop Arnulph of Metz, was appointed *major domus* or viceroy of Austrasia under Lothair II.—PEPIN OF HÉRISTAL (died 714), his grandson, succeeded as mayor of the palace in Austrasia, to this added after 687 the similar viceroyalties of Neustria and Burgundy, and called himself 'Duke and Prince of the Franks.' He was their real ruler during the reigns of the puppet kings Theodoric, Ludwig III., Childebert III., and Dagobert III., and fought successfully against the Frisians, the Alemanni, and the

Bavarians.—PEPIN, the son of Charlemagne, who was born in 778, was crowned king of Italy in 781, fought against the Avars, the Slavs, and the Saxons, drove the Saracens out of Corsica, and conquered Venice (810). He died in 810.—PEPIN, son of Louis the Pious, was made king of Aquitania, revolted twice against his father and deposed him, but finally restored him, and protected him until he himself died (838). See CARLOVINGIANS, FRANCE.

Pepper (*Piper*), a genus of plants of the natural order Piperaceæ (q.v.), which once included the whole of that order, but, as now limited, consists of plants with woody stems, solitary spikes opposite to the leaves, and flowers on all sides, the flowers mostly hermaphrodite. The most important species is Common or Black Pepper (*P. nigrum*), a native of the East Indies, now cultivated also in many tropical countries; its berry or drupe being the most common and largely used of all spices. It is a rambling and climbing shrub, with smooth and spongy stems, sometimes 12 feet in length, and broadly ovate, acuminate, leathery leaves. The fruit is about the size of a pea, of a bright-red colour when ripe, not crowded on the spike. In cultivation the pepper plant is supported by poles, or by small trees planted for the purpose, as it loves a certain degree of shade, and different kinds of trees are often planted for this purpose in India. It is propagated by cuttings or suckers, comes into bearing in three or four years after it is planted, and yields two crops annually for about twelve years. When any of the 'berries' of a spike begin to change from green to red all are gathered, as when more fully ripe they are less pungent, besides being apt to drop off. They are spread on mats to dry in the sun, and separated from the spikes by rubbing with the hands or by treading with the feet, after which they are cleaned by winnowing. The Black Pepper of commerce consists of the berries thus dried, which become wrinkled and black; White Pepper is the seed freed from the skin and fleshy part of the fruit, to effect which the dried fruit is soaked in water and then rubbed. White pepper thus prepared is of a whitish-gray colour, but not unfrequently undergoes a bleaching by chlorine, which improves its appearance at the expense of its quality. Black pepper is much more pungent than white pepper, the essential constituents of the spice being more abundant in the outer parts of the fruit than in the seed. Pepper depends for its properties chiefly on an acrid resin and volatile oil; it contains also a crystalline substance called *Piperin*. The fruit of *Piper trioicum*, a species very similar to the Common Pepper, is more pungent; and it is cultivated in some parts of India. The fruit of other species of Piperaceæ is used as pepper in their native countries. The fruit of *Piper longum* or *Chavica Roxburghii* yields the Long Pepper of commerce. They have woody climbing stems, solitary spikes opposite to the leaves, diœcious flowers, and the fruits so close together on the spikes as in ripening to become a compact mass. The spikes are gathered when unripe, and dried in the sun. They are used in pickling and for culinary purposes, also in medicine for the same purposes as common pepper. They are generally reputed to be more pungent than common pepper. *C. Roxburghii* is cultivated in eastern India, Ceylon, and Java. The root and thickest part of its stem are extensively used in India as a stimulant medicine.



Black Pepper (*Piper nigrum*).

Pepper acts on the skin as a rubefacient and vesicant, and is often used for this purpose in a powdered state, moistened with some kind of alcoholic spirit. It is also employed as a local stimulant in relaxation of the uvula, and is applied in the form of an ointment to ringworm. Taken into the stomach in small quantities it is a pleasant stimulant, but in large doses it produces great pain and irritation. The quantity used, however, by the natives of hot climates much exceeds anything known among Europeans, and the effects are evidently beneficial rather than injurious. The chief use of pepper is as a spice and condiment.

Pepper was known to the ancients; Hippocrates employed it as a medicine, and Pliny expresses his surprise that it should have come into general use, considering its want of flavour. In the middle ages pepper was one of the most costly spices, and in the 13th century a few pounds of it were reckoned a princely present. The quantity now imported into Europe is immense. The average annual imports into the United Kingdom are about 29 million lb., of which about 7 million lb. are taken for consumption; the quantity imported into the United States is of course even larger. Malabar black pepper is considered the best kind, and the Tellicherry and Penang the finest varieties of the white.

The name pepper is popularly given to substances possessing a pungency resembling that of pepper, although produced by very different plants. Thus, Cayenne Pepper is the produce of species of Capsicum (q.v.), of the natural order Solanaceæ; Jamaica Pepper, or Pimento (q.v.), of species of Eugenia, of the natural order Myrtaceæ; and Guinea Pepper (q.v.), or Maleguetta Pepper, is *Amomum*, Ethiopian Pepper *Xylopia Æthiopica*, and Benin Pepper *Cubeba Clusii*.

Pepper, JOHN HENRY, chemist and mechanical inventor, was born in Westminster on 17th June 1821, and in 1848 was appointed analytical chemist at the Royal Polytechnic, and has written several handbooks of popular science. But he is best known as the improver and exhibitor of 'Pepper's Ghost,' in its earliest form the invention of Henry Dircks (q.v.), a device for associating on the same stage living persons and phantoms to act together. The phantom is produced by a large sheet of unsilvered glass on the stage, practically invisible to the spectators, which reflects to them, along with a visible actor or actors, the appearance of another actor on an understage, who is himself invisible. Pepper travelled with this show in America and Australia, and became public analyst in Brisbane, Queensland.

Peppercorn Rent, a nominal rent of one peppercorn a year, to be paid on demand; an acknowledgment of tenancy when lands or houses are let virtually free of rent.

Peppermint. See MINT.

Pepper-pot, a celebrated West Indian dish, of which Casareep (q.v.) is a principal ingredient; and along with it flesh or dried fish, vegetables, chiefly the unripe pods of the ochro (a Hibiscus, q.v.), and chillies (see CAPSICUM).

Pepper-root (*Dentaria diphylla*), a perennial herbaceous plant, of the natural order Cruciferæ, a native of North America, with pairs of ternate leaves, and racemes of white flowers; the root of which has a pungent mustard-like taste, and is used as a condiment.

Pepsin has been already discussed (in the article DIGESTION) as one of the essential constituents of the gastric juice. Various modes of extracting it from the walls of the stomach of the calf, sheep, and pig have been proposed by different chemists. It has not been satisfactorily isolated, and its chemical constitution is unknown. 'At present the manifestation of peptic powers is our only test of the presence of pepsin' (M. Foster). This substance, either in powder or in solution, has been employed of late years to a considerable extent in medical practice, in cases of disorders of digestion due to deficient or imperfect secretion of gastric juice, and of convalescence from typhoid and other debilitating fevers. It is an ingredient in most of the digestive preparations now in the market.

Peptones. See DIGESTION, Vol. III. p. 819.

Pepys, SAMUEL, the celebrated diarist, son of John and Margaret Pepys, was born on February 23, 1632–33. He was a member of a junior branch of an old and widely-spread family in the eastern counties, but there was little property in the possession of this branch, and Samuel's father for a time followed the business of a tailor in the city of London. It is not known whether the diarist was born at Brampton, a village near Huntingdon, where there was a small property belonging to his father's family, or in London. We do know, however, that he went to school at Huntingdon before entering St Paul's School, and that he remained at the latter until he was seventeen years of age. On March 5, 1650–51, he first put on his gown as a scholar at Magdalene College, Cambridge. On the 1st December 1655, very soon after leaving college, he was married to Elizabeth St Michel, a beautiful but portionless girl of fifteen. Sir Edward Montagu (afterwards Earl of Sandwich), whose mother was a Pepys, gave a helping hand to the imprudent couple, and allowed them to live in his house. As Samuel does not appear to have owed much to his father, it seems probable that Montagu acted as a patron at a still earlier period of his life. At all events his true start was entirely due to this patron, for whom Pepys always expressed the most unbounded attachment. Pepys's real life begins for us on the 1st January 1659–60, when the *Diary* was commenced. His appointment to the clerkship of the Acts of the Navy in 1660 was distinctly a job, for he knew nothing of the work of the navy when he undertook the office, but it was a job that amply justified itself, for his intelligence and industry were so great that he soon became master of the work of his office, and as Clerk of the Acts, and subsequently as Secretary to the Admiralty, he was one of the most distinguished officials in naval affairs that England has ever possessed. At the Revolution his career was closed, but until the end of his life he was still looked upon as the Nestor of navy affairs, to be consulted upon matters of particular importance, and his name is still held in honour at the Admiralty. It is not, however, as an official that the fame of Pepys still lives, but as the writer of a *Diary* which is unique in the literature of the world. This work has thrown the most unexpected light upon the history and manners of his day, while at the same time it presents a most remarkable psychological study. Never before had man written down his inmost feelings with so little disguise. Hence Pepys's character has suffered while his fame has spread. Passing thoughts which had but little real influence upon his actions were set down by him, and they have given a wrong impression of the man to numerous readers.

Pepys's life was prosperous, for he made money and held high offices. He was twice Master of the Trinity House, first in 1676 and a second time in 1685, Master of the Clothworkers Company in 1677, and President of the Royal Society (1684–86). But he was not without his troubles. At the period of the supposed Popish Plot in 1679 he was committed to the Tower, and in 1690 he was placed in Gatehouse at Westminster for a few days; and at his death the crown was indebted to him to the extent of £28,000, a sum which was never paid. Early in life Pepys was successfully cut for the stone, and for many years he enjoyed good health, but before his death, on the 26th May 1703, the wound broke out afresh. The *Diary* was discontinued on 29th May 1669, and we must ever regret that it was not continued to a later period. The shorthand MS. was deciphered by the Rev. J. Smith and first published in 1825 under the editorship of Lord Braybrooke. Although much original matter has been added to various editions, particularly in that of the Rev. Mynors Bright (1875), the *Diary* had never been printed in its entirety up to 1891, when a new edition of the whole was in preparation. Besides the *Diary* Pepys wrote nothing of importance but his *Memoires relating to the State of the Royal Navy*, published in 1690. Pepys was essentially a collector, and he never saw a curious or uncommon object without wishing to possess it. His library, bequeathed to Magdalene College, Cambridge, still remains in the exact condition in which he left it. In the room containing that library and among his books and papers we the better understand that method, diligence, and general intelligence which is exhibited in the *Diary*, and which, united with the power of carrying out his views, helped to consolidate the British navy.

See *Memoirs of Samuel Pepys, Esq., Comprising his Diary from 1659 to 1669*, edited by Lord Braybrooke (2 vols. 1825); *Diary and Correspondence*, by Rev. Mynors Bright (6 vols. 1875); *Life, Journal, and Correspondence of Samuel Pepys*, by Rev. John Smith (2 vols. 1841); and *Samuel Pepys and the World he lived in* (1880) and the edition of the Diary (8 vols. 1893–96), by the present writer.

Pequots, or PEQUODS, a tribe of American Indians, a branch of the Mohicans, were warlike and powerful in the country round the Thames River when Connecticut was first settled, and made treaties with the Dutch and English. Hostilities, however, broke out in 1637, and the tribe was cut to pieces and scattered; yet a few descendants may be found at Green Bay, Wisconsin.

Pera, a suburb of Constantinople (q.v.).

Peræa (Gr., 'the country beyond'), a term applied to many districts beyond a river or sea; most frequently to great part of Palestine (q.v.) beyond the Jordan.

Perak, a Malay state on the west side of the peninsula of Malacca, under the protection of Britain since 1874. Estimated area, 7950 sq. m. The interior ranges up to 8000 feet. The soil is fertile, and for the most part covered with luxuriant vegetation. Elephants, leopards, huge snakes, and deer swarm in the forests of the interior. The soil produces rice, sugar, tobacco, coffee, tea, vanilla, and spices. But the principal production of the state is tin; the mines, worked chiefly by Chinamen, yielded 2060 tons in 1876 and 14,000 tons in 1887. Lead also exists in great quantity. Pop., mostly Malays and Chinese, increased from 55,880 in 1879 to 179,600 in 1889. The capital is Kwala Kansar. Taiping and Kinta are the principal tin-mining towns. There are 8 miles of railway. The British have made many miles of good roads since they began to govern the country. The murder of J. W. Birch, the first British resident, in 1875 necessitated a punitive military expedition in 1876. The state is now in a highly prosperous condition, exporting to the annual value of £973,400, and importing to £1,828,200. See M'Nair's *Perak and the Malays* (1877).

Perambulation. See BOUNDS (BEATING THE).

Perameles. See BANDICOOT.

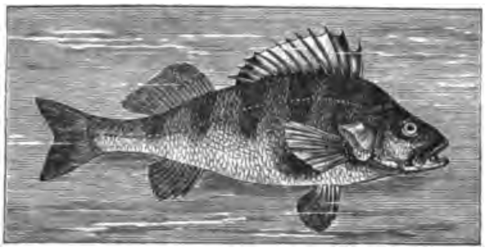
Perception, in philosophical usage, may mean internal perception, the apprehension of any modification of consciousness; but it usually refers to external perception, the recognition of an external object by means of the senses—something more than sensation, and including an element of judgment or the comparing power.

Two great disputes connect themselves with perception, both raised into prominence by Berkeley. The first is the origin of our judgments of the distances and real magnitudes of visible bodies; Berkeley maintaining, in opposition to the common opinion on this subject, that these were learned by experience, and not known by the mere act of vision (see VISION). The second question relates to the grounds we have for asserting the existence of an external and material world. See BERKELEY, KANT, REID; also PSYCHOLOGY, PHILOSOPHY.

Perceval, SPENCER, English minister, was the second son of the second Earl of Egmont, and was born in London, November 1, 1762. He was educated at Harrow and Trinity College, Cambridge, and was called to the bar at Lincoln's Inn in 1786. He soon obtained a reputation as a diligent lawyer, and in 1796 he entered parliament for Northampton, and became a strong supporter of Pitt. In the Addington administration he was made Solicitor-general in 1801 and Attorney-general in 1802, and in the Portland administration of 1807 he became Chancellor of the Exchequer, and was even then the real head of the government, being much trusted by George III. for his steadfast opposition to the Catholic claims. On the death of the Duke of Portland in 1809 Perceval became premier also, and retained office till his tragic death, 11th May 1812, when he was shot dead entering the lobby of the House of Commons, about five in the afternoon, by a Liverpool broker named Bellingham, whose losses had turned his head. Perceval's death was rather a private than a public calamity. He was a man of spotless integrity in his public and private character, but, though an effective parliamentary debater, his abilities were only moderate and his views were narrow.

Perch (*Perca*), a genus of spiny-finned or acanthopterous fishes, well represented by the Fresh-water Perch (*P. fluviatilis*). The members of the large family (Percidæ) to which the perch belongs are carnivorous fishes, frequenting the fresh waters and coasts of temperate and tropical regions. The body is somewhat compressed; the spinous dorsal fin is well developed; the ventral fins are thoracic in position; the teeth are simple and conical; there are no barbels. These characters are possessed by many perch-like fishes, some of which are discussed in separate articles—e.g. the Bass (Labrax); the Perch (Lates) of the Nile, Ganges, &c.; the Pike-perch (Lucioperca); the Sea-perch (Serranus); the Murray Cod and Hapuku (Oligorus); the Growler (Grystes), &c. Of American Percidæ the 'glass-eye' or 'yellow pike' (*Stizostedion vitreum*) is largest and most important, while the dwarf-perches or darters (Microperea, Percina, &c.) are among the minutest fishes, *Microperea punctulata* measuring only an inch and a half.

The fresh-water perch is widely distributed in lakes, ponds, and rivers in Europe, North Asia, and North America, and is common in many parts of Britain. It is of a greenish-brown colour above and golden yellow on the under parts, with six or seven indistinct dark bands on the back. In length it measures about 18 inches, and its height is about a third of this. It sometimes weighs from three to five pounds, and a prize of nine pounds has been recorded. Among its characteristics may be noted the small villiform backward-turned teeth, their presence on the palatines and vomer, their absence from the tongue, the two dorsal fins, of which the first has thirteen or fourteen spines, and the small scales on the body. The perch loves still waters, and thrives well in ponds, at the cost, however, of smaller fishes. It also feeds on insects, worms, &c. It can endure removal from the water for a considerable time. The eggs are laid in spring, and are attached in long viscid strings to water-weeds. The number of eggs in one spawn may exceed a million. As an edible fish the perch has a good reputation, eating best with lemon-juice and cayenne-pepper, but the American variety is less esteemed. Of species distinct from *P. fluviatilis* little is known.—The so-called Climbing Perch (q.v.) is separately treated.



Perch (*Perca fluviatilis*).

Perch, a measure of length. See ROD.

Percival, JAMES GATES, an American poet, was born at Kensington, Connecticut, 15th September 1795, graduated at Yale in 1815, at the head of his class, and afterwards studied botany and medicine. But his heart was not in herbs and physic, and although he practised—or rather advertised his willingness to practise—both in Kensington and in Charleston, S.C., very few professional calls dragged him from his favourite studies. His poems *Prometheus* and *Clio* appeared at Charleston in 1822. Two years later he filled for a few months the chair of Chemistry at West Point; but he found the duties heavy and irksome, and took himself to Boston, and then to New Haven. There the third part of *Clio* was published (1827). Percival afterwards divided his attention between his verses and geology, and as he grew older he gave more and more of his time to the new love, the visible results being Reports on the Geology of Connecticut (1842) and of Wisconsin (1855). These are valuable but very dry, and in delicious contrast to his poems, which flow freely and with volume, and on whose fluent, half-careless lines their author's learning is borne as easily as trees on a river in flood. His *Dream of a Day* appeared in 1843, and occasional lyrics for a long time after. He was appointed geologist of Wisconsin in 1854, and died there at Hazel Green, on 2d May 1856. His collected works were published in 1859, his *Life and Letters*, by J. H. Ward, in 1866.

Percussion, in Medicine, is the method of eliciting sounds by tapping or gently striking the surface of the body; its object being to determine by the nature of the sound the comparative density of the subjacent parts. This means of diagnosis was first employed by Auenbrugger in the middle of the 18th century, and it was afterwards adopted by Corvisart in the investigation of heart diseases; but its value was not fully appreciated till Laennec made the diseases of the chest his peculiar study; and since his time its application and various uses have been extended by the labours of Piorry, Hughes Bennett, and other physicians.

Percussion is chiefly employed in the diagnosis of diseases of the lungs, heart, and abdominal organs. It may be *direct* (or, as some writers term it, *immediate*), or it may be *mediate*. In the former case, the part to be examined is struck with the ends of the first three fingers set close together on the same level, or with a small hammer tipped with india-rubber; while in the latter, which is now almost universally adopted, a flat body is placed upon the chest, or other part to be examined, and is then struck by the fingers or hammer. The flat intervening body is termed a *Pleximeter* (from the Gr. *plexis*, 'a blow,' and *metron*, 'a measure'). The instrument usually sold as a pleximeter is a flat oval piece of ivory, but the left index or middle finger of the physician, with its flat surface fitted accurately to the part to be examined, acts equally well. The force of the stroke on the pleximeter—whether the stroke be made with the fingers or the hammer—must vary according as it is desired to elicit the sound from a superficial or a deep-seated part. The surface to be percussed should be exposed, or, at most, only covered with one layer of clothing; and the blow should fall perpendicularly on the pleximeter. When percussion is made over a considerable cavity filled with air—as the stomach or intestines—a hollow, drum-like, or (as it is usually termed by medical writers) a *tympanitic* sound is produced. When any part of the surface of the chest is struck below which there is a considerable depth of healthy lung-tissue, consisting of small cells filled with air, a clear sound, less loud and hollow than the tympanitic sound, and termed the *pulmonary percussion note*, depending partly on the vibrations of air in the lung-cells, and partly on the vibrations of the walls of the chest, is evolved. When the subjacent substance is solid (as the heart, liver, or spleen) or fluid (as when there is effusion into a closed sac) the sound is *dull* in proportion to the density and want of elasticity of the part struck. Important information is also gained by attending to the varying degree of resistance experienced by the fingers during percussion over different parts of the surface. The first thing that must be acquired in order to make percussion useful in the diagnosis of disease is an accurate knowledge of the sounds elicited from the different parts in their normal condition. When, for example, the healthy pulmonary percussion note is known, increased resonance of the walls of the chest will indicate a dilatation of the air-cells (or Pulmonary Emphysema), while various degrees of dullness will afford evidence of such morbid changes as the effusion of fluid into the pleura (Hydrothorax), or inflammatory solidification of the lung-tissue (the Hepatisation of Pneumonia), or tubercular deposition. The use of percussion in relation to diagnosis is further shown in the articles PERICARDIUM and PLEURISY. Diagnosis by Auscultation (q.v.), directly and by means of the Stethoscope (q.v.), is often used in connection with percussion.

Percussion Caps are small copper cylinders, closed at one end, for conveniently holding the detonating powder which is exploded by the act of percussion in percussion-arms. See FULMINATES; also FIREARMS, Vol. IV. p. 639.

Percussion, CENTRE OF. See CENTRE OF PERCUSSION.

Percy, a noble northern family, famous in the history of England for five hundred years. Its founder, William de Percy, came with the Conqueror to England, and was rewarded with lands in Hampshire, Lincolnshire, and Yorkshire—among the last being Topcliffe and Spofforth, long the chief seats of the house. The male descendants became extinct with the death of the third baron, and the representation of the house devolved upon his daughter Agnes, who married Josceline of Louvain, brother-in-law of King Henry I., on the condition that he assumed the name of Percy. Their youngest son, Richard de Percy, then head of the family, was one of the chief barons who extorted Magna Charta from King John, and the ninth feudal lord, Henry de Percy, gave much aid to Edward I. in the subjugation of Scotland, and was made governor of Galloway. The latter was driven out of Turnberry Castle by Robert Bruce, and was rewarded by Edward II. with the empty honour of Bruce's forfeited earldom of Carrick, and the governorship of the castles of Bamborough and Scarborough. In 1309 he obtained by purchase from Bishop Antony Bek the barony of Alnwick, the chief seat of the family ever since. His son, Henry de Percy, defeated and captured King David II. of Scotland at the battle of Neville's Cross (1346); his grandson fought at Crécy; his great-grandson, the fourth Lord Percy of Alnwick, was marshal of England at the coronation of Richard II., and was created the same day Earl of Northumberland. Henry, eldest son of the last, was the famous Hotspur whom the dead Douglas defeated at Otterburn (1388), and who himself fell at Shrewsbury (1403) fighting against King Henry IV. His brother, Thomas Percy, Earl of Worcester, was executed immediately after the battle. Their father, who had turned against Richard II., and helped Henry of Lancaster to the throne, was dissatisfied with Henry's gratitude, and with his sons plotted the insurrection which ended in Shrewsbury fight. Later he joined Archbishop Scroope's plot, and fell at Bramham Moor (1408), when his honours were forfeited on attainder, but restored in 1414 to his grandson Henry, the second earl, from which day the Lancastrian loyalty of the family never wavered. Henry became High Constable of England, and fell in the first battle of St Albans (1455). His son Henry, the third earl, fell at Towton (1461), and it was his brother, Sir Ralph Percy, who comforted himself as he lay bleeding to death on Hedgley Moor (1464), that he had 'saved the bird in his bosom.' The title and estates were now given to Lord Montagu, a brother of Warwick, the king-maker, but in 1469 Henry, the son of the third earl, subscribed an oath of allegiance to Edward IV., and was restored. He was murdered at his Yorkshire house of Cocklodge, in 1489, in an outburst of popular fury against an extortionate subsidy of Henry VII. The sixth earl, Henry-Algernon, in youth had been the lover of Anne Boleyn, and was forced against his will to marry a daughter of the Earl of Shrewsbury. He died childless in 1537, and, as his brother Sir Thomas Percy had been attainted and executed for his share in the Pilgrimage of Grace, the title and honours were forfeited, and the title of Duke of Northumberland was conferred by Edward VI. upon John Dudley, Earl of Warwick, who in turn was attainted and executed under Mary in 1553. That queen in 1557 granted the earldom to Thomas

Percy, son of the attainted Sir Thomas Percy. A devoted Catholic, he took part in the Rising of the North, and was beheaded at York in 1572. His brother Henry succeeded as eighth earl. He became involved in Throgmorton's conspiracy in favour of Mary Stuart, and was committed to the Tower, where he was found dead in bed, with a pistol beside him, whether through suicide or murder, 21st June 1585. His son, the ninth earl, was imprisoned for fifteen years in the Tower, and fined £30,000 on a baseless suspicion of being privy to the Gunpowder Plot. He was followed by his son, the tenth earl, who fought on the parliamentary side in the Civil War, and was succeeded by his son Josceline, the eleventh earl, with whose death in 1670 the male line of the family became extinct. Charles II. created in 1674 his third bastard by the Duchess of Cleveland, Earl, and afterwards Duke, of Northumberland, but the titles expired on his dying childless in 1716. The eleventh earl's only surviving child and heiress, in her own right Baroness Percy, married Charles Seymour, Duke of Somerset, and became the mother of Algernon, Duke of Somerset, who was created in 1749 Baron Warkworth and Earl of Northumberland, with remainder to his son-in-law, Sir Hugh Smithson, fourth Baronet, of Stanwick in Yorkshire. Sir Hugh succeeded to the earldom in 1750, assuming the surname and arms of Percy, and was created in 1766 Earl Percy and Duke of Northumberland. The sixth duke succeeded in 1867.

See books cited under NORTHUMBERLAND, and E. Barrington de Fonblanque's *Annals of the House of Percy* (privately printed, 2 vols. 1887).

Percy, THOMAS, editor of the famous *Reliques of Ancient English Poetry*, was born a grocer's son at Bridgnorth in Shropshire, April 13, 1729. He was educated at the grammar-school there; in 1746 entered Christ Church, Oxford; and in 1753 was presented by his college to the sequestered vicarage of Easton Maudit, Northamptonshire, where he lived for twenty-five years. In 1756 he married happily, and three years after received also the adjacent rectory of Wilby. His leisure soon yielded fruit in *Hau Kiou Chooan* (4 vols. 1761), a Chinese novel translated from the Portuguese, and *Miscellaneous Pieces relating to the Chinese* (2 vols. 1762), as well as anonymously in *Five Pieces of Runic Poetry translated from Icelandic* (1763), prompted by the success of Macpherson, and *A New Translation of the Song of Solomon from the Hebrew* (1764). In the summer of 1764 Dr Johnson paid him a long visit at Easton Maudit. In later days they sometimes quarrelled, but continued to retain a high regard for each other. 'A man out of whose company I never go without having learned something'—so Johnson described him to Boswell. 'I am sure that he vexes me sometimes, but I am afraid it is by making me feel my own ignorance.' In the February of the following year (1765) Percy published in 3 vols. the *Reliques of Ancient English Poetry* (4th ed. 1794; an excellent edition by H. B. Wheatley, 3 vols. 1886). He had long been engaged in collecting old ballads from every quarter, and a large folio MS. of ballads had fallen accidentally into his hands, having been found 'lying dirty on the floor under a Bureau in the Parlour' of his friend Humphrey Pitt of Shiffnal, in Shropshire, 'being used by the maids to light the fire.' This he claimed as the original of his work, but of the 176 pieces in the first edition actually only 45 were taken from the folio MS.; while almost all those actually from it were so touched up and tricked out in false ornament and conventional 18th-century poetic diction as often to bear but little likeness to their originals. For example, the 39 lines of the 'Child of Ell' have been puffed out to 200 in Percy's version, nor do even all the 39 originals themselves appear. Again, the 'Heir of Lin' has swollen from 125 lines to 216, and these, moreover, polished to death. The antiquary Ritson, in his 'Observations on the Ancient English Minstrels' prefixed to his *Ancient Songs from Henry III. to the Revolution* (1790), attacked Percy with characteristic acrimony, denied the very existence of the folio MS., and denounced the work as an impudent forgery, and that the worse because by a clergyman. Percy exhibited the MS. in Pall Mall, and had his portrait painted by Sir Joshua Reynolds holding it in his hand. For over a hundred years it lay hid in Ecton Hall, jealously guarded from almost all eyes, until at length Mr Furnivall, instigated by Professor Child, succeeded in getting it printed (3 vols. 1867–68; those deservedly marked by the bishop 'loose and humorous' being printed separately), with Introductions by Professor Hales and himself. The MS. was 15½ inches long by 5½ wide and about 2 inches thick, and was written in a Caroline hand.

The publication of Percy's *Reliques* was first suggested to him by Shenstone. The work was dedicated to the Countess of Northumberland, and the author was soon rewarded by being made chaplain to her husband, the first duke of the present creation, while he also succeeded in persuading himself that he was a scion of the noble house of Percy. In 1769 he became chaplain to George III., and next year he took his degree of D.D. at Cambridge, and published his translation of the *Northern Antiquities* of the Swiss historian Paul Henri Mallet (1730–1807). About 1771 his wife was appointed nurse to the Prince Edward, afterwards father of Queen Victoria, and her home-coming after a year at court gave her husband the inspiration for his lovely ballad, 'O Nanny wilt thou gang with me?' so happily set to music by an Irishman, Thomas Carter (c. 1735–1804). In 1771 Percy wrote also his pleasing ballad the 'Hermit of Warkworth.' In 1778 he was appointed to the deanery of Carlisle, in 1782 to be Bishop of Dromore, with £2000 a year. His only son died in 1783; his wife in 1806; he himself, after a few years of blindness, 30th September 1811—the only survivor of the original members of Dr Johnson's famous Literary Club. He left two daughters, and was buried in the transept which he himself had added to Dromore Cathedral.

For the literary influence of the *Reliques*, see the article BALLAD. A good Life by the Rev. J. Pickford is prefixed to vol. i. of Hales and Furnivall's reprint. Many of his letters are given in vol. viii. of J. B. Nichol's *Illustrations of the Literary History of the 18th Century*. His name was assumed by the Percy Society (94 issues, 1840–52).

Percy Anecdotes, a collection of extraordinary popularity, published in monthly parts (1820–23) by 'Sholto and Reuben Percy, Brothers of the Benedictine Monastery of Mount Benger.' Their real names were Thomas Byerley (died 1826), first editor of the *Mirror*, and Joseph Clinton Robertson (died 1852), projector and editor of the *Mechanics' Magazine*; the work owed its name to the Percy Coffee-house in Rathbone Place, their usual place of meeting during its progress. An edition was prepared by John Timbs (1868).

Peregrine Falcon. See FALCON.

Pereira, JONATHAN, pharmacologist, was born at Shoreditch, London, 22d May 1804, and was successively lecturer on chemistry and physician to the London Hospital (1841). Elected a Fellow of the College of Physicians in 1845, he acted as examiner in Materia Medica and Pharmacy from the establishment of the London University till his death, 20th January 1853. His books were *Elements of Materia Medica* (1839–40), and treatises on *Diet* and on *Polarised Light* (1843). See *Memoir* (1853).

Perekop, ISTHMUS OF, in South Russia, connecting the peninsula of the Crimea (q.v.) with the mainland of European Russia. For the dimensions and course of the ship-canal through the isthmus, for which the preliminary works were completed in 1889, see CANAL, Vol. II. p. 701. In the north of the isthmus is the small town of Perekop; pop. 5000.

Père-la-Chaise. See LACHAISE.

Perennial, in Botany, a term employed in contradistinction to Annual (q.v.) and Biennial (q.v.), to designate plants which subsist for a number of years. Some plants, however, which are annual in cold climates are perennial in warmer regions. The term perennial is in general applied only to herbaceous plants, and indicates a property only of their roots, the stems of most of them dying at the end of each summer. Perennial herbaceous plants, like shrubs and trees, are capable of producing flowers and fruit time after time, in which they differ from annual and biennial plants, which are fruitful only once. Those plants which are capable of being propagated by cloves, offset bulbs, or tubers are all perennial. Thus, the potato is a perennial plant, although the crop is planted in spring and reaped in autumn, like that of corn, whilst all the corn plants are annuals. There is great diversity in the duration of life of perennial plants.

Pereslavl, a town of Russia, 96 miles NE. of Moscow by rail. It has a 12th-century cathedral, cotton-manufactures, and lake-fisheries. Pop. 7466.

Perez, ANTONIO, minister of Philip II. of Spain, was born in Aragon in 1539. His reputed father was an ecclesiastic who was secretary to Charles I. and Philip II., and he himself was appointed to this office when only twenty-five years of age, and acquired the entire confidence of the king. Don John of Austria having sent his confidant, Juan de Escovedo, to Spain, to solicit aid against the party of Orange, and Escovedo having rendered himself an object of suspicion to the king as an abettor of Don John's ambitious schemes, Philip resolved to put him out of the way by murder, and entrusted Perez with the accomplishment of this design, which Perez accomplished accordingly, 31st March 1578. The family of Escovedo denounced Perez as the murderer, and all his enemies joined against him. The king at first sought to shield him; but in July 1581 he was arrested, and by torture forced to confess. He succeeded, however, in making his escape to Aragon, where he put himself under protection of its fueros, which secured a trial in open court. The king, charging him with heresy, now applied for aid in May 1591 to the Inquisition, and the Aragonese court delivered him up to its agents; but the people rose in tumult and liberated him. This happened repeatedly; and at last, in September 1591, Philip II. entered Aragon with an army powerful enough to subdue all opposition, abolished the old constitutional privileges of the country, and caused a number of the principal people to be executed. Perez, however, made his escape, avoiding the many plots which the king laid for his assassination. He was condemned in Spain as a heretic, but was treated with great kindness in Paris and in London, where he was the intimate of Bacon and the Earl of Essex. He spent the latter years of his life in Paris, and died there, 3d November 1611, in great poverty. Perez wrote an account of his misfortunes, which was published at Paris in 1598, under the title of *Relaciones*. See Mignet's monograph (5th ed. 1881); also Froude in *Nineteenth Century*, 1883.

Perfectibility, or PERFECTIONISM, the doctrine that man in a state of grace may attain to perfection in this life. Catholics hold that no one, not even the most holy, can avoid sin altogether except by a special privilege of God, as in the case of the Blessed Virgin; the justified do not, however, commit mortal, but venial sins (see SIN). In various points Franciscans, Jesuits, and Molinists approach to a doctrine of perfection denied by Dominicans and Jansenists. Among Protestants, Wesleyan Methodists believe in the possibility of a *Christian perfection* attainable in this life. It is not a perfection of *justification*, but a perfection of *sanctification;* which John Wesley, in a sermon on Christian Perfection, from the text Heb. vi. 1, 'Let us go on to perfection,' earnestly contends for as attainable in this life by believers, by arguments founded chiefly on the commandments and promises of Scripture concerning sanctification; guarding his doctrine, however, by saying that it is neither an *angelic* nor an *Adamic* perfection, and does not exclude ignorance and error of judgment, with consequent wrong affections, such as 'needless fear or ill-grounded hope, unreasonable love, or unreasonable aversion.' He admits, also, that even in this sense it is a rare attainment. The Friends profess that the justified may be 'free from actual sinning and transgression of the law of God, and in that respect perfect. Yet doth this perfection admit of a growth; and there remaineth a possibility of sinning where the mind doth not most diligently and watchfully attend unto the Lord.' Other schools also hold similar views; but most Protestants repudiate the doctrine of Perfectibility. The general belief of Protestant Christians is that those who have professed a belief in their own perfectibility were merely more self-complacent and less sensible of their own corruptions than is usual, and that the commands and promises concerning sanctification are all susceptible of an explanation consistent with remaining corruption in believers, and a need of further sanctification, or a continued going on unto perfection whilst this life endures.

Perfection, COUNSELS OF. See SUPEREROGATION.

Perfectionists, also called BIBLE COMMUNISTS and FREE-LOVERS, a small American sect, founded by John Humphrey Noyes, who was born at Brattleboro, Vermont, 6th September 1811, graduated at Dartmouth in 1830, then studied law, and afterwards theology at Andover and Yale. While a theological student, he experienced a second conversion, discovered that the prevailing theology was wholly wrong, and lost his license to preach. He held that the gospel if accepted secures freedom from sin; that God has a dual body (male and female); that the author of evil is uncreated, but not God; and that communion with Christ not merely saves from sinning, but from disease and death. He now founded a 'Perfectionist' church at Putney, Vermont. He and his converts, men and women, with their children, put their property into a common stock; they gave up the use of prayer, all religious service, and the observance of the Sabbath; those who were married renounced their marriage ties, and a 'complex marriage' was established between all the males and all the females of the 'Family.' Having dispensed with law, he set up public opinion as a controlling power in its stead; and free criticism of one another by the members of the society became an important feature of his system. In 1848, after not a few difficulties, the community removed to a new home in the sequestered district of Oneida, in the state of New York, and soon numbered some 300 members, living in strict order and with much outward comfort on thoroughly communistic principles—the community of women and of children being an outstanding feature carefully regulated by the 'mutual criticism' of the family. In 1880, however, the pressure of outside opinion forced the family to modify their peculiar principles; marriage and the ordinary family relationship was introduced; communism of property gave way to limited liability joint-stock, each member having a separate share represented by so much stock in the Oneida Community, Limited. Various co-operative institutions were also established. The headquarters are at Kenwood, New York, and works have been started also at Niagara Falls, Ontario. Noyes, who assisted in elaborating the new constitution, died at Niagara Falls, 13th April 1886.

See works by Noyes, *The Second Coming of Christ*, *Salvation from Sin the End of Faith*, and *History of American Socialism*; the periodicals conducted by him (nearly 40 vols. 1834-80; in British Museum); Hepworth Dixon's *New America*, &c.; Charles Nordhoff, *Communistic Societies of the United States* (1875).

Perfumery. Perfumes are of two distinct classes—those derived from plants and those which are of animal origin.

Vegetable Perfumes.—The most ancient of the so-called primary odoriferous bodies are the so-called gum-resins which exude naturally from the trees which yield them, or from wounds accidental or purposely inflicted to increase the yield. The most important are benzoin, myrrh, opoponax, tolu, Peru, and storax. Gum-resins form the chief ingredients in 'Incense' (q.v.) and Pastilles (q.v.).

A second group is that large class of perfumes which are procured by distillation, and are mostly fluid bodies, and are termed Volatile Oils, Essential Oils, or Ottos—formerly Quintessences (see OILS). As soon as the Greeks and the Romans learned the use of the still, which was an invention imported by them from Egypt, they quickly adapted it to the separation of the odorous principle from the numerous fragrant plants indigenous to Greece and Italy. Long before that time, however, fragrant waters were in use in Arabia. Odour-bearing plants contain the fragrant principle in minute glands or sacs; these are found sometimes in the rind of the fruit, as the lemon and orange; in others it is in the leaves, as sage, mint, and thyme; in wood, as rosewood and sandalwood; in the bark, as cassia and cinnamon; in seeds, as caraway and nutmeg; in yet others in the petals, as in rose, lavender, or Ihlang-Ylang. The odour principle of orris is a solid resembling cocoa-butter, and is contained in what is really the rhizome of *Iris florentina*, though technically called orris-root. These glands or bags of fragrance may be plainly seen in a thin-cut stratum of orange-peel; so also in a bay leaf, if it be held up to the sunlight, all the oil-cells may be seen like specks. All the fragrance-bearing substances yield by distillation an essential oil peculiar to each; thus is procured oil of patchouli from the leaves of the patchouli plant, *Pogostemon patchouli*, a native of Burma; oil of caraway, from the caraway-seed; oil of geranium, from the leaves of the *Pelargonium roseum;* oil of lemon, from lemon-peel, *Citrus limonis;* and a hundred of others of infinite variety.

All the various essential oils or ottos are very slightly soluble in water, so that in the process of distillation the water which comes over is always fragrant. Thus, elder-water, rose-water, orange-water, dill-water are, as it were, the residue of the distillation for obtaining the several ottos. The process of Distillation (q.v.) is very simple: the fragrant part of the plant is put into the still and covered with water, and when the water is made to boil the ottos rise along with the steam, are condensed with it in the pipe, and remain floating on the water, from which they are easily separated by decanting. In this way 100 lb. of orange, lemon, or bergamot fruit peel will yield about 10 oz. of the fragrant oil; 100 lb. of cedar-wood will give about 15 oz. of oil of cedar; 100 lb. of nutmeg will yield 60 to 70 oz. of oil of nutmeg; 100 lb. of geranium leaves will yield 2 oz. of oil.

Every fragrant substance varies in yield of essential oil. The variety of essential oils is endless; but there is a certain relationship among odours as among tints. The lemon-like odours are the most numerous, such as verbena, lemon, bergamot, orange, citron, citronella; then the almond-like odours, such as heliotrope, vanilla, violet; then spice odours, cloves, cinnamon, cassia. The whole may be classified into twelve well-defined groups. All these ottos are very soluble in alcohol, in fat, butter, and fixed oils. They also mix with soap, snuff, starch, sugar, chalk, and other bodies, to which they impart their fragrance.

The principal consumption of the cheaper sorts of fragrant ottos is for scenting Soaps (q.v.), most of which are perfumed while in a melted state with the several ottos or mixtures of them. The best qualities of soaps, however, are scented cold by grinding or squeezing the previously dried soap between granite rollers after having been mixed with the perfumes. With perhaps the exception of Tonquin bean, the 'scents' used for snuffs and tobacco can scarcely be termed perfumes. There is a large consumption of fragrant essential oils in the manufacture of toilet powders; under the various names of rose powder, violet powder, &c.; a mixture of starch and orris, differently scented, is in general demand for drying the skin of infants after the bath. Precipitated chalk and powdered cuttle-fish bone, being perfumed with otto of roses, powdered myrrh, and camphor, become 'Dentifrice.' The ottos of peppermint, lavender, rose, and others are extensively used in flavouring sweetmeats and lozenges.

It is found that some flowers either do not yield an essential oil by distillation or yield it in quantities too small to be commercially available. The perfume from these is collected by the process called *enfleurage*. The flower-farmers of the Alpes Maritimes follow this method on a very large scale with the following flowers: rose, orange, acacia, violet, jasmine, tuberose, and jonquil. In the valley of the Var there are acres of flowers, the blossoms of which are gathered by women and children, and placed in little panniers like fishermen's baskets hung over the shoulders. They are then carried to the laboratory of flowers and weighed. In the laboratory great quantities of grease, lard, and beef-suet have been collected, melted, washed, and clarified. In each laboratory there are several thousand *châsses* or *châssis* ('sashes'), upon which the grease to be scented is spread, and upon this grease the blossoms are sprinkled or laid. The *châsse en verre* is, in fact, a frame with a glass in it as near as possible like a window-sash, only that the frame is two inches thicker, so that when one châsse is placed on another there is a space of four inches between every two glasses, thus allowing space for blossoms. The flower blossoms are changed every day, or every other day. The same grease, however, remains in the châsse so long as the particular plant being used yields blossoms. Each time the fresh flowers are put on, the grease is 'worked'—i.e. serrated with a knife—so as to offer a fresh surface of grease to absorb odour. The grease being *enfleurée* or 'enflowered' in this way for three weeks or more—in fact, so long as the plants produce blossoms, or the fat is capable of absorbing more odour—is at last scraped off the châsse, melted, strained, and poured into tin canisters, and is now fit for exportation. Fat or oil is perfumed with these same flowers by the process of *maceration*—i.e.

infusion of the flowers in oil or melted fat. For this end purified fat is melted in a *bain marie*, or warm water bath, and the fresh blossoms are infused in it for several hours. Fresh flowers being procured, the spent blossoms are strained away, and new flowers added repeatedly, so long as they can be procured. Oil does not require to be warmed, but improved results are obtained when it is slightly heated.

Jasmine and tuberose produce best perfumed grease by enfleurage, but rose, orange, and acacia give more satisfactory products by maceration; while violet and jonquil grease is best obtained by the joint processes—enfleurage followed by maceration. In the place of glass the space is filled with a wire-net on which is laid a *molleton*, or thick cotton fabric—moleskin, soaked with oil; on this the flowers are laid, just as with solid grease. In due time—that is, after repeated changing of the flowers—the oil becomes fragrant, and it is then pressed out of the moleskin cloth. Oil of jasmine, tuberose, &c. are prepared in this way. In order now to obtain the perfume of these flowers in the form used for scenting handkerchiefs, we have only to infuse the scented fat or oil, made by any of the above methods, in strong alcohol.

In extracting the odour from solid fat it has to be chopped up as fine as suet is chopped, put into the spirit, and left to infuse for about a month. In the case of scented oil it has to be repeatedly agitated with the spirit. The result is that the spirit extracts all the odour, becoming itself 'perfume,' while the grease again becomes odourless; thus is procured the essence of jasmine, essence of orange-flowers, essence of violets, and others already named, rose, tuberose, acacia, and jonquil. It is right to mention that the reason for producing a pomade—as these scented fats are technically termed—of orange-flowers is that the odour of the essential oil obtained by the distillation of orange-blossoms with water has not, in the least degree, the odour of the orange-blossoms from which it is obtained. The otto in fact undergoes a chemical change, and is no longer orange so far as odour is concerned. It is called Neroli, and is valued at from £16 to £20 the lb. weight, the variation depending upon the crop, which is of course greatly influenced by the season. The same remarks apply, though in a less marked degree, to rose.

Some idea of the magnitude of the flower industry may be gained from the following summary showing the weight of these particular flowers grown in the south of France in 1889: orange-blossoms, 1860 tons; roses, 930; violets, 147; jasmine, 147; tuberose, 74; cassia, 30; jonquil, 15. The seat of the rose industry for the production of otto of roses is Bulgaria, more especially the cantons of Kezanlik and Karlova. Here no less than 5660 lb. were produced in 1889 at an average value of say 20s. per oz.

Perfumes of Animal Origin.—Only four of these are used in perfumery—viz. Musk (q.v.), Ambergris (q.v.), Civet (q.v.), and Castor (q.v.). The aroma of musk freely imparts odour to every body with which it is in contact. Its power to impart odour is such that polished steel will become fragrant of it if the metal be shut in a box where there is musk, contact not being necessary. In perfumery manufacture tincture of musk is mixed with other odorous bodies to give permanence to the more evanescent perfumes or bouquets, the musk acting to them almost as a mordant does to a dyestuff. The usual statement as to the length of time that musk continues to give out odour is exaggerated. If fine musk be spread in thin layers upon any surface, and fully exposed to a changing current of air, all fragrance, it is said, will be gone in from six to twelve months. The finest musk, that which indeed is only really useful in perfumery, is distinguished as Tonquin musk, the average price of which is about 90s. per oz.

Civet is exceedingly potent as an odour, and when pure, and smelled at in the bulk of an ounce or so, is utterly insupportable from its nauseousness; in this respect it exceeds musk. When, however, civet is diluted so as to afford but minute quantities to the olfactories, then its sweet perfume is generally admitted; the fragrant principle is the same as that breathed by the beautiful narcissus. Civet is extensively used duly attenuated in perfumery. Its powerful and lasting odour enables it to be used in some soaps, and especially in sachets. It is one of the perfumes of 'Spanish Leather,' or Peau d'Espagne; the first gloves used in England were scented with it. Several thousand ounces are annually imported, the average price of which is about 9s. per oz.

Castor is in our day said to be almost obsolete as a perfume, but this is not so; for although it cannot be largely used in any given perfume on account of the almost blackness of its tincture, still when properly diluted it is extensively employed. Its perfume, when old especially, is exceedingly pleasant, and its *fixing* power is at least equal to that of musk. About 1500 lb. are annually imported, which fetch on the market about 36s. per lb.

Of late years the progress of scientific chemistry has led to the production of numerous odoriferous substances, some identical with the active odoriferous principles of plants. Among them may be mentioned vanillin, the principle of vanilla (methyl protocatechnic aldehyde); coumarin, of Tonquin bean (coumaric anhydride), and many derivatives of phenol; but the majority of this class of bodies are more used in confectionery for flavouring than in perfumery. The artificial musk of L. Bauer is a delightful perfume, and has many applications in perfumery; but it differs widely in odour from true musk.

The perfumes or bouquets of the shops are really mixtures of some or several of the primitive odours of the two above-mentioned groups. An example or two will illustrate this. 'Jockey Club Bouquet' is thus compounded: 2 gal. extract of orris; ½ gal. each of cassia, rose, and tuberose pomades; ½ gal. civet; ¼ gal. musk; 1½ gal. spirits of wine; 8 oz. bergamot otto; 1½ oz. rose. 'White Rose:' 2 pints extract rose pomade; 1 pint each cassia and jasmine; 1½ pint spirits of wine; ½ oz. rose otto; 1 drm. patchouli otto. It is obvious that the possible variety is infinite, since there are some sixty or more primitive odoriferous substances.

See the *Rose Industry of Bulgaria*, by Christo Christoff, Kezanlik (trans. by C. H. Piesse); and the 5th edition of Piesse's *Art of Perfumery* (Lond. 1891).

Pergamus, or PERGAMUM, anciently a city of Mysia in Asia Minor, on the river Caïcus, 15 miles from its mouth. According to tradition, the place was founded by Greeks from Arcadia. It first acquired prominence when Lysimachus, one of Alexander's generals, chose it as a stronghold in which to keep his treasures. Under Philetærus, his eunuch, whom he appointed guardian of his treasures, it became the capital of a state, 283 B.C. His successor, Eumenes I., maintained its independence against the Seleucids, although the title of king was first assumed by Attalus I., who reigned from 241 to 197 B.C., and defeated the Gauls in a great battle. He intimately allied himself with the Romans against Philip of Macedon, and this alliance subsisted throughout succeeding reigns, during which the kingdom continued to increase in extent and importance. Attalus III., surnamed Philometer, who died in 133 B.C., left it to the Romans, and under them it was one of the chief cities of Asia Minor. The native kings had adorned it with grand sculptures, the work of artists belonging to the Pergamenian school, and collected a library only inferior to that of Alexandria. Pergamus was a special seat of the worship of Asclepius (Æsculapius); and it gave its name to Parchment (q.v.). It began to decline under the Byzantine emperors. The place still exists under the name *Bergama*, and is noted for the splendour and magnificence of its ruins, which embrace temples, palaces, aqueducts, gymnasia, amphitheatres, and city walls. These were excavated for the Prussian government by Humann, Bohn, and others, in 1878–86, many of the treasures being carried to Berlin.

Pergolese, GIOVANNI BATTISTA, Italian musician, was born at Jesi, near Ancona, on 3d January 1710, studied music at Naples, and struck out an original style for himself. His first great work was the oratorio of *San Guglielmo*, composed in 1731, in which year appeared his bright and tuneful operetta of *La Serva Padrona*. This is his masterpiece; it was revived in London in 1873. In 1734 he was appointed *maestro di capella* of the Church of Loretto. In consequence of delicate health he removed to Pozzuoli, where he composed the cantata of *Orfeo* and his second masterpiece, the pathetic *Stabat Mater*, but died immediately afterwards on 16th March 1736. Besides the works quoted, Pergolese composed numerous operas, oratorios, and other sacred pieces.

Peri, according to the mythical lore of the East, a being begotten by fallen spirits, which spends its life in all imaginable delights, is immortal, but is for ever excluded from the joys of Paradise. It takes an intermediate place between angels and demons, and is either male or female. So far from there being only female Peris, as is supposed by some, and these the wives of the Devs, the Peris live, on the contrary, in constant warfare with these Devs. Otherwise, they are of the most innocuous character to mankind, and, just like the fairies with whom our own popular mythology has made us familiar, are when female of surpassing beauty. They belong to the great family of genii, or Jinn (see DEMONOLOGY).

Periagua, a large canoe composed of the trunks of two trees, hollowed and united into one fabric; whereas an ordinary canoe is formed of the body of one tree only.

Perianth. See FLOWER.

Pericardium, a conical membranous sac containing the heart and the commencement of the great vessels, to the extent of about 2 inches from their origin. It is placed with its apex upwards behind the sternum in the interval between the pleuræ—the serous sacs in which the lungs are enclosed; while its base is attached to the diaphragm. It is a fibro-serous membrane, consisting of an external fibrous and an internal serous layer. The outer layer is a strong, dense, fibrous membrane; the serous layer invests the heart, and is then reflected on the inner surface of the fibrous layer. Like all serous membranes, it is a closed sac; its inner surface is smooth and glistening, and secretes a thin fluid which serves to facilitate the natural movements of the heart. It is inflammation of this serous sac which constitutes the disease known as pericarditis.

DISEASES OF THE PERICARDIUM.—Pericarditis is a disease of frequent occurrence; the result of a very large number of post-mortem examinations being to show that about one in twenty-three of all who die at an adult age exhibits traces of recent or old attacks of this disorder. The first change which takes place in an inflamed pericardium is a dulling of its glistening surface, with some congestion, which is speedily followed by effusion into the sac. The effusion is sometimes almost entirely fibrinous, in which case it coagulates, and gives rise to adhesions between the heart and the pericardium; or it may consist almost entirely of serum, which remains liquid; or it may be, and most frequently is, a mixture of the two. In a few cases it rapidly becomes purulent. In the cases that prove fatal when fibrinous fluid has been effused, but has not coagulated to such an extent as to cause complete adhesion of the heart to the pericardium, the partially coagulated fibrin or lymph is seen to be of a yellowish-white colour, and to occur in a rugged, shaggy, or cellular form. Laennec compared the surface on which the lymph is deposited to that which would be produced by suddenly separating two flat pieces of wood between which a thin layer of butter had been compressed. When the patient dies at a more advanced stage of the disease —viz. soon after the whole of the membrane has become adherent—incipient blood-vessels, in the form of red points and branching lines, are seen, indicating that organisation is commencing in the deposit, which if death had not ensued would have been finally converted into cellular or areolar tissue, and might have occasioned the complete obliteration of the pericardial cavity.

The recognition of the disease depends almost entirely upon the signs revealed by auscultation and percussion. The earliest is generally the *friction-sound*, or *to and fro murmur*, caused by rubbing together of the roughened surfaces, and heard to accompany the heart's action; but if fluid is effused it may speedily disappear. In this case percussion of the chest shows that the dull area occupied by the heart is larger than normal, while the impulse of the organ on the chest-wall cannot be felt. The symptoms, besides those common to all inflammations, are extremely variable: in some cases where pericarditis comes on in the course of other serious disease the patient makes no complaint, and the complication is only discovered during the routine examination of the chest. But there may be intense pain and tenderness on pressure in the region of the heart, great irregularity or feebleness of the heart's action, distressing breathlessness, delirium, &c.

Pericarditis is a disease which occasionally runs a very rapid course, and terminates fatally in forty-eight hours or less. In ordinary cases, however, which terminate in apparent recovery, the disease generally begins to yield in a week or ten days, and, excepting that adhesion may remain, the cure appears to be complete in three weeks or less. If the adhesions which have formed are dense and fibrous, they may impede the heart's action and lead to serious symptoms at some subsequent period.

Pericarditis rarely occurs as an independent disease. It may result from extension of an inflammation in a neighbouring organ, pleura, ribs, &c. It is no uncommon result of a contaminated state of the blood, such as occurs in the exanthematous diseases, especially scarlatina, and in Bright's disease of the kidney; but, beyond all comparison, it is of most frequent occurrence in association with acute Rheumatism (q.v.), of which it forms one of the most serious complications. It is often associated with inflammation of the muscular substance of the heart, and, especially in rheumatism, of the lining membrane as well.

The treatment of pericarditis at present in favour is much less active than when bleeding, mercurialisation, &c. were considered necessary. Complete rest in bed, light diet, with opium or other sedatives as required; general medication suited to the disease with which the pericarditis is associated; local application of poultices or cotton-wool, sometimes of leeches or blisters, are the chief measures employed. In cases where there is extensive fluid effusion it may be necessary to aspirate, or, if the fluid be purulent, even to make a free incision.

The pericardium may also be distended with fluid without inflammation (hydropericardium) in the course of general dropsy; and occasionally is the seat of tumours, syphilitic or tubercular processes, &c.

Pericarp. See FRUIT.

Pericles, the greatest statesman of ancient Greece, was born of distinguished parentage in the early part of the 5th century B.C. His father was that Xanthippus who won the victory over the Persians at Mycale, 479 B.C.; and by his mother, Agariste, the niece of the great Athenian reformer Cleisthenes, he was connected with the princely line of Sicyon and the great house of the Alcmæonidæ. He received an elaborate education; but of all his teachers the one whom he most reverenced was the serene and humane philosopher Anaxagoras. Pericles was conspicuous all through his career for the singular dignity of his manners, the Olympian grandeur of his eloquence, his 'majestic intelligence,' in Plato's phrase, his sagacity, probity, and profound Athenian patriotism. Both in voice and in appearance he was so like Pisistratus that for some time he was afraid to come forward in political life. When he entered on public life Aristides had only recently died, Themistocles was an exile, and Cimon was fighting the battles of his country abroad. Although the family to which he belonged was good, it did not rank among the first in either wealth or influence, yet so transcendent were the abilities of Pericles that he rapidly rose to the highest power in the state as the leader of the dominant democracy. The sincerity of his attachment to the popular party has been questioned, but without a shadow of evidence. At anyrate the measures which either personally or through his adherents he brought forward and caused to be passed were always in favour of extending the privileges of the poorer class of the citizens, and, if he diminished the spirit of reverence for the ancient institutions of public life, he enlisted an immense body of citizens on the side of law. He extended enormously, if he did not originate, the practice of distributing gratuities among the citizens for military service, for acting as dicast and in the Ecclesia, and the like, as well as for admission to the theatre—then really a great school for manners and instruction. Pericles seems to have grasped very clearly, and to have held as firmly, the modern radical idea, that, as the state is supported by the taxation of the body of the citizens, it must govern with a view to general interests rather than to those of a caste alone.

About 463 Pericles, through the agency of his follower, Ephialtes, struck a great blow at the influence of the oligarchy, by causing the decree to be passed which deprived the Areopagus of its most important political powers. Shortly after the democracy obtained another triumph in the ostracism of Cimon (461). During the next few years the political course pursued by Pericles is less clearly intelligible to us, but it is safe to say that in general his attitude was hostile to the desire for foreign conquest or territorial aggrandisement, so prevalent among his ambitious fellow-citizens. Shortly after the battle of Tanagra (457), in which he showed conspicuous courage, Pericles magnanimously carried the measure for the recall of Cimon. His successful expeditions to the Thracian Chersonese, and to Sinope on the Black Sea, together with his colonies planted at Naxos, Andros, Oreus in Eubœa, Brea in Macedonia, and Ægina, as well as at Thurii in Italy and Amphipolis on the Strymon, did much to extend and confirm the naval supremacy of Athens, and afford a means of subsistence for her poorer citizens. But his greatest project was to form in concert with the other Hellenic states a grand Hellenic confederation in order to put an end to the mutually destructive wars of kindred peoples, and to make of Greece one mighty nation, fit to front the outlying world. The idea was not less sagacious than it was grand. Had it been accomplished the semi-barbarous Macedonians would have menaced the civilised Greeks in vain, and even Rome at a later period might perhaps have found the Adriatic, and not the Euphrates, the limit of her empire. But the Spartan aristocrats were utterly incapable of appreciating such exalted patriotism, or of understanding the political necessity for it, and by their secret intrigues the well-planned scheme was brought to nothing. Athens and Sparta were already in that mood towards each other which rendered the disaster of the Peloponnesian war inevitable. When the Spartans in 448 restored to the Delphians the guardianship of the temple and treasures of Delphi, of which they had been deprived by the Phocians, the Athenians immediately after marched an army thither, and reinstated the latter. Three years later an insurrection broke out in the tributary Megara and Eubœa, and the Spartans again appeared in the field as the allies of the insurgents. The position of Athens was critical. Pericles wisely declined to fight against all his enemies at once. A bribe of ten talents sent the Spartans home, and the insurgents were then thoroughly subdued. The thirty years' peace with Sparta (445) left him free to carry out his schemes for the internal prosperity of Athens.

Cimon was now dead and was succeeded in the leadership of the aristocratical party by Thucydides, son of Melesias, who in 444 B.C. made a strong effort to overthrow the supremacy of Pericles by attacking him in the popular assembly for squandering the public money on buildings and in festivals and amusements. Thucydides made an effective speech; but Pericles immediately rose and offered to execute the buildings at his own expense, if the citizens would allow him to put his own name upon them instead of theirs. The sarcasm was successful, Thucydides was ostracised, and to the end of his life Pericles reigned the undisputed master of the public policy of Athens. During the rest of his career 'there was,' says the historian Thucydides, 'in name a democracy, but in reality a government in the hands of the first man.' And the Athens of his day was the home of Æschylus, Sophocles, Euripides, Anaxagoras, Zeno, Protagoras, Socrates, as well as Myron and Phidias; while there flourished at the same time, but elsewhere in Greece, Herodotus, Hippocrates, Pindar, Empedocles, and Democritus. The centre of this splendid group was Pericles, of whom the truthful pen of Thucydides records that he never did anything unworthy of his high position, that he did not flatter the people or oppress his adversaries, and that with all his unlimited command of the public purse he was personally incorruptible.

Soon after this the Samian war broke out, in which Pericles gained high renown as a naval commander. This war originated in a quarrel between Miletus and the island of Samos, in which Athens was led to take part with the former. The Samians after an obstinate struggle were beaten, and a peace was concluded (439). The position in which Athens then stood towards many of the Greek states was peculiar. Since the time of the Persian invasion she had been the leader of the confederacy formed to resist the attacks of the powerful enemy, and the guardian of the confederate treasury kept in the isle of Delos. Pericles caused the treasury to be removed to Athens, and, commuting the contingents of the allies for money, enormously increased the contributions to the patriotic fund, Athens herself undertaking to protect the confederacy. The grand charge against Pericles is that he applied the money thus obtained to other purposes than those for which it was designed; that, in short, he adorned and enriched Athens with the spoils of the allied states. To his mind Hellas was subordinate to Athens, and he confounded the splendour of the dominant city with the splendour of Greece in a manner possible to a man of poetic imagination, hardly to a man of the finest honour. His enemies, who dared not attack himself, struck at him in the persons of his friends. Phidias was flung into prison for the impiety of introducing portraits of himself and Pericles into the battle of the Amazons depicted on the shield of the goddess Athena in the Parthenon; the brilliant Aspasia, the famous mistress of Pericles, was arraigned on a charge of impiety, and only acquitted through the eloquence of Pericles on her behalf; while the aged Anaxagoras was driven from the city.

It is unnecessary to give a detailed account of all that Pericles did to make his native city the most glorious in the ancient world. Greek architecture and sculpture under his patronage reached perfection. To him Athens owed the Parthenon, the Erechtheum, left unfinished at his death, the Propylæa, the Odeum, and numberless other public and sacred edifices; he also liberally encouraged music and the drama; and during his rule industry and commerce were in so flourishing a condition that prosperity was universal in Attica.

At length in 431 the long-foreseen and inevitable Peloponnesian war broke out between Athens and Sparta. The plan of Pericles was for Athens to follow a defensive attitude, to defend the city itself, leaving Attica to be ravaged by the enemy, but to cripple the power of Sparta by harassing its coasts. The story of the war is told elsewhere; here it is enough to say that the result was fatal to Athens for reasons for which Pericles was only in small part to blame. He trusted in the ultimate success of Athens both from her superior wealth and from her possessing the command of the sea, but he had not calculated upon the deterioration in her citizens' spirit, nor upon the robust courage of the Bœotian and Spartan infantry. Nor was his advice to keep behind the city walls rather than face the enemy in the field best calculated to arouse the Athenians' courage. The plague ravaged the city in 430, and in the autumn of the following year Pericles himself died after a lingering fever. His two sons had been carried off by the plague; he had been harassed by a charge of peculation brought by Cleon, and the actual infliction of a fine by the dicastery, while he had been without office from July 430 to July 429; but before the last he recovered his hold over the Ecclesia, and was gratified in the closing days of his life by its legitimation of his son by Aspasia.

As a statesman his greatest fault was a failure to foresee that personal government is ultimately ruinous to a nation. He taught the people to follow a leader, but he could not perpetuate a descent of leaders like himself. Hence we cannot wonder, when days of trouble broke over Athens, how that men spoke bitterly of Pericles and all his glory. Yet he was a lofty-minded statesman, inspired by noble aspirations, and his heart was full of a noble love for the city and her citizens. Plutarch tells the story that as he lay dying and apparently unconscious his friends around his bed were passing in review the great achievements of his life, and the nine trophies which he had erected at different times for so many victories. The dying patriot quietly interrupted with the characteristic sentence—'What you praise in my life belongs partly to good fortune, and is, at best, common to me with many generals. But that of which I am proudest you have left unnoticed—no Athenian has ever put on mourning through any act of mine.'

For his life and character, see Thucydides and Plutarch; the histories of Greece of Thirlwall, Grote, and Curtius; W. Watkiss Lloyd's *Age of Pericles* (2 vols. 1875); and the excellent study by Evelyn Abbott in the 'Heroes of the Nations' series (1891).

Peridotite. See IGNEOUS ROCKS.

Périer, CASIMIR, French politician, was born at Grenoble, 21st October 1777. A Parisian banker, he condemned in 1817 the financial policy of the ministry, and thereby won a seat in the Chamber of Deputies. In 1828 he held the portfolio of finance under Martignac, but resigned it in August of the next year. Having taken an active part in the July revolution (1830), he was rewarded with a seat in the cabinet, but without a portfolio. When, however, Laffitte became President of the Council (November 2), Périer undertook the presidency of the Chamber of Deputies. On 13th March 1831 he succeeded Laffitte as minister; he sternly repressed all attempts at revolution, and governed by the *Juste Milieu* (q.v.) policy. He died of cholera, 16th May 1832. For his son, see CASIMIR-PÉRIER.

Perigee. See MOON.

Périgueux, a town of France, formerly capital of Périgord, now in the department of Dordogne, and situated on the right bank of the Isle, a tributary of the Dordogne, 95 miles by rail NE. of Bordeaux. It consists of the ancient city, which is gloomy in aspect and has narrow streets, with numerous houses and other remains of mediæval and Renaissance architecture, and the Puy St Front, which until 1269 was a separate and a rival town. The cathedral of St Front is a Byzantine edifice, said to be a copy of St Mark's at Venice, built in 984–1047, but spoilt by 'restoration' in 1865. The town museum is especially rich in Roman and other antiquities. Statues of Montaigne, Fénelon, and the soldiers Daumesnil and Bugeaud adorn public places in the town. Iron is mined and worked, and woollens are manufactured. The celebrated *pâtés de Périgueux*, made of partridges and truffles, are largely exported. Pop. (1891) 30,725. Périgueux, a town of the highest antiquity, is the Gallic *Vesunna* mentioned by Cæsar. The Romans built another town on the opposite side of the river at the junction of five Roman roads. Close to the modern town are the remains of a vast amphitheatre, aqueducts, baths, and temples. The tower of Vesunna is the most remarkable fragment of Roman architecture. It is 89 feet high, 200 feet in circumference, and has walls 6 feet thick, but has neither doors nor windows. Its purpose is not known. The district of Périgord is noted for its Caves (q.v.) and archæological finds. See FLINT IMPLEMENTS.

Perihelion (Gr. *peri*, and *hēlios*, 'the sun'), that point in its orbit at which a planet is nearest the sun. See PLANETS, ORBIT, APHELION.

Perim, a barren island, and coaling and telegraph station, belonging to Britain, situated in the Strait of Bab-el-Mandeb, at the southern entrance to the Red Sea, 97 miles W. of Aden, 1½ from the Arabian shore, and 9 from the African. It is about 3½ miles long by 2½ wide, and crescent shaped, the two horns embracing a deep and spacious harbour. The island was held by the British in 1799–1800, and was again occupied in 1857. In 1883 it was made a coaling station, and soon began to be a rival to Aden. The island is under the jurisdiction of the governor of Bombay Presidency. Pop. about 400, mostly coolie coal-heavers. See H. Spalding, *Perim as it is* (1890).

Perinæum, the floor of the human pelvis. The anterior portion, situated in front of the anus, is called the *true perinæum*, or urethral portion of the perinæum; the posterior portion is called the anal portion or ischio-rectal region.

Period and Periodicity. One of the most striking features of the ordinary phenomena of nature is their tendency to recur and repeat themselves apparently indefinitely; and in general this repetition takes place at successive and practically equal intervals of time. The day, the month, the year are familiar examples of such periods, corresponding respectively to the earth's rotation, the moon's progression through its phases, and the earth's changes of distance from the sun. As a factor in human life the year is practically traced out by the climatic changes that accompany its progress, but strictly speaking it is the period determined by the recurring configurations of earth and sun. Many periodic phenomena of importance, such as eclipses, transits, occultations, depend like the moon's phases on the configurations of three bodies; and long before Newton's law of gravitation gave the key to the cosmic universe the periods of some of these had been discovered. See CHRONOLOGY (with its various cycles—the metonic of 19 years, the Calippic of 76 years, &c.), CYCLE, DAY, ECLIPSES, YEAR, &c.

When we look into the minute mechanism of nature we find here also the same prominence attached to periodic qualities. Sound and light consist physically of a vibratory or oscillatory motion of some sort; and to the accurate time periodicity of these motions we trace our sensations of harmony in music and colour. In certain respects, however, the periodicity is imperfect, each period not being an exact reproduction of its predecessor. Thus, a tuning-fork or pianoforte-string vibrating freely in air rapidly loses its vibratory character, and its motion steadily decays; and yet, judged by the pitch, the frequency or time periodicity remains the same throughout. In these and similar cases Viscosity (q.v.) ultimately transforms the original vibratory energy into heat (see ENERGY). Heat itself is believed to be some kind of vibratory energy of the molecules; and the spectroscope demonstrates that intense heat is certainly associated with definite periodic motions, giving rise to rays of corresponding periodicity (see SPECTRUM).

Passing now to the other extreme, we find, chiefly in astronomy, instances of long periods, some of which have not been completed within historic times, but of which the evidence is incontrovertible. The Precession (q.v.) of the equinoxes and the slow changes in the eccentricities and inclinations of planetary orbits may be mentioned by way of illustration. The geologist also has found evidence of periodic changes in the climatic conditions of the earth (see GLACIAL PERIOD, PLEISTOCENE). Generally periodicity involves the idea of time; but we may have periodic qualities depending on position or on grouping. A very good example of this is the periodic law of modern chemistry (see ATOMIC THEORY; also WAVE).

Life is as full of periodic phenomena as inanimate nature; but the increasing complexity of conditions makes the periodicity still less perfect. In the beating of the heart, in the alternation of waking and sleeping, of hunger and satiety we have examples of vital actions with a distinct periodic character.

Periodicals. Everything is a periodical that is published periodically. Every publication that is published more than once is necessarily published periodically. Therefore every publication, excepting a book complete in itself, may, strictly speaking, be described as a periodical, from the *Times* to *Whitaker's Almanac* and the *Post-office Directory*. The use of the term is, however, restricted in ordinary conversation to magazines and reviews appearing not less frequently than once a quarter, and not more frequently than twice a month. Weeklies, at least in Great Britain, have with a few exceptions ceased to be regarded as periodicals. As we have no fortnightlies, our periodicals may be said to be practically reduced to monthlies and quarterlies.

The refusal of the English-speaking world to tolerate fortnightly publications is as remarkable as it is unmistakable. In France and Italy and Belgium the fortnightly is regarded as the natural form of the high-class periodical. Outside these countries the fortnightly is practically unknown. Neither in Great Britain, nor in Greater Britain, has it been found possible to acclimatise the fortnightly. In Russia, in Germany, in Scandinavia, and in Spain and Portugal the periodicals are monthly. As if to remind the world of the constitutional incapacity of the English race to take its literature in bimonthly instalments, the *Fortnightly Review* is published monthly, but religiously announces on every cover that the issue of the 15th is suspended.

The number of periodicals is almost numberless. There are 332 monthlies in Italy alone, of which, at a moderate computation, 300 are read by no one outside Italy, and by probably fewer than 300 subscribers within the peninsula. But the number of periodicals of general interest that are worth calling periodicals are comparatively few. In Italy, for instance, there are hardly more than three which the outside world ever heard of. In France there are not more than four or five. Different countries excel in different departments. For pure literature and criticism the *Revue des Deux Mondes* has the first place. For illustration America leads easily, distancing all rivals with the *Century*, *Scribner's*, and *Harper's*; while in the second rank, although still ahead of foreign competitors, with one exception, come the *Cosmopolitan* and the *New England Magazine*. The only exception is the German magazine, *Velhagen und Klasing's Neue Monatshefte*. For general interest and solidity combined the English quarterlies and monthly miscellanies rank first, although they are hard pressed by the *Nouvelle Revue*, the *North American Review*, the *Forum*, and the *Arena*. For bulk the Russians surpass all the magazinists and reviewers of the world. The Russian monthly contains about three times as much printed matter as the *Nineteenth Century*. In proportion to its size Belgium leads the world in the multiplicity of its periodicals; but their prosperity is in an inverse proportion to their numbers. There is only one Portuguese monthly procurable in London.

The genesis of the periodical can be traced back for centuries, but the earlier publications of the kind bear about as much resemblance to the magazines and reviews of to-day that the eohippus bears to the winner of last year's Derby. The evolution of the modern magazine is usually traced back to the *Philosophical Transactions of the Royal Society*, which began to appear in 1665, but the true progenitor of our monthly miscellanies were the pamphlets which were spawned in such numbers in the heat of the revolutionary ferment of the 17th century. There was no regular periodicity in their appearance. Pamphleteers wrote as the spirit moved them, but their intermittent productions, in everything excepting the regularity of their appearance and the fact that each appeared singly instead of being stitched together with a dozen others, correspond very closely to the monthly miscellanies which have now become the forum of civilisation. Milton, Marvell, and Defoe would all have been regular contributors to our monthly reviews if these publications had existed in their time. As they were without those conveniences of a more complex civilisation they were under the necessity of publishing each of their essays separately, often at their own risk, and very seldom to their own profit. In these as in other departments of human activity the middleman has been found indispensable alike for the profit of the producer and the convenience of consumers. The modern review is the monthly market where authors sell their wares, and of late the excessive multiplication of such marts has led to the publication of a kind of clearing-house of periodical literature in the *Review of Reviews* in London and New York, and *La Revue des Revues* in Paris.

The history of periodical literature in the 18th century as usually told in encyclopædias is little better than a parade of epitaphs from the tombstones of defunct reviews. Two notable facts, however, stand out clearly discernible on these sepulchral tablets. The first, the literary position given for the first time to periodical publications by Addison's editorship of the *Spectator*, although it was as little of a magazine as it was of a newssheet; and the second, the birth of the first monthly magazine of the modern type, when Cave the publisher brought out the *Gentleman's Magazine* in 1731. Of the *Weekly Memorials for the Ingenious*, published for twelve months in 1689, or the *Gentleman's Journal or Monthly Miscellany*, which appeared in 1692, nothing need be said. The *Gentleman's Magazine*, after making a fortune for its originator, has continued to flourish ever since.

If England may claim the honour of having invented the magazine, Scotland has the unquestioned right to be regarded as the originator of the review. A new era in periodical literature dawned when half-a-dozen brilliant young Scotsmen, with the assistance of Sydney Smith and a few less gifted Southrons, decided to establish the *Edinburgh Review* (q.v.) in the Whig interest in 1802. Their enterprise was rewarded by an immediate and signal success. The wit, the talent, the audacity, and the sheer impudence of the young reviewers startled the limited world of letters from centre to circumference, and convinced the Tories in no less than seven years that it was indispensable to counter the blue and yellow organ of militant Whiggery by a quarterly of unimpeachable orthodoxy. Thus it was that of the *Edinburgh* was born the *Quarterly* (q.v.), and the two great quarterlies have held the field ever since as the most authoritative exponents of the most respectable and scholarly element of the two great parties. The honour of initiative in these matters was not confined to the Scottish Whigs. Fifteen years after the *Edinburgh* first made its appearance a Scottish publisher on the other side, William Blackwood by name, achieved fame and fortune by an equally happy stroke in the publication of *Blackwood's Magazine*, a half-crown monthly which may be regarded as the parent of the political monthly miscellany. *Blackwood* was to the *Edinburgh* and the *Quarterly* what the saucy frigate was to the stately three-decker. It appeared twelve times a year, against their four numbers; it was infinitely more varied. It published serial fiction, poetry, prose, and that marvellous symposium, the *Noctes Ambrosianæ*, the secret of which perished with Christopher North. This again compelled the other side to retort by the publication of monthlies which are for the most part not only dead, but forgotten. The poet Campbell did his best in *Colburn's Monthly*, but for a dozen years the ascendency of the truculent but brilliant *Maga* was undisputed. Then in 1830 came *Fraser*—a magazine which, after many vicissitudes under many editors, is now extinct, while *Blackwood* still flourishes, less brutally truculent in its Toryism than of yore, but still bright, brilliant, and scholarly.

The Scottish initiative so remarkably asserted in the *Edinburgh* among the quarterlies and *Blackwood* among the monthlies was not exhausted. In 1832 *Chambers's Journal* made its appearance, marking the commencement of a new and more popular phase of magazinedom. It was published weekly, but was also issued in monthly parts. More than half a century has passed, and *Chambers* is still 'familiar in our mouths as household words,' *Cassell's Family Paper* (now known as *Cassell's Family Magazine*) was not started till 1853. The old *Penny Magazine* (1832), published by the Society for the Diffusion of Useful Knowledge, deserves honourable mention. It was succeeded by the *Leisure Hour* in 1852, still one of the best illustrated sixpennies, published by the Religious Tract Society. Charles Dickens founded *Household Words* in 1850, and *All the Year Round* in 1859.

In 1859 Macmillan—again a Scot—published the first shilling magazine. This new departure was rapidly followed by the publication of the *Cornhill*, under the editorship of Thackeray, which at once achieved a phenomenal success; of *Temple Bar*, edited by George Augustus Sala; and of *London Society*, which has always relied chiefly upon fiction for its circulation.

In 1865 George Henry Lewes founded the *Fortnightly Review*, an avowed imitation of the *Revue des Deux Mondes*. It was started as a medium for the discussion of 'subjects which interest cultivated and thoughtful readers,' and it was to be published at intervals 'neither too distant for influence on passing questions, nor too brief for deliberation.' Mr Lewes was soon succeeded by Mr John Morley, who, in the sixteen years during which he was editor, gave a distinctive character to the new periodical literature of our time. The success of the *Fortnightly* led to the publication of the *Contemporary* (1866), with a bias as pronounced in favour of Christianity as the *Fortnightly* was biassed in favour of Agnosticism. This again was followed eleven years later by the publication of the *Nineteenth Century*, a miscellany entirely free from editorial bias of any kind. These three reviews have a practical monopoly of the field. They have as neighbours or poor relations —they can hardly be described as either rivals or competitors—the *National Review* (1883), which is Conservative; and the *Westminster*, which, originally founded in 1824 as a quarterly, was converted in 1887 into a monthly, while still remaining true to its original philosophical Radical principles. All these are published at half-a-crown. Most of them publish both signed and unsigned articles—the *Nineteenth Century* alone has consistently refused to insert any article not signed by the real name of the author. The circulation of the *Nineteenth Century* is the highest. It is the only half-crown review with more than 12,000 subscribers.

In 1850 the *Monthly Packet* was founded by Miss Yonge; it is written for young girls. Another Church of England shilling magazine was the *Newbery House Magazine*, issued from 1889 to 1894. Similar is the *Minster*, a sixpenny, founded in 1894. In 1860 *Good Words*, founded by Mr Strahan, under the editorship of Dr Norman Macleod, achieved so great a success as a sixpenny monthly, that it was followed in 1864 by the publication of the *Sunday Magazine*, edited by Dr Guthrie. The prosperity of the sixpennies led to the extinction of some of the older magazines. One of the best and cheapest is the *English Illustrated Magazine* started in 1883. In 1882 *Longman's* made its appearance at sixpence; in 1888 the *Cornhill* reduced its price from one shilling to sixpence. A year later came the sixpenny *New Review*, of which the price was afterwards raised to ninepence, and then to a shilling. In 1887–89 *Murray's Magazine* appeared at one shilling. In 1890 the *Review of Reviews* appeared at sixpence, followed in 1891 by the *Strand Magazine*, a kind of illustrated sixpenny *Tit Bits;* both of these magazines achieved in the first year of their publication a circulation exceeding 100,000. The *Idler*, a sixpenny, edited by Mr Jerome, dates from 1892; the *Pall Mall Magazine*, a richly illustrated shilling serial, from 1893; the *Woman at Home* from 1894; the *Windsor* began in 1895. The most widely circulated magazines, besides the *Strand*, *Quiver*, *Chambers's Journal*, *English Illustrated Magazine*, are the *Boy's Own Paper*, *Girl's Own Paper*, *Cassell's Family Magazine*, *Leisure Hour*, *Sunday at Home*, *Good Words*, and *Sunday Magazine*.

Among monthly periodicals devoted to art the oldest is the *Art Journal*, which first appeared as the *Art Union* in 1839. Mr S. C. Hall edited it till 1880. The *Portfolio*, founded by Mr Hamerton in 1869, is since 1894 a series of half-crown monographs on artists. The *Magazine of Art*, which dates from 1878, is a shilling monthly. Music is represented by the *Musical Times*, the *Magazine of Music*, the *Strand Musical Magazine*, and a few others; and the drama by the *Theatre*.

The geographical societies of London and Edinburgh publish their proceedings monthly, and most of the sciences have their own reviews. There are innumerable religious magazines, almost every sect having its own organ. There is, however, nothing in English periodical literature corresponding to the *Missionary Review* published at New York. The Catholic Church is represented by the *Dublin Review* (quarterly), the *Month* (2s.), the *Lamp* (6d.), and the *Lyceum* (4d.). The Wesleyan Methodists and the Primitives publish quarterlies; the Congregationalists have no longer the high place in periodical literature they possessed when Dr Allen edited the *British Quarterly*, and Paxton Hood edited the *Eclectic*. The Salvation Army has a bright and readable monthly in *All the World* (6d.); Mr Spurgeon established the *Sword and Trowel* (3d.); the *Animal World* (3d.) is the organ of the Society for the Prevention of Cruelty to Animals, and the *Child's Guardian* of the Society for the Prevention of Cruelty to Children; *Lucifer* (1s. 6d.), the mid-monthly organ of the Theosophists; the *United Service Magazine* (1s.) is our only service monthly. There are monthly magazines devoted to astrology, postage-stamps, chess, cricket, cycling, vegetarianism, anti-vaccination, Malthusianism, spiritualism, and mysterious psychical phenomena, &c. *Santa Lucia* is the monthly for the blind, in raised Braille type. See BLUE-BOOKS.

A general idea prevails among the public that to write for the magazines is a sure and easy road to competence. As a matter of fact, if we except writers of popular fiction, the number of contributors to periodical literature, not holding editorial appointments, who make £200 a year out of the magazines might probably be counted upon the fingers of one hand. The best paid contributions by the highest class reviews seldom exceed £1 a page of 500 words. The average review article does not yield its writer more than £15. As there are not ten men in England who contribute ten articles each a year to monthly miscellanies—the conclusion is obvious. Yet the flood of contributions rises ever higher. The late editor of the *Forum* recently calculated that he received from outsiders 3000 MSS. per annum, out of which he was usually able to use less than one per cent. 'Whaur 's the harm,' asked the Ettrick Shepherd in *Noctes*, 'o' a few gude, sober, steady, judicious, regular, well-informed, versateele, and biddable contributors?' To this inquiry Christopher North replied, 'None such are to be found on earth—you must look for them in heaven.' From which it would seem that the editorial burden has changed little in fifty years. Poetry in particular is a drug in the market. In the same *Noctes* Christopher North said, 'I seldom pay for poetry. In cases of charity and courtesy—that is to say of old women and young ones—my terms are a shilling for a sonnet, a dollar for a dramatic scene, and for a single book of an epic by way of a specimen, why, I do not grudge a sovereign.' This is probably more than the epic poet of our day would get for all his books from any magazine editor. Many periodicals, like hospitals, are supported entirely by voluntary contributions.

In Greater Britain the periodical flourishes chiefly in the United States of America. In the colonies the English product seems to kill out the native production. Beyond a somewhat consumptive quarterly in Sydney, and some diminutive religious magazines, Australia has no monthly magazines or reviews, except the quarterly *Imperial Review* of Melbourne. New Zealand has the *Monthly Review*. South Africa has produced no magazine of more than provincial fame. Canada had in the *Bystander* a unique magazine edited, written, and owned by Mr Goldwin Smith, but it no longer appears. Barbadoes has a little monthly in *Excelsior;* Honduras boasts the *Honduras Mining Journal*, formerly *Honduras Progress;* and British Guiana publishes *Timehri*, a quarterly. Among the periodicals in English published on the Continent are the *Esquiline* (Rome) and *Anglo-Austria* (Meran). India has the *Calcutta Review* (quarterly), and the monthlies, the *National Magazine*, the *Indian Magazine and Review*, and the new *Allahabad Review;* but the publications of London and Edinburgh overshadow the periodicals of the rest of the empire. The *Asiatic Quarterly* now embraces colonial and African topics, otherwise the colonies are not specially represented except by the small monthly papers *Imperial Federation* and *Greater Britain*.

The American magazines are every year becoming more and more formidable competitors of the English periodicals even in Great Britain. They have an enormous advantage in the excellent American postal rule by which all periodically issued printed matter is conveyed by the mails at special rates not exceeding a halfpenny per pound. In England it costs 2½d. to send a half pound of printed matter, if published monthly, through the post from St-Martin's-le-Grand to Downing Street—although the post-office will carry a pound weight of printed matter if it is issued weekly for one halfpenny from Land's End to John o' Groats. This absurd method of handicapping monthly publications is unknown in the United States. The American magazines are distinguished for the excellence of their typography, and the clearness and artistic character of their illustrations. There is no such illustrated magazine as the *Century* published outside of New York. The American illustrated magazine is making its way rapidly throughout the whole British empire. *Scribner's* has now begun an Australian edition. The *Century* and *Harper* circulate largely in India. The *Cosmopolitan* has now begun to publish in London as well as in New York. The *New England Magazine* is also a well-illustrated monthly. Of the non-illustrated American magazines the *Atlantic Monthly* (1858) is one of the oldest and most respectable. *Lippincott* publishes monthly a complete novel of high character, with a selection of miscellaneous essays. All these are now published simultaneously in London and New York. But the three monthly reviews which correspond to the *Nineteenth Century*, *Fortnightly*, and *Contemporary* are the *North American* (1815), the *Forum* (1886), and the *Arena* (1888). The *Arena* accompanies its letterpress with portraits and occasional illustrations. It has a distinctive rôle of its own, being the arena for the free discussion of all the heresies which seem to foreshadow the trend of progress. The *Forum* is steady, sensible, and instructive. The *North American* is more lively and up to date. All these publish signed articles. The *Arena* publishes stories. English writers contribute largely to the *North American* and the *Forum*. In theology there are the *Andover Review*, *Homiletic Review*, *Church Review*, *American Catholic Quarterly*, *Catholic World*, &c.

Up to 1891 some of the English reviews were in the habit of forwarding printed sheets to New York every month; but hitherto the chief knowledge of the American reader concerning English periodicals has been gained from the pages of *Littell's Living Age* and *Current Literature*, two publications which are freely fed from the pages of English magazines and reviews. The Americans produce copiously the more solid and ponderous quarterlies. They are great on economics and education, and theology of the slightly antiquated pattern. Their *Popular Science Monthly* is one of the best of its kind, and the *Chautauquan* is quite unique—a magazine that aspires to be a substitute for a university.

Coming to foreign periodicals the first place naturally belongs to France, whose two principal reviews, the *Revue des Deux Mondes* (1829) and the *Nouvelle Revue* (1879), are read throughout the whole Latin world. It is a curious fact that the *Revue des Deux Mondes* has more subscribers outside France than within the republic. There is a great Latin belt of a French reading public stretching from Madrid to Bucharest, and among them the *Revue* reigns as it has long reigned supreme. The *Nouvelle Revue* owes its character and its charm to its editor, Madame Adam. Both of these great reviews devote much more space to the chronicle of the events of the month than any English or American periodical. The *Cosmopolitain*, the oldest French review, founded in 1829, is published on the 10th and 25th of each month. It is Catholic with the traditions of Montalembert. Excluding the high-class art magazines, like the *Gazette des Beaux-Arts*, there is no illustrated periodical in France, although of late *La Revue des Revues* has been making praiseworthy efforts to fill the gap.

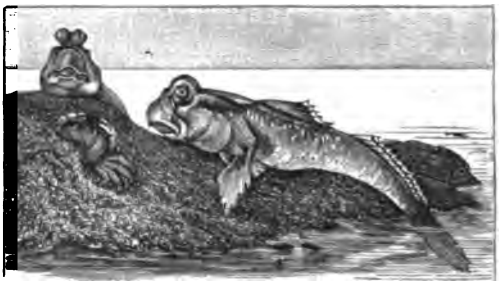
Germany has many literary capitals, and her magazines do not all emanate from a single centre. Most of the popular German magazines, such as *Die Gartenlaube* and *Ueber Land und Meer*, are issued both weekly and monthly. They are copiously illustrated, and form a great contrast in their readableness to such ponderous reviews as the *Deutsche Rundschau*, the *Deutsche Revue*, *Unsere Zeit*, and the *Preussische Jahrbücher*. Among the illustrated popular magazines, *Vom Fels zum Meer* deservedly holds a high place. The best of the German magazines is *Velhagen und Klasing's Neue Monatshefte*, already mentioned. *Westermann's Deutsche Illustrirte Monatshefte* and *Nord und Süd* are also high-class magazines. German periodical literature is very rich in theological reviews; and several periodicals represent the various new schools of literature—e.g. the *Gesellschaft* is the organ of the Realists. Similarly the *Moderne Rundschau*, the *Deutsche Dichtung*, and others are conducted by members of the new schools and tendencies.

In Russia the unwieldy review forms the chief field for the manifestation of the literary talent of the nation. These reviews are published either at Moscow or at St Petersburg. They are hardly seen outside Russia; they are not illustrated, and their circulation is comparatively small. In Italy the *Nuova Antologia*, *La Rassegna Nazionale*, and *La Civilta Cattolica* are the only periodicals excepting those purely scientific or professional that are seen outside the peninsula. Spain has *España Moderna* or *Revista Ibero-Americana* and *Revista Contemporánea*; Holland, *De Gids*, *Vragen des Tijds*, and *Elsevier's Geillustreird Maandschrift*; Scandinavia, *Tilskueren*, *Svensk Tidskrift*, *Nordisk Tidskrift*, *Samtiden*.

In concluding this rapid survey of the periodical literature of the world, mention should be made of the latest born and most polyglot of monthlies, the *Pantobiblion*, a magazine published in St Petersburg in no fewer than fifteen different languages. It aims at providing professional and scientific men of all countries with a clue to the periodical literature, technical and scientific, of all the world. It is like a periodical monument reared to the memory of the Tower of Babel.

Poole's *Index to Periodical Literature*, a dictionary of the more important articles in the quarterlies, monthlies, and many weeklies, is edited by a Chicago librarian. Stead's popular *Index to the Periodicals of 1890* has been issued in London, and the publication is to be continued annually. See also the articles NEWSPAPER and BOOK-TRADE in this work.

Periophthalmus, a remarkable genus of acanthopterous fishes, allied to the gobies. Their eyes protrude and are very mobile; their pectoral fins can be used as legs. Several species occur on the coasts of the Indian Ocean and Western Africa; of these the best known is *P. koelreuteri*.



Periophthalmus koelreuteri.
(From Hickson's *Naturalist in North Celebes*, 1890.)

This fish lives about low tide-mark on the muddy flats or among rocks, and by means of its pectoral fins and tail hops along in search of crustaceans, insects, and gastropods. Respiration seems to be effected through the skin of the tail even more than by the gills. They cling by their fins to rocks and mangrove-roots, and keep their tails in the water; or they climb entirely out of the water, and jump with agility when disturbed.

Periosti'tis, inflammation of the periosteum, the tough fibrous membrane which surrounds the various bones (see BONE). It generally occurs on the surface of thinly-covered bones, such as the tibia, clavicles, and cranial bones. Its chief causes are (1) a *syphilitic taint*; (2) *rheumatism*; and (3) *scrofula*; but its occurrence is often determined by injury to the part. The affection, especially when due to the first or second of the above causes, is usually accompanied with considerable nocturnal pain. If the disease occurs in an acute form it must be treated with leeches, fomentations, and the other ordinary antiphlogistic remedies. If severe, an incision through the inflamed tissue is sometimes the most effectual treatment.

Peripatetic Philosophy, a designation of the philosophy of Aristotle (q.v.) and of his followers. It is of doubtful origin, being supposed to have been derived either from his custom of occasionally walking about (*peripatein*) during the delivery of his lectures, or from the place in which they were delivered being a shaded walk.

Peripatus, a genus occupying a unique position between myriopods and insects on the one hand and annelids on the other. For, along with the tracheæ or air-tubes characteristic of insects, Peripatus has the nephridia or excretory tubes characteristic of the higher worms. The body measures about two inches in length, is shaped like that of a worm or caterpillar, but without external rings, bears numerous (14 to 42) imperfectly-jointed stump-like clawed feet, and has a soft skin, with little of that chitin which is abundant as a cuticular product in other arthropods. The head bears a pair of mobile antennæ, a pair of mandibles in the mouth, and a pair of oral papillæ from which slime oozes. With this Peripatus catches its prey of small insects, &c. The species live in moist places under stones and bark, and are nocturnal in their habits. Professor Sedgwick says that 'the exquisite sensitiveness and constantly changing form of the antennæ, the well-rounded plump body, the eyes set like small diamonds on the side of the head, the delicate feet, and, above all, the rich colouring and velvety texture of the skin all combine to give these animals an aspect of quite exceptional beauty.' There are many remarkable structural features: thus, the ventral nerves are widely separate; the eyes are simple, like those of an annelid; the body-cavity is divided into three longitudinal compartments, from which the cavities of the legs are furthermore distinct. The sexes are separate. The development varies considerably in different species, for the ova may contain a considerable amount of yolk or none at all. In several it has been observed that the cells of the embryo are for a prolonged period indistinctly separate from one another. The embryos develop within the body of the mother-animals; when born they resemble the parents except in size. The distribution is very wide; in South Africa there are four species—e.g. *P. capensis*, *P. balfouri;* in New Zealand, *P. novæ Zealandiæ;* in Queensland, *P. leuckartii;* in Caracas, *P. edwardsii;* and others from Demerara, Trinidad, St Vincent, Chili, Quito, &c. The distribution, the structure, and the development of Peripatus all suggest that it is the survivor of an archaic type. The genus is usually dignified as a special class of Arthropods—Prototracheata. See figure under CATERPILLAR; and monograph by A. Sedgwick, *Quart. Journ. Micr. Sci.*, xxviii. (1888).

Perissodactyla. See ARTIODACTYLA.

Peristaltic Motion, the action of the muscular coat of the intestines, by which the substances contained within it are regularly moved onward. See DIGESTION.

Peritoneum (Gr. *periteinein*, 'to extend around'), a serous membrane, and, like all membranes of this class, a shut sac, which, however, in the female is not completely closed, as the Fallopian tubes communicate with it by their free extremities. The peritoneum more or less completely invests all the viscera lying in the abdominal and pelvic cavities, and is then reflected upon the walls of the abdomen, so that there is a visceral and a parietal layer. Numerous folds are formed by the visceral layer as it passes from one organ to another. They serve to hold the parts in position, and at the same time enclose vessels and nerves. Some of these folds are termed *Ligaments*, from their serving to support the organs. Thus, we have ligaments of the liver, spleen, bladder, and uterus formed by peritoneal folds. Others are termed *Mesenteries* (from the Gr. *meson*, 'the middle,' and *enteron*, 'the intestine'), and connect the intestines with the vertebral column. They are the Mesentery proper, the ascending transverse, and descending meso-colon, and the meso-rectum. Lastly, there are folds called *Omenta*, which proceed from one viscus to another. The great omentum always contains some adipose tissue, which in persons inclined to corpulency often accumulates to an enormous extent. Its use appears to be (1) to protect the intestines from cold by covering them anteriorly as with an apron, and (2) to facilitate their movement upon each other during their vermicular action.

DISEASES OF THE PERITONEUM.—The peritoneum often becomes the seat of dropsical effusion, both in cases of general dropsy and in cirrhosis of the liver. It may also be attacked by cancer, either primary or secondary, and, like all the serous membranes, readily takes on inflammation from various exciting causes. This inflammation is termed Peritonitis, and may be either an acute or a chronic disease.

Acute Peritonitis, inflammation of the coating of the bowels, but often popularly spoken of as 'inflammation of the bowels,' generally presents well-marked symptoms. It sometimes commences with a chill, but severe pain in the abdomen is usually the first symptom. The pain is at first sometimes confined to particular spots (usually in the lower part of the abdomen), but it soon extends over the whole abdominal region. It is increased, on pressure, to such an extent that the patient cannot even bear the weight of the bedclothes; and to avoid, as far as possible, internal pressure upon the peritoneum, he lies perfectly still, on his back, with the legs drawn up, and breathes by means of the ribs, in consequence of the pain occasioned by the descent of the diaphragm in inspiration. The breathing is naturally shallow in these cases, and, less air being admitted at each movement of respiration, the number of those movements is increased. There are perhaps forty or even sixty respirations executed in a minute, instead of eighteen or twenty. The pulse is usually very frequent, often 120 or more in the minute, and small and tense, though occasionally strong and full at the commencement of the attack; the temperature is usually raised, and vomiting is almost always an early symptom. After the disease has continued for a certain time the belly becomes tense and swollen; the enlargement being caused at first by flatus, and afterwards also by the effusion of fluid, as may be ascertained by percussion and palpation. The progress of the disease is in general rapid. In fatal cases death usually takes place within a week, and often sooner. The symptoms indicating that the disease is advancing towards a fatal termination are great distention of the abdomen, a very frequent and feeble pulse, a pinched and extremely anxious appearance of the face, and cold sweats.

Peritonitis rarely arises from exposure to cold alone. It is frequently the result of local violence, and of wounds penetrating the peritoneal sac, including various surgical operations. In the majority of cases it is due to extension of some inflammatory process in one of the abdominal viscera, particularly the hollow viscera (stomach, intestines, gall-bladder, urinary-bladder, womb). It is sometimes caused by Bright's disease. Two varieties call for special mention: *puerperal peritonitis*, due to extension of septic inflammation of the lining membrane of the womb after child-birth or miscarriage, a most fatal form of disease; and *peritonitis from perforation* of one of the hollow viscera, which is characterised by the suddenness of the attack, intense pain, incapable of mitigation by medicine, all at once arising in some part of the abdomen, the whole of which soon becomes tender in every part. This form of the disease is generally fatal, death usually ensuing within two days, and sometimes within a few hours. Perforation of the small intestine, in consequence of ulceration of its glands, is of not uncommon occurrence in typhoid fever, and sometimes occurs in phthisis. That apparently useless structure, the vermiform appendage of the cæcum, is a comparatively frequent seat of perforation. Sometimes it is the stomach which is perforated, and in these cases the patients are usually unmarried women (especially domestic servants), who may have previously appeared in good health, or at most have complained of slight dyspepsia.

At the onset of the disease it is not always easy to distinguish it from Colic (q.v.), but the progress of the case will soon settle the question. With this exception, the only disease with which peritonitis is likely to be confounded by the well-educated practitioner is a peculiar form of hysteria; but the age and sex of the patient, the presence of hysteria in other forms, and the general history of the patient and of her symptoms will almost always lead to a correct diagnosis of the disease.

The treatment of a case of peritonitis must depend upon the cause to which it is due. Perfect rest in bed is essential. In the great majority of cases opium should be given in full doses, to allay pain and keep the bowels at rest. But in some, particularly those following surgical operations on the female generative organs, the opposite plan, treatment by saline purgatives, introduced by Lawson Tait, gives excellent results. The diet must be light and fluid; in cases of perforation of the stomach no food or even drink must be given by the mouth. Light poultices, or hot fomentations, should be constantly applied to the abdomen; leeches are sometimes useful. In cases of perforation from disease or injury, and of suppurative peritonitis, life has frequently been saved during recent years by prompt surgical interference.

Chronic Peritonitis occurs in two forms, which differ in their origin and degree of fatality, but are very similar in their symptoms. In the first the inflammation is of the ordinary character, and, although the disease sometimes originates spontaneously, it is more frequently the sequel of an imperfectly cured acute attack; in the second it depends upon tubercular inflammation, and is generally met with in persons of a scrofulous constitution. The symptoms of chronic peritonitis are more obscure than those of the acute form. There is abdominal pain, often slight, and not always constant, which is increased by pressure, or sometimes is felt only when pressure is made. The patient complains of a sensation of fullness and tension of the belly, although its size is not visibly increased; of a loss of appetite; and of nausea and vomiting; and the bowels are usually more or less out of order. After a time the abdomen enlarges, and becomes tympanitic, or more or less filled with fluid; and death gradually ensues from debility and emaciation, unless the fatal issue is accelerated by an acute inflammatory attack. It is not always easy to determine, during life, whether the disease belongs to the first or second form. When its origin cannot be traced to a preceding acute attack, to local abdominal injury, or to chronic affections of the abdominal viscera, there is strong reason to believe it to be of the tubercular form, especially if the general constitution and the hereditary tendencies of the patient point in the same direction.

Little can be done in the way of medical treatment, especially in the tubercular form, further than mitigating the most distressing symptoms, and possibly retarding the final issue, though recovery sometimes follows the continuous application of mercurial liniment. In chronic, even tubercular peritonitis, however, as in the acute disease, surgical interference, either by aspiration or by free opening of the abdominal cavity, has given very encouraging results in many cases.

Periwinkle (*Vinca*), a genus of plants of the natural order Apocynaceæ, having a 5-cleft calyx, and a salver-shaped corolla bearded at the throat, with five obliquely truncated segments. The leaves are opposite and evergreen; the flowers grow singly or in pairs from the axils of the leaves. The Lesser Periwinkle (*V. minor*), a native of many parts of Europe and of the southern parts of Britain, growing in woods and thickets, is a half-shrubby plant with trailing stems, rooting at their extremities, ovato-lanceolate leaves, and pale-blue —sometimes white or reddish-purple—salver-shaped flowers. The Greater Periwinkle (*V. major*), which has much larger flowers and ovato-cordate leaves, is a native of the south of Europe, and is found in a few places in the south of England. Both of these species are very commonly planted in shrubberies and gardens, rapidly cover unsightly objects with pleasing green foliage, and produce their beautiful flowers at almost all seasons of the year, even in winter when the weather is mild. The Herbaceous Periwinkle (*V. herbacea*), a Hungarian species, is remarkable for the abundance of its flowers. The Yellow Periwinkle (*V. lutea*) is a native of the southern parts of North America. The Rose-coloured Periwinkle (*V. rosea*), a native of Madagascar, is a favourite hothouse plant.

Periwinkle (*Littorina*), a genus of marine Gasteropods, represented by several species on British coasts. The commonest, *Littorina littorea*, is abundant between tide-marks on the rocks, and is often collected and used for food. It is boiled in its shell, extracted as eaten, and is very palatable. Periwinkles crawl about under water, but usually remain passive when left uncovered by the tide. Without water they can survive for many hours, and they are also able to endure a considerable freshening of the salt water. They feed on seaweeds, and are often useful in keeping beds of young oysters from being smothered. Periwinkles drawn up from 70 to 80 fathoms were first in 1889 used as bait for cod-fishing on the banks of Newfoundland. The edible species is oviparous, but in *L. rudis*, which is usually common nearer high-water mark, the young are hatched and have a hard shell before they leave the mother. These shells are apt to make this periwinkle gritty, and therefore it is not used as food. Among the structural characters of the periwinkle the substantial shell of few whorls, the closely-fitting, horny operculum, the nearly circular shell aperture without any siphon-notch are at once evident. Species of Littorina occur on almost all coasts, and there are about half a hundred in all. It should be carefully noticed that the periwinkle is often called the Wilk, Wulk, or Whelk in Scotland, but it is not nearly related to the true whelks (Purpura, Buccinum, &c.). See Whelk.

Perizzites, the Canaanites of Galilee. See Palestine, Vol. VII. p. 712.

Perjury is the crime committed by one who, when giving evidence on oath as a witness in a court of justice, or before some constituted authority of the same kind, gives evidence which he knows to be false. But in order to make the giving of false evidence a crime the evidence must be material—i.e. it must affect the decision of some question before the court. If the falsehood occurred as to some trifling or immaterial fact no crime is committed. Moreover, it is necessary, in proving the crime, that at least two persons should be able to testify to the falsehood of the matter, so that there might be a majority of oaths on the matter—there being then two oaths to one. But this rule is satisfied though both witnesses do not testify to one point. The perjury must also have taken place before some court or tribunal which had power to administer the oath (see Oath). Though in some courts affirmations are allowed instead of oaths, yet the punishment for false affirmation is made precisely the same as for false swearing. The punishment for perjury was, before the Conquest, sometimes death or cutting out the tongue; perjury is now a misdemeanour, punishable by imprisonment with hard labour. The crime of Subornation of Perjury—i.e. the persuading or procuring a person to give false evidence—is also punishable as a distinct offence; if the false evidence is not given the crime is incitement. In many states of the American Union the crime of false swearing, recognised by common law, is further particularly defined by statute. The violation of an oath of office is not perjury; nor is a false affidavit to an account rendered to an administrator technically perjury, nor false evidence in depositions taken by consent by unauthorised persons.

Perkeniers. See Moluccas.

Perleberg, a town of the Prussian province of Brandenburg, 80 miles NW. of Berlin. Pop. 7825.

Perlitic Structure, in Petrography, is a structure seen in some vitreous rocks. These rocks seem as if made up of little pearly or enamel-like spheroids, each of which is subdivided into a number of concentric coats by curved cracks, roughly parallel to its boundary. The spheroids usually lie packed between rectilinear or curved fissures that traverse the rock in all directions. Perlite is the name given to rocks showing this structure.

Perm, a town of Russia, on the Kama, by which it is 685 miles NE. of Kazan. It is the chief seat of the extensive transit trade between European Russia and Siberia, and has a cathedral, tanneries, distilleries, flour-mills, and oil-works, and a government arsenal and cannon-foundry. Pop. 35,729. The *government* has an area of 128,211 sq. m. and a population of 2,713,987, and is exceptionally rich in minerals.

Permian System. In Britain this series of strata rests unconformably upon the Carboniferous rocks. It consists of the following groups:

Upper Red Sandstones, clays and gypsum (50 to 100 feet thick in east of England; west of Pennine chain, 600 feet thick).
Magnesian Limestone (500 to 600 feet) = Zechstein of Germany.
Marl Slate (about 60 feet) = Kupferschiefer.
Lower Red and Mottled Sandstones, with conglomerates and breccias (3000 feet in Cumberland; in the east of England not over 250 feet) = Rothliegende of Germany.

The Lower Red Sandstones are greatly developed in Staffordshire, Cheshire, and Lancashire, and the Vale of Eden in Westmorland and Cumberland. Small areas also occur in the valleys of the Nith and Annan and in Ayrshire; and similar areas appear in the districts of Down, Tyrone, and Armagh in Ireland. The breccias met with in this group often contain erratics, and have the general aspect of glacial accumulations; and Sir A. Ramsay thought they probably indicate the occurrence of a glacial episode in the Permian period. In the Scottish area the rocks contain sheets of lava-form rocks and tuffs, associated with which are many small filled-up volcanic vents or *necks*. The most important member of the overlying groups is the Magnesian limestone, which is the chief repository of Permian fossils. Many of its beds assume curious concretionary forms, as is well seen on the coast of Durham.

In Germany the Permian consists of an upper and lower group—hence the system is often termed Dyas—the Zechstein and Kupferschiefer forming the upper, and the Rothliegende the lower group. Volcanic rocks are associated with the latter. The Kupferschiefer has long been famous for its ores of copper and other metals, and fossil fishes; while associated with the Zechstein are beds of anhydrite, gypsum, rock-salt, and bituminous shales. In Russia the system occupies an area of more than 15,000 sq. m. between Moscow and the Urals. It is well developed in the government of Perm, from which it derives it name. While the German Dyas presents the same general features as the Permian of Durham and the east of England, the Russian development resembles the Permians of the Midlands and north-west of England—limestone being quite a subordinate formation, and often wanting. Although there is commonly an unconformity between the Permian and the Carboniferous, yet in some places, as at Autun in the heart of France, a conformable passage is traced from the coal-measures into the Permian. The same is the case in North America, where in the western part of that continent no hard and fast line can be drawn between the two systems—the Carboniferous graduating upwards into the Permian.

Life of the Period.—The Permian strata as a whole are not rich in fossils—the red sandstones which form so large a portion of the system being for the most part barren. As contrasted with the flora of the Carboniferous period that of the Permian is poor and meagre. But that poverty may be only apparent—the conditions for its preservation not having been so favourable as during Carboniferous times. It may be considered as an impoverished continuation of the Carboniferous flora. The most common plants are ferns—both herbaceous and arborescent—many of the genera being Carboniferous, while others, such as Callipteris, are not known as Carboniferous forms. Conifers were likewise numerous, especially the yew-like Walchia and the cone-bearing Ullmannia. Traces of what some suppose to have been cycads (Nœggerathia) are met with in Permian strata. Finally, it may be noted that many characteristic Palæozoic types died out in Permian times, such as the Lepidodendroids, Sigillarioids, and Calamites. The animal life of the period is somewhat better represented; but it too appears impoverished when contrasted with that which flourished in the preceding Carboniferous period. We note that rugose corals, so abundant in the older Palæozoic rocks, are very sparingly met with in Permian strata; even tabulate forms are feebly represented. Polyzoa are fairly numerous in the Magnesian limestone. Amongst brachiopods the more abundant types are survivals from the Carboniferous, as Producta, Spirifera, Strophalosia. Lamellibranchs are somewhat more numerous than brachiopods, common forms being Schizodus, Bakevellia, Gervillia, &c. Gasteropods (Murchisonia, Pleurotomaria) are feebly represented, and the same is the case with the cephalopods (Nautilus, Orthoceras, Cyrtoceras). It is worthy of note that the trilobites are represented by one form (Phillipsia)—the last appearance of that eminently Palæozoic order. Among the fishes the principal genera are Palæoniscus and Platysomus. Amphibians seem to have abounded; they are all labyrinthodonts (Archegosaurus, Branchiosaurus, Pelosaurus). At this horizon true reptiles (Proterosaurus) make their earliest appearance.

In most parts of Europe where Permian strata are developed they rest unconformably on Carboniferous and other rocks, from which it is evident that towards the close of Carboniferous times considerable earth-movements took place. These caused the sea to disappear from wide regions in Europe, and resulted eventually in the isolation of certain areas, which thus became inland seas or salt lakes. In these latter mottled sandstones, dolomitic limestones, rock-salt, and gypsum were accumulated, so that the conditions were not favourable to life. One or more such inland seas covered large areas of what is now central England, and extended into southern Scotland and the north of Ireland. Similar large inland seas existed in middle and eastern Europe. The strata accumulated in such basins show plentiful footprints and other indications of shallow-water conditions, such as worm-tracks, sun-cracks, rain-pittings, and ripple-marks—evidence which indicates that the level of the lakes was often abnormally lowered during dry seasons, leaving wide tracts exposed over which crawled annelids, amphibians, and reptiles. Volcanic action was rife in Scotland and Germany, and it has been suggested that the abundant and well-preserved fish remains which occur in the Kupferschiefer may have been poisoned by the sudden influx of mineral springs connected with the volcanic disturbances of the time. Some of the inland seas may have had occasional connection with the open sea for longer or shorter periods, as, for example, during the formation of the thicker fossiliferous limestones. But, taken as a whole, the general character of the strata is that of accumulations formed in inland seas. The climate of the period, so far as one can judge from the aspect of flora and fauna, was probably mild and genial. Nevertheless the occurrence of coarse breccias, with their scratched stones and erratics, in the Permian of Britain and the Continent, and the similar appearances met with in strata, which are believed to be of the same age, in India, Australia, and South Africa seem hard to explain without the agency of floating ice.

Permissive Bill. See LOCAL OPTION.

Permutations and Combinations. A combination, in Mathematics, is a selection of a number of objects from a given set of objects, without any regard to the order in which they are placed. The objects are called elements, and the combinations are divided into classes, according to the number of elements in each. Let the given elements be the four letters *a*, *b*, *c*, *d*; the binary combinations, or selections of two, are *ab*, *ac*, *ad*, *bc*, *bd*, *cd*—six in all; the combinations of three are *abc*, *abd*, *acd*, *bcd*—four in all; while there is only one combination of four—viz. *abcd*.

Permutation, again, has reference to the order of arrangement; thus, the two elements, *a* and *b*, may stand *ab* or *ba*, so that every combination of two gives two permutations; the three elements, *a*, *b*, and *c*, may stand *abc*, *acb*, *bac*, *bca*, *cab*, *cba*, one combination of three thus affording six permutations. The combinations of any order with all their permutations are called the *Variations*. Formulas are given in works of algebra for calculating the number of permutations or combinations in any given case. Suppose seven lottery-tickets marked 1, 2, 3, to 7, and that two are to be drawn; if it is asked how many possible pairs of numbers there are, this is a question of the number of combinations of seven elements, *two* together, which is found to be 21. If we want to know how many times the same seven persons could sit down to table together with a different arrangement each time, this is to ask how many permutations seven objects admit of, and the formula gives $7 \times 6 \times 5 \times 4 \times 3 \times 2 = 5040$. The theory of probabilities is founded on the laws of combination. Thus, in the case of drawing two tickets out of seven, since there are 21 possible pairs, the chance or probability of drawing any particular pair is 1 in 21, or $\frac{1}{21}$. In working out questions in 'combinations' advantage is often taken of the fact that, whatever number of elements be *taken* from a group to form a combination, the number *left* gives the same number of combinations; thus, the number of combinations of 10 elements *three* together, is the same as that of 10 elements *seven* together.

Pernambu'co, or RECIFE, the busiest seaport of north Brazil, stands at the easternmost point of the coast, in 8° 3′ S. lat. It consists of three portions, connected by bridges—*Recife* ('the reef') proper, a Dutch-looking quarter, with narrow, winding streets, the chief seat of commerce, on a peninsula; *San Antonio*, a modern quarter, with straight, wide streets, on an island between the peninsula and the mainland; and *Boa Vista*, where are the merchants' villas, on the mainland. The principal buildings and public institutions embrace two arsenals, an observatory, the palace of the Bishop of Olinda (8 miles to the north), a law school, &c. The harbour is formed by a reef lying a quarter to half a mile from the coast, with an opening for vessels drawing 19 feet of water. In 1889 a contract was made for the deepening of the harbour, the construction of additional quays, docks, and a new breakwater. In the meantime mail-steamers load and unload by means of lighters from the outer (exposed) roadstead. Cottons, machinery, and tobacco are manufactured, and shipbuilding is carried on. There is a lighthouse in the harbour, which is defended by forts. The principal exports are sugar and cotton, with rum, hides, dye-woods, &c.; the principal imports are cottons and woollens, fish and meat, vegetables, minerals, wines, &c. The former fluctuate in value between £1,417,000 (1888) and nearly four times that sum (1880), the fluctuations depending upon the sugar and cotton crops; the imports average from one to two millions sterling. England, the United States, and France have the largest shares in this trade, England supplying about one-half of the imports and taking between one-half and one-third of the exports. Pop. (1878) 94,493; (1888, an estimate) 130,000. Recife was founded by the Spaniards in the second half of the 16th century. Sir James Lancaster captured it in 1595, and the Dutch in 1630. The other two quarters, Mauritsstad (now San Antonio) and Schoonzigt (Boa Vista), were laid out by the Dutch Count Maurice in 1639. The Portuguese captured the town in 1654.—The *province* has a hot, moist climate; produces sugar and cotton; and has an area of 49,625 sq. m. and a pop. of (1872) 841,539; (1888) 1,110,831. Large portions of the interior still remain in a state of nature, uncultivated and covered with forests.

Pernambuco Wood. See BRAZIL-WOOD.

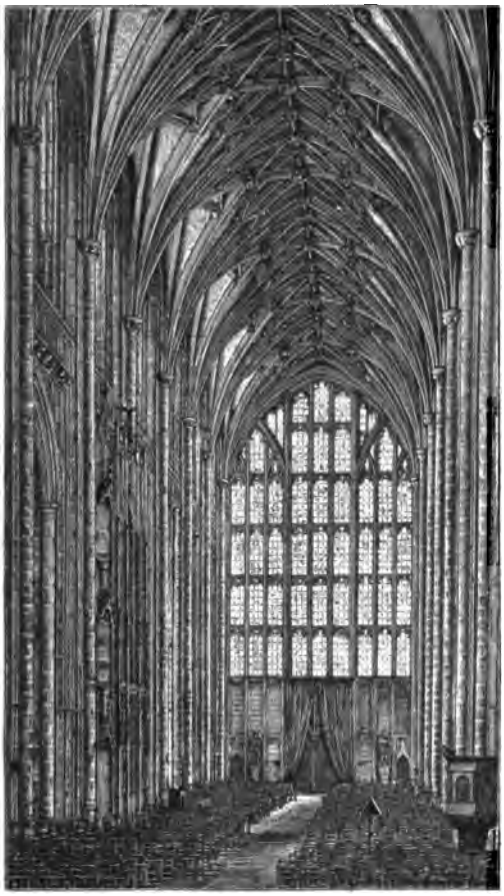
Pernow (Ger. *Pernau*), a seaport of the Baltic Provinces of Russia, stands at the mouth of the river Pernow, at the northern extremity of the Gulf of Riga, 100 miles N. of Riga and 80 W. of Dorpat. Besides linseed and barley, it ships large quantities of flax, principally to Great Britain. The total exports average £526,000 per annum (£423,000 for flax); the imports (herrings, coal, and chemical manure) only some £6500. Pop. 12,918. The university of Dorpat was stationed here from 1699 to 1710.

Pérouse. See LA PÉROUSE.

Perowne, JOHN JAMES STEWART, was born at Burdwan in Bengal, March 13, 1823, of a family of Huguenot origin. He had his education at Norwich grammar-school and at Corpus Christi College, Cambridge, carried off many prizes for theological knowledge and Hebrew, besides the Member's

Latin essay, graduated B.A. in 1845, and was elected Fellow of his college in 1849. He was afterwards examiner for the classical tripos, select preacher, Hulsean lecturer (1868), and Lady Margaret's preacher; professor in King's College, London; and from 1862 till 1872 vice-principal of St David's College, Lampeter. Later he was prelector in Theology and Fellow of Trinity College, Cambridge; preacher at the Chapel Royal, Whitehall; and canon residentiary of Llandaff from 1869 to 1878, when he was appointed Dean of Peterborough. Already, since 1875, he had been also Hulsean professor of Divinity at Cambridge, and an honorary chaplain to the Queen. In 1891 he succeeded Dr Philpott as Bishop of Worcester. Dr Perowne is a sound Hebrew scholar, sat throughout in the Company for the revision of the Old Testament, and has been general editor of the admirable series of short commentaries forming 'The Cambridge Bible for Schools.' His principal work is his commentary on the *Book of Psalms* (2 vols. 1864–68), a masterpiece of exegetical science. Besides sermons and contributions to magazines, other works are his Hulsean Lectures on *Immortality* (1869), and Lampeter and Llandaff *Sermons* (1873).

Perpendicular, the name given to the style of Gothic architecture in England which succeeded the Decorated style. It prevailed from about the end of the 14th century to the middle of the 16th century, and was thus contemporary with the Flamboyant style in France. These styles have much in common, but they derive their names from the features peculiar to each. Thus, the Flamboyant (q.v.) is distinguished by the flowing lines of its tracery; whilst the Perpendicular is remarkable for its stiff and rectilinear lines. The lines of the window-tracery are chiefly vertical, and the mullions are frequently crossed by transoms or horizontal bars. The mouldings are usually thin and hard. The same feeling pervades the other features of the style; the buttresses, piers, towers, &c. are all drawn up and attenuated, and present in their shallow recesses and meagre lines a great contrast to the deep shadows and bold mouldings of the earlier styles. The art of masonry was well understood during the Perpendicular period, and the vaulting was admirably built. Fan-tracery Vaulting (q.v.) belongs to this style. The depressed or four-centre arch is another of its peculiar features. In doorways the arched head is frequently enclosed in a square panel over the arch, with spandrels containing shields, quatrefoils, &c. Panelling was also much used, the walls being frequently almost entirely covered with it, as in Henry VII.'s Chapel at Westminster. There are many well-known buildings of this style. Most of the colleges at Oxford and Cambridge belong to it, and in almost every cathedral and church of importance there are some specimens of it—e.g. William of Wykeham's nave at Winchester (q.v.). Open timber-roofs are very common in the Perpendicular style, and are amongst the peculiar and beautiful features of the architecture of England. The roof of Westminster Hall, built by Richard II., is the largest example ever erected.



Winchester Cathedral—Nave, looking west.

Perpetual Cure. See Curate, Vicar.

Perpetual Motion. Formerly the attempts made to 'square the circle' led to an enormous waste of time till mathematicians proved, by repeated and unassailable methods, that the circular area cannot possibly be expressed in terms of the diameter or radius. It logically follows from the definition of a circle that it is a plane figure which does not admit of being squared. In the same way, to all who have understood the words *force* and *motion*, it follows from the definition of a machine that it does not admit of being 'perpetual,' or self-moved. Every machine is constructed to transmit motion or force. The machine, further, modifies the transmitted force, so as to overcome certain resistances, some 'useful' and some 'prejudicial.' In every instance the motion of the machine is derived from without, and the energy so conveyed is to be at once referred to muscular action, or the weight of falling water, or a current of air, or the expansive force of steam, or some other natural power. Some such force is at once implied by the action of any machine, whether the motion is only commencing or has continued for an indefinite time. In an ordinary clock, for example, action is due to the muscular force expended in coiling a spring or raising a weight. The sight of motion in wheels or levers compels us to believe that force has been exerted upon them, and that they are merely vehicles for transmitting it. The machine has gained so much motion and energy, but only at the expense of some exterior agent. The quantity of force in existence being fixed, no new stock can be created, and therefore a self-moving machine is absurd even in name. The practical engineer knows that the force of his steam-engine is exactly in proportion to the amount of coal burned per hour—i.e. the work depends on the consumption of heat. If the mechanical force produced is in excess, however small, of its equivalent (measured by the coal burned), then perpetual motion would be at last found, because then the engine would be generating force—i.e.

giving out more than was derived from the heat of the coal. This, of course, is impossible; it is from the inexhaustible stores of nature alone, such as fire, water, wind, chemical action, and electricity, that force is derived to give motion to any machine whatever. Instead of producing more force than it has received, and so laying up a stock of energy which might render it 'perpetual,' every machine must in its results show less energy than has been transmitted to it. Some of the machine's work is always spent on friction and the atmospheric resistance, so that it cannot give out all the force that was put in.

A 'simple pendulum' swinging in an exhausted receiver, or a top spinning there, might illustrate the term Perpetual Motion, if friction could be avoided. Neither of these, however, could be called a perpetual machine. Give the top some work to do by putting it in gear, say, with a wheel or a crank, and speedily its motion slackens; which proves that, for a 'machine,' new force is constantly required from without, especially if anything more than mere motion is required. In the words of the French Academy (*Histoire*, 1775): 'Neglecting friction and resistance (of the air), a body to which motion has been given will retain it for ever, but only on condition that it does not act on other bodies; and the only perpetual motion possible, even on this hypothesis, would be useless for the purpose of the devisers. . . . Numerous mechanics who might have been of great service have wasted (on this kind of research) their means, time, and talents.'

The mere enumeration of all the chief attempts made in various countries to contrive a self-moving machine would be tedious. We shall only note some typical cases in each class. In one class of so-called perpetual machines the essential part was a wheel revolving on a horizontal axis, with several movable weights so distributed round the rim as apparently to act always more on one side than the other, and thus continue the revolution. One of these was by the ingenious Marquis of Worcester, and is described in his *Century of Inventions* as having been tried in the Tower before the king and court. On the same principle was Jackson's machine shown in fig. 1. In other attempts of this class the side of the wheel was divided symmetrically into cells with curved sides, each cell holding a ball which rolled about as the revolution took place, so that the balls should, by being further from the centre, act more on one side than on the other, as shown in fig. 2. A foreign instance, described in a letter to Newton as an undoubted success, was that of Orffyreus, consisting of a large wheel covered with canvas. When set in motion the speed increased till it reached a rate of twenty-five revolutions a minute; and when sealed up by the Elector of Cassel it was found at the end of two months to be moving as rapidly as ever. We must of course assume the existence of some imposition in this and more recent cases.

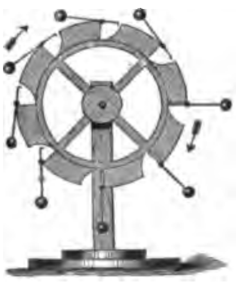


Fig. 1.

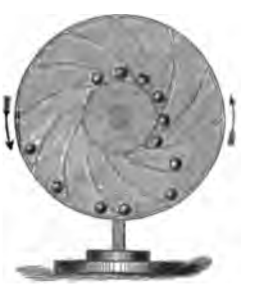


Fig. 2.

In another class of self-moving machines water or mercury became the prime motor, and was sometimes used in defiance of the most elementary laws of hydrostatics. One of these consisted essentially of a large vessel having a curved tube leading from the bottom up one side and bending over the brim. The inventor actually concluded that the great weight of the liquid in the vessel when full, or nearly so, must force the liquid in the tube up higher than the edge of the vessel, and thus cause a perpetual circulation.

Another class depended on magnetic action, such as Bishop Wilkins's inclined plane up which an iron ball was drawn in a groove by the attraction of a loadstone fixed at the top (fig. 3). Before reaching the loadstone the ball was ingeniously intended to fall through a hole in its path on to a curving incline beneath, and thus be conveyed by a second groove to the foot of the first inclined plane, in order to recommence its upward journey under exactly similar circumstances. The bishop overlooked the fact that the magnetic action would also tend to prevent a fall; but for that fallacy, he had come as near success as the laws of nature permit. In Addeley's perpetual motion the wheel was surrounded by a set of magnets, projecting like teeth in a slanting direction, and having the S poles all towards the centre (fig. 4). Four larger fixed magnets were disposed outside the wheel, two of which at opposite points of the circumference presented their S poles to attract the revolving magnets, while half-way between them the other two presented their N poles to retard them. All the four magnets, however, acted against the inventor's purpose, as well as in the direction which he intended. In fact, if magnetic action or gravity could be temporarily nullified in a particular direction (as light is by interposing an opaque body) the problem of perpetual motion could immediately be solved.

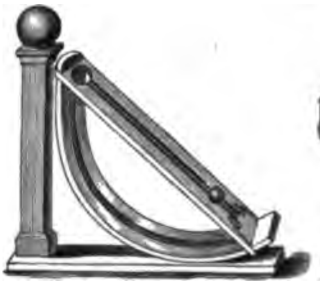


Fig. 3.

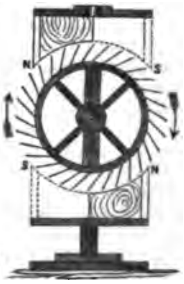


Fig. 4.

Innumerable patents have been taken out for magnetic and electric machines, but in the principle of each some fallacy lurks, due to a misconception of the laws of force-transmission. A typical case is an electric machine driven by a gas-engine where the latter is heated by the decomposition of water by the electricity produced; just as if a steam-engine, for example, could be heated by the friction of certain bodies set in motion by itself.

Some intelligent and practical proposals have from time to time been made to utilise the rise and fall of tides as the motive power of machines. These, however, should not be classed, as is sometimes done, under those named 'perpetual,' since the supply of power is obviously derived from a natural source—the moon's attraction combined with the earth's daily rotation. A tide-mill, exactly as a water-mill or wind-mill, is entirely dependent on an outward supply of power, and can in no sense be termed self-moving or 'perpetual.' Ultimately, of course, all the forms of natural energy are to be referred to the sun, the source of planetary force as well as life, whatever be their modifications. See H. Dircks, *Perpetuum Mobile: Search for Self-motive Power* (2d series, 1861-70).

Perpetuity, in English law, means an arrangement whereby property is tied up—i.e. rendered inalienable—for all time or for a very long period. Testators and settlers have always been tempted by family pride to restrain their successors from parting with settled property, especially land; but the policy of the law requires that owners should be free to dispose of their property, and perpetuities are sternly discouraged. Land was formerly tied up by means of Entails (q.v.) and by the creation of remainders, but these forms of disposition were brought within strict rule. Trusts were then used to evade the rules of common law, but the equity courts gradually evolved a rule that property should not be tied up unless for the lives of persons in being and twenty-one years beyond; any disposition which may possibly postpone the vesting of property beyond that period is void. The rule left a settler free, by selecting the lives of young persons, to tie up his property for eighty or ninety years. Thellusson, a London banker, attempted to create an immense fortune by directing that the income of his property should go on accumulating during the lives of his children, grandchildren, and great-grandchildren, living at the time of his death, and for twenty-one years beyond. This led to the passing of what is called the Thellusson Act in 1800; the act restricts accumulation of income (except for payment of debts, &c.) to a period of twenty-one years from the death of the settler, or some other of the limited periods described in the act. It is to be observed that trusts for public and charitable purposes are not, as a general rule, within the scope of the law against perpetuities. In the United States the rules developed by the English courts have been generally adopted as the basis of the law; several states have legislated on the subject, and in some cases the local law against perpetuities has been made a part of the state constitution.

Perpignan, a town of France, and a fortress of the first rank (dept. Pyrénées-Orientales), stands on the river Têt, 7 miles from the Mediterranean, 40 by rail S. of Narbonne, and 17 from the Spanish frontier. It commands the passes of the Eastern Pyrenees, and is defended on the south by a citadel, which encloses the old castle of the Counts of Roussillon, and by a detached fort. The streets are narrow and the houses of semi-Moorish construction, and show evidences of Spanish influence. The cathedral (begun in 1324), the Moorish-Gothic cloth-hall or bourse (1396), the town-house (1692), the building of the former university (1349–French Revolution), the palace of justice, and a college are the principal public buildings and institutions. Good red wine is made, sheep and silkworms are bred, vegetables and fruit grown, brandy distilled, cloth woven, and corks cut; and there is a good trade in wine, spirits, wool, cork-bark, oil, cloth, and silk. As capital of the former county of Roussillon Perpignan was in the hands of the kings of Aragon from 1172 to its capture by France in 1475; it was restored to Spain in 1493; but Richelieu retook it in 1642, and France has possessed it ever since. Pop. (1891) 31,432.

Perranzabuloe ('Perran in the sands'), a Cornish coast parish, 10 miles N. by W. of Truro. The rude little stone oratory (25 by 12½ feet) of St Piran, who was sent to Cornwall by St Patrick in the 5th century, had been buried in the sands for a thousand years, when it was discovered in 1835; it is probably the earliest ecclesiastical structure in England. Perran Round is a circular enclosure, with seven rows of seats that could seat 2000, in which miracle plays were performed of old. See works by Haslam (1844) and Trelawny (8th ed. 1884).

Perrault, Charles, immortal as the author of 'Puss-in-Boots,' 'Cinderella,' and 'Bluebeard,' was born at Paris, January 12, 1628, the youngest of an advocate's four sons. He was sent at nine to the Collége de Beauvais, but quarrelled with his masters, and had the rest of his education left to chance. He studied law fitfully, and took his license at Orleans in 1651, but soon tired of the humdrum routine of the profession, and filled from 1654 till 1664 an easy post under his brother, the Receiver-general of Paris. In 1663 he became a kind of secretary or assistant to Colbert in matters of architecture and art generally, and for twenty years enjoyed a salary, if not his master's friendship throughout, while by his influence he was admitted to the Academy in 1671. His poem, 'Le Siècle de Louis XIV.,' read to the Academy, and Boileau's angry criticisms thereon, opened up the famous and foolish dispute about the relative merits of the ancients and moderns; to the modern cause Perrault contributed his ambitious but poorly argued *Parallèle des Anciens et des Modernes* (4 vols. 1688–96). The same quarrel inspired his *Éloges des Hommes Illustres du Siècle de Louis XIV.* (2 vols. folio, 102 portraits; 1696–1700), the labour of his latest years. He died May 16, 1703. His *Mémoires* appeared in 1769.

All his writings would already have been forgotten but for the happy inspiration which prompted him to publish in 1697 his eight inimitable prose fairy-tales, the *Histoires ou Contes du Temps Passé*, with the title on the frontispiece of 'Contes de Ma Mère L'Oye.' These had already appeared anonymously from 1696 to 1697 in Moetjens' *Recueil*, a little miscellany published at the Hague since 1694. The same volume contained a reprint of three tales in verse by Perrault (*Peau d'Ane*, *Les Souhaits Ridicules*, and *Griselidis*), which had already appeared both in Moetjens' *Recueil* and in small volumes at Paris in 1694–95. The prose *contes*, on the other hand, were expressly stated to be by P. Darmancour, Perrault's little boy, to whom the 'Privilége du Roy' is granted. M. Paul Lacroix attributes the complete authorship to the son; it is more reasonable to believe with Andrew Lang that, if the naïveté and popular traditional manner point to the conservatism of the child and the native inspiration of his nurse, many a happy touch is due to the elderly academician and wit. But whatever the method of composition of these tales, the resultant is a group of masterpieces in the most difficult of arts, the same judgment of which is renewed generation after generation. It were impertinence to praise these stories; it is enough to enumerate their names: 'La Belle au Bois Dormant' (The Sleeping Beauty); 'Le Petit Chaperon Rouge' (Little Red Riding Hood); 'La Barbe Bleue' (Bluebeard); 'Le Maistre Chat, ou le Chat Botté' (Puss-in-Boots); 'Les Fées' (The Fairy); 'Cendrillon, ou la Petite Pantoufle de Verre' (Cinderella); 'Riquet à la Houppe' (Riquet of the Tuft); and 'Le Petit Poucet' (Hop o' my Thumb, Tom Thumb). .

There are editions of the tales by Giraud (Lyons, 1865), Lefèvre (Paris, 1875), Paul Lacroix (Jouast, Paris, 1876), and Andrew Lang (Clar. Press, Oxford, 1888). The last has an exhaustive Introduction of 115 pages. See also Charles Deulin's *Contes de Ma Mère l'Oye avant Charles Perrault* (Paris, 1879); and Deschanel's *Boileau, Charles Perrault, &c.* (Paris, 1888).

Perry, an agreeable beverage made by fermenting the juice of pears. It is extensively made in Worcestershire, Gloucestershire, Herefordshire, and Devonshire, and forms, with cider, the chief diet-drink of those districts. It contains from 5 to 9 per cent. of alcohol. See CIDER.

Perry, OLIVER HAZARD, an American naval officer, born at South Kingston, Rhode Island, 23d August 1785, is famous for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with 54 guns and 492 officers and men, fought six vessels, with 63 guns and 502 officers and men, lost four-fifths of the crew of his flagship, and finally won a complete victory, which he announced in the brief despatch: 'We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop.' Perry died of yellow fever at Trinidad, 23d August 1819, and was buried at Newport, Rhode Island, where there is a bronze statue (1885). See Life by A. S. Mackenzie (2 vols. New York, 1843), and in Fenimore Cooper's *Lives of Distinguished American Naval Officers* (1846).

Perryville, a village of Kentucky, about 40 miles SW. of Lexington, was the scene of a hard-fought battle between the Union and Confederate armies of Buell and Bragg, 8th October 1862.

Persecution. The principles that underlie the persecution of obnoxious opinions, as opposed to the principles of toleration, are regarded by those who persecute as essentially similar to those that arm justice against the criminal. Persecution of unpopular religious views has on religious or political grounds been especially common. The persecutions of the early Christians by the Roman emperors (see CHURCH HISTORY) have been usually, though artificially, counted as ten, viz. under Nero, 64 A.D.; Domitian, 95; Trajan, 107; Hadrian, 125; Marcus Aurelius, 165; Septimius Severus, 202; Maximinus, 235; Decius, 249; Valerianus, 257; Diocletian, 303. Some of the best of the emperors were thus the most strenuous persecutors of the Christians. The persecution seemed in many cases but to fan the zeal of the victims and survivors; in Tertullian's words, the blood of the martyrs was the seed of the church. But there have been many cases in which minor sects have been extinguished, partly or wholly by systematic persecution. The orthodox persecuted the Arians not without success; and the number of Lapsed (q.v.) raised a serious problem in the church. Cathari and Albigenses were practically persecuted out of existence by the Dominicans and the Inquisition; and the measures adopted to suppress the Reformation were triumphant in Bohemia, Spain, and Italy. In the Huguenot wars religion was complicated with politics (see BARTHOLOMEW, ST); the Dragonnades (q.v.) were part of a deliberate attempt to crush out Protestantism. The name persecution is used in England specially for the sufferings inflicted by Catholics on Protestants and by Protestants on Catholics in Mary's and Elizabeth's reigns; in Scotland also on the measures used against the Covenanters and other recusants in the 17th century. The oppressive legislation against Independents in Charles II.'s reign may also be classed under this head; and Massachusetts and most of the Puritan colonies passed several repressive measures against the Quakers. The persecutions carried on in the Netherlands by the Spanish authorities (see HOLLAND) were especially cruel and persistent. They comprised fine, imprisonment, ban, torture, beheading, strangling, strangling and burning, burning alive, burying alive; and their continuance goaded the people into a great national revolt. It deserves to be noted that the strenuous denunciation by Voltaire of the persecution of the unfortunate Calas (q.v.) family led to a new chapter in the history of toleration. Furious persecutions extirpated Catholicism from Japan in the middle of the 17th century, and Corea in the middle of the 19th. The Orthodox Eastern Church has in Russia had the assistance of the state in repressing the Raskolnik sectaries. Luther and Melanchthon were more pronouncedly hostile to the heretical astronomy of Copernicus than the Catholic authorities. A notable case of the persecution of a Protestant by Protestants is that of Servetus (q.v.; see also CALVIN). In this case Calvin had the sympathetic support of many foreign Protestant churches and their leaders. The 'theocratic' system established in Geneva by Calvin so confounded errors, sins, and crimes as to turn the administration of justice largely into a persecuting organisation; in three years there were fifty-eight sentences of death, and over eight thousand imprisonments for the crime of blasphemy (see Hug and Stead, *Switzerland*, 1891). The old Scottish discipline of the kirk-session was regarded as persecuting in spirit long ere it ceased to be rigorously applied. The persecutions of the Jews were especially persistent and especially unsuccessful, and have recurred in recent years in Russia, Roumania, and elsewhere.

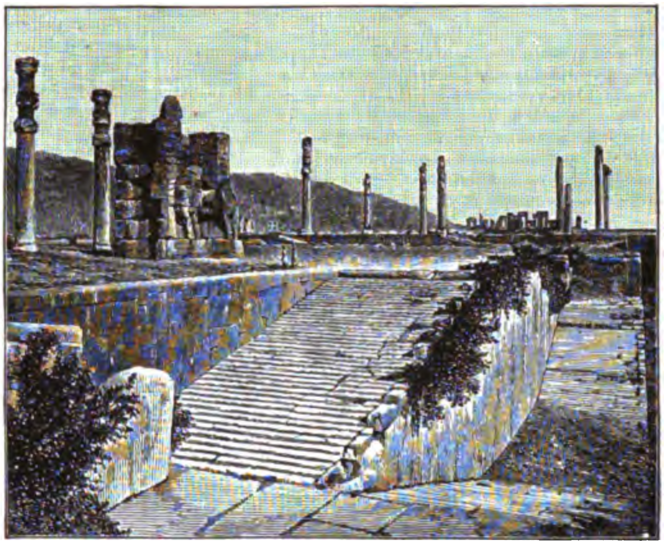
From the same causes as persecution come much other bloodshed and strife, war and devastation, social oppression, and personal suffering. Metaphysical principles formed the watchwords of political as well as of ecclesiastical parties. 'These evils mostly came from that which has been a permanently disastrous fact in Christian history—the interference of the state, which gave the decrees of the councils that sanction which elevated the resolutions of the majority upon the deepest subjects of human speculation to the factitious rank of laws which must be accepted on pain of forfeiture, banishment, or death' (Hatch, *Hibbert Lectures*, 1888).

See also the articles named above, especially INQUISITION and TOLERATION; also ALBIGENSES, AUTO DA FÉ, BLASPHEMY, BRUNO, CAMISARDS, CATHOLIC EMANCIPATION, GALILEO, HERESY, HUGUENOTS, MORMONS, WALDENSES, WITCHCRAFT; such works as Foxe's *Book of Martyrs* on one side, and on the other Challoner's *Memoirs of Missionary Priests and other Catholics who suffered Death for Religion*; Buckle's *History of Civilisation*; Lecky's *Rationalism in Europe*; and Draper's *Conflict between Science and Religion*.

Perseids. See METEORS, Vol. VII. p. 158.

Persephone. See PROSERPINE.

Persep'olis ('Persian City'), the Greek translation of the lost name (*Parsa-Karta?*) of the capital of ancient Persia, was situated to the east of the river Medus (Polwar—i.e. Murghab), about 14 miles above its confluence with the Araxes (Bendemir), in the plain of Merdusht, about 35 miles to the north-east of Shiráz, on the road to Ispahan. A series of most remarkable ruins is all that now remains of that city, with which, according to ancient writers, 'no other city could be compared either in beauty or in wealth,' and which was generally designated 'The Glory of the East.' Darius Hystaspes, Xerxes, Artaxerxes, and other Achæmenides each in his turn contributed towards its aggrandisement. Alexander the Great in his march of conquest is said to have destroyed Persepolis completely; but this must probably only be understood to apply to some of the chief palaces. It may also be presumed that after the fall of the Achæmenides the extension of the original town (afterwards known as Istakhr), on which were situated the royal edifices and the temples used as royal treasuries up to the time of Epiphanes, gradually fell into decay. The situation of these structures, overlooking the vast luxuriant plain of Merdusht, is described in terms of rapturous enthusiasm by every traveller from Chardin to our own day. Three groups are chiefly distinguishable in the vast ruins existing on the spot. First, the Chehel-Minár (Forty Pillars), with the Mountain of the Tombs (Rachmed), also called Takht-i-Jamshíd or the throne of Jamshíd, after a fabulous king, the reputed founder of Persepolis. The next in order is Naksh-i-Rustam, to the north-west, with its tombs; and the last, the building called the Haram of Jamshíd. The most important is the first group, situated on a vast terrace of cyclopean masonry at the foot of a lofty mountain-range. The extent of this terrace is about 1500 feet north by south and about 800 east by west, and it was, according to Diodorus Siculus, once surrounded by a triple wall of 16, 32, and 60 cubits respectively in height. The whole internal area is further divided into three terraces —the lowest towards the south; the central being 800 feet square and rising 45 feet above the plain, and the third, the northern, about 550 feet long and 35 feet high. No traces of structures are to be found on the lowest platform; on the northern, only the so-called 'Propylæa' of Xerxes; but the central platform seems to have been occupied by the foremost structures, which again, however, do not all appear to have stood on the same level. There are distinguished here the so-called 'Great Hall of Xerxes' (called Chehel-Minár by way of eminence), the Palace of Xerxes, and the Palace of Darius. The stone used for the buildings is dark gray marble, cut into gigantic square blocks, and in many cases exquisitely polished. The ascent from the plain to the great northern platform is formed by two double flights, the steps of which are nearly 22 feet wide, 3½ inches high, and 15 inches in the tread, so that many travellers have been able to ascend them on horseback. What are called the Propylæa of Xerxes on this platform are two masses of stone-work, which probably formed an entrance-gateway for foot-passengers, paved with gigantic slabs of polished marble. Portals still standing bear figures of animals 15 feet high, closely resembling the Assyrian bulls of Nineveh. The building itself, conjectured to have been a hall 82 feet square, is, according to the cuneiform inscriptions still extant, the work of Xerxes.


Great Staircase to Northern Platform, and Propylæa of Xerxes; Great Hall of Xerxes and Palace of Darius in the distance.

An expanse of 162 feet divides this platform from the central one, which still bears many of those columns of the Hall of Xerxes from which the ruins have taken their name. The staircase leading up to the Chehel-Minár or Forty Pillars is, if possible, still more magnificent than the first; and the walls are more superbly decorated with sculptures, representing colossal warriors with spears, gigantic bulls, combats with wild beasts, processions, and the like; while broken capitals, shafts, pillars, and countless fragments of buildings, with cuneiform inscriptions, cover the whole vast space of this platform, 350 feet from north to south and 380 from east to west. The Great Hall of Xerxes, perhaps the largest and most magnificent structure the world has ever seen, is computed to have been a rectangle of about 300 to 350 feet, and to have consequently covered 105,000 square feet or 2½ acres. The pillars were arranged in four divisions, consisting of a centre group six deep every way, and an advance body of twelve in two ranks, the same number flanking the centre. Fifteen columns are all that now remain of the number. Their form is very beautiful. Their height is 60 feet, the circumference of the shaft 16, the length from the capital to the torus 44 feet. The shaft is finely fluted in fifty-two divisions; at its lower extremity begin a cincture and a torus, the first 2 inches in depth and the latter 1 foot, from whence devolves the pedestal, shaped like the cup and leaves of the pendent lotus, the capitals having been surmounted by the double semi-bull. Behind the Hall of Xerxes was the so-called Hall of Hundred Columns, to the south of which are indications of another structure, which Fergusson terms the Central Edifice. Next along the west front stood the Palace of Darius, and to the south the Palace of Xerxes, measuring about 86 feet square, similarly decorated and of similar grand proportions.

For a more minute description, see the travels of Niebuhr, Ker Porter, Rich, &c.; Fergusson's *Palaces of Nineveh and Persepolis Restored*, Vaux's *Nineveh and Persepolis*, Rawlinson's *Five Great Monarchies*, Madame Dieulafoy's *La Perse et La Susiane*, M. Dieulafoy's *L'Art Antique de la Perse*, and above all, for detailed photographic views, *Persepolis*, by F. Stolze and Th. Nöldeke (Berlin, 1882). See also CYRUS, DARIUS, XERXES, CUNEIFORM, and PERSIAN ARCHITECTURE.

Perseus, in Greek Mythology, the son of Zeus and Danaë (q.v.) and grandson of Acrisius. He was brought up at Seriphos, one of the Cyclades, where Polydectes reigned, who, wishing for private reasons to get rid of him, sent him when yet a youth to bring the head of the Gorgon Medusa, on the pretence that he wanted to present it as a bridal gift to Hippodamia. Perseus set forth under the protection of Athena and Hermes, the former of whom gave him a mirror by which he could see the monster without looking at her (for that would have changed him into stone), the latter a sickle, while the nymphs provided him with winged sandals and a helmet of Hades or invisible cap. After numerous wonderful adventures he reached the abode of Medusa, who dwelt near Tartessus, on the coast of the ocean, and succeeded in cutting off her head, which he put into a bag and carried off. On his return he visited Ethiopia, where he liberated and married Andromeda (q.v.), by whom he subsequently had a numerous family, and arrived at Seriphos in time to rescue his mother from the annoyance of the too ardent addresses of Polydectes, whom, along with some of his companions, he changed into stone. After this he went to Argos, from which Acrisius fled to Thessaly, and Perseus assumed the vacant throne. But this, like many other details of the myth, is differently narrated. Perseus was worshipped as a hero in various parts of Greece, and, according to Herodotus, in Egypt too. In ancient works of art the figure of Perseus much resembles that of Hermes.

Perseverance of Saints, a doctrine necessarily resulting from the most essential part of the Calvinistic system, and therefore held by almost all who adopt the Calvinistic or Augustinian doctrines. It is advocated not only by arguments from other doctrines, as those of election, atonement, the intercession and mediatorial dominion of Christ, imputed righteousness, and regeneration, but also from many texts of Scripture, as those which declare eternal life to be always connected with believing, and those which encourage the believer to depend on the faithfulness, love, and omnipotence of God. To an objection very commonly urged against it, that it tends to make men careless concerning virtue and holiness, its advocates reply that this objection is valid only against a doctrine very different from theirs, the true doctrine of Perseverance of Saints being one of perseverance in holiness, and giving no encouragement to a confidence of final salvation which is not connected with a present and even an increasing holiness.

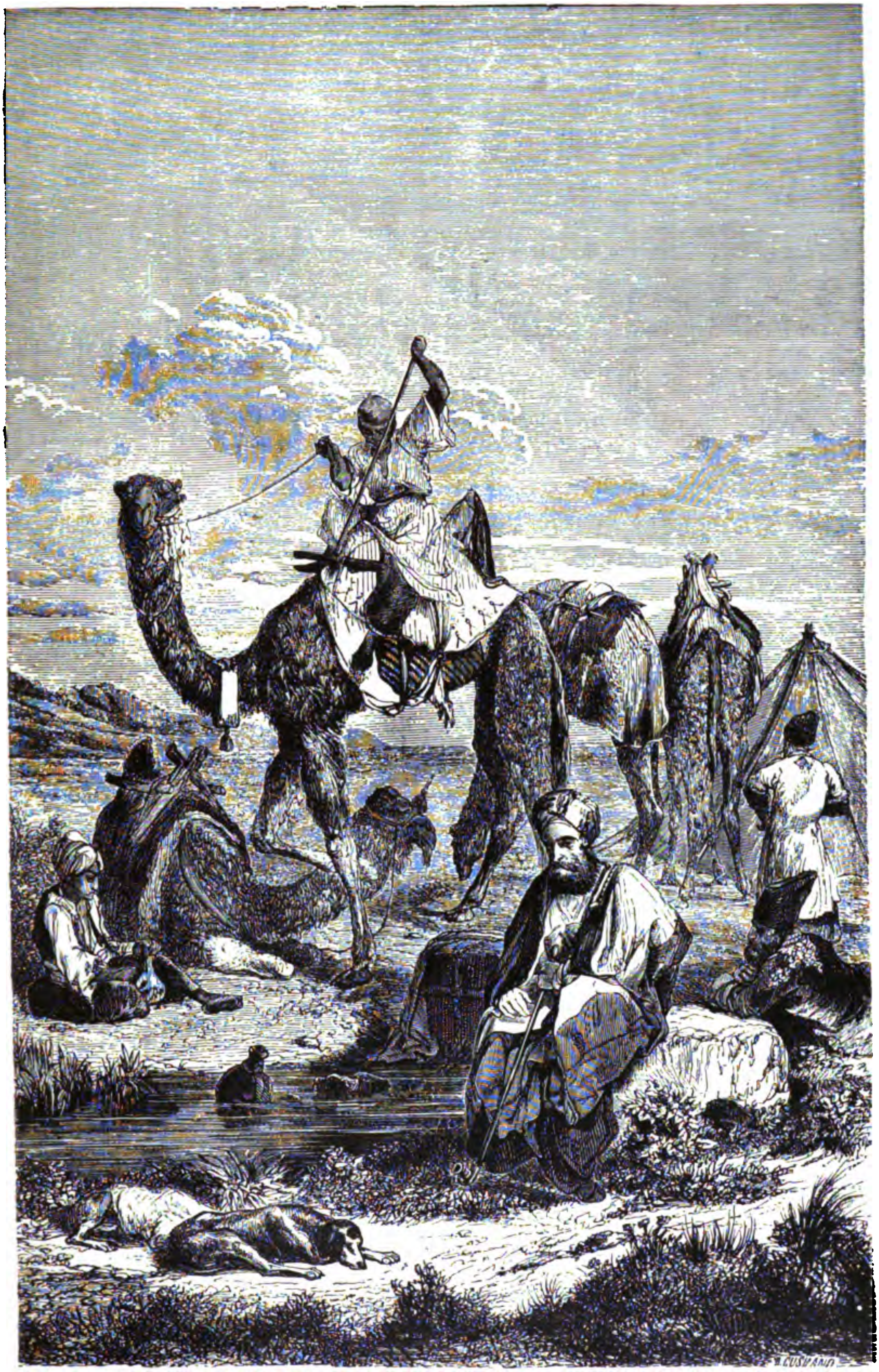
Pershore, a pleasant, old-fashioned market-town of Worcestershire, in a great fruit-growing district, on the Avon, 9 miles SE. of Worcester. Holy Cross, the church of a mitred Benedictine abbey, originally founded in 689, is but a fragment—choir, south transept, and central tower, mainly Decorated in style, but with Norman and Early English features. It was restored by Scott in 1863–65. Pershore has manufactures of stockings and agricultural implements. Pop. (1851) 2717; (1881) 2885; (1891) 2708. See Styles's *History of Pershore Abbey Church* (1838).

Persia, called by the natives IRAN (see ARYAN RACE), the most extensive and powerful native kingdom of western Asia, is bounded on the N. by the Transcaspian provinces of Russia, the Caspian Sea, and the Transcaucasian provinces of Russia; on the E. by the Transcaspian provinces of Russia, Afghanistan, and Beluchistan; on the S. by the Strait of Ormuz and the Persian Gulf; and on the W. by Asiatic Turkey. It extends 900 miles from east to west and 700 miles from north to south, and has an area of about 638,000 sq. m. It consists for the most part of a great tableland or elevated plateau, which in the centre and on the east side is almost a dead level, but on the north, west, and south is covered with mountain-chains. The provinces of Azerbijan, Mazanderan, Ghilan, Kurdistan, Luristan, and Fars are almost wholly mountainous. From the southern boundary of Azerbijan the majestic range of the Elburz runs eastward, following the line of the Caspian coast at a distance varying from 12 to 60 miles. On reaching Astrabad the mountains sink into ridges of lower elevation, one of which joins the Paropamisus in Afghanistan. A hill-country lies north of this line; it terminates in the Daman-i-koh chain, which sinks abruptly to the low plain of Turkestan. South and east of Azerbijan a broad mountain-belt traverses Persia from north-west to south-east, the chains and valleys of which it consists lying in the same direction. To this region belong the mountains running from Hamadan to Shiraz, some of the peaks of which are clad with perpetual snow, and the Zagros Mountains and Pushti Kuh on the western frontier. The Persian mountains are mostly primitive; granite, porphyry, felspar, and mountain-limestone enter largely into their composition. They also exhibit indications of volcanic action, Demavend, a conical peak 18,600 feet in height, the highest summit connected with the Elburz range (or ranges), being an extinct volcano; and earthquakes occasionally occur. The Persian plateau, which lies in an angle formed between these mountains, is intersected by many subsidiary ranges and groups of mountains, and spreads eastward to the plateau of Afghanistan, its general elevation ranging from 2000 to 5000 feet above sea-level, the lowest portion being the Great Salt Desert in the south-west of Khorassan, which has 2000 feet of elevation above the sea; while the average elevation of the whole plateau above the sea is about 3700 feet. See ASIA.

A great part of Khorassan, the north half of Kerman, the east of Irak-Ajemi, which form the great central plain, and detached portions of all the other provinces, with the exception of those on the Caspian Sea, forming more than three-fourths of the surface of Persia, are desert—that is to say, are uncultivated owing to the want of rain and of artificial irrigation. In some parts of this waste the surface produces a scanty herbage of saline plants; in other parts, called *Kevir*, it is covered with an efflorescence of saltpetre, which glitters and flashes in the sunlight, forcing the traveller on these inhospitable wastes to wear a shade to protect his eyes; but by far the greater portion of this region consists of light dry soil, which only requires irrigation to become fruitful. This great central desert contains a few oases, but none of great extent. A narrow strip of low and level country extends along the shores of the Persian Gulf and the Strait of Ormuz. It consists of a succession of bare plains, occasionally interrupted by a plantation of palms near the scanty rivulets which traverse it. It is called Dushtistan, or by the generic name, applied to many other localities, of *Garmisir*—i.e. the warm region, in opposition to the mountainous districts, called *Sarhad*, or the cold country.

Although so much of Persia is desert, some parts of the country are of exceeding fertility and beauty; the immense valleys, some of them 100 miles in length, between the various ranges of the Kerman Mountains abound with the rarest and most valuable vegetable productions. Great portions of the provinces of Fars, Khuzistan, Ardelan, and Azerbijan have been lavishly endowed by nature with the most luxuriant vegetation; while the provinces of Ghilan and Mazanderan, which lie between the Elburz and the Caspian Sea, and the southern slopes of the Elburz are as beautiful as wood, water, and a moderately hot climate can make them—the mountain-sides being clothed with trees and shrubs, and the plain, 300 miles long by from 5 to 30 miles wide, studded with mulberry plantations, rice-fields, vineyards, orchards, orange grounds, and sugar and cotton plantations.

Rivers and Lakes.—Persia has hardly one river that can properly be termed navigable, though some of them are several hundred miles in length, and of great width and volume of water. The Karun (q.v.) was opened to foreign steam-navigation from its mouth to Ahwaz (where there is a series of rapids) in 1889. The rivers which flow to the southward receive in the latter part of their course few tributaries, and fertilise only a narrow strip of land on each side of them, except when their waters are applied, by means of canals or other works, to the artificial irrigation of the soil. Most of the monuments of the architectural skill



PERSIAN CARAVAN AT REST.

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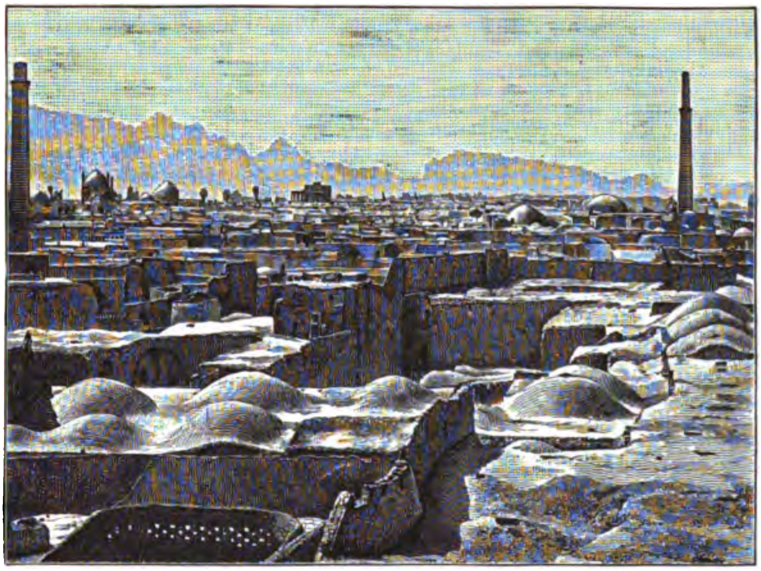
and laborious industry of the ancient Persians in this department are now ruinous. As a natural consequence of the nature and situation of its surface, Persia abounds with saline lakes, and there are nearly thirty of them having no visible outlets. The chief lake is Lake Urumiah (q.v.), in Azerbijan. Lake Bakhtegan, in the east of Fars, the receptacle for the drainage of the northern half of that province, is about 60 English miles in length by 9 in breadth. Lake Shiraz is much smaller. Part of Lake Zirreh is included in the frontier of Persia.

Climate and Products.—The climate is necessarily very varied. What the younger Cyrus is reported to have said to Xenophon regarding the climate, 'that people perish with cold at one extremity of the country, while they are suffocated with heat at the other,' is literally true. Persia may be considered to possess three climates—that of the southern Dushtistan, of the elevated plateau, and of the Caspian provinces. In the Dushtistan the autumnal heats are excessive, those of summer more tolerable, while in winter and spring the climate is delightful. On the plateau the climate of Fars is temperate. About Ispahan the winters and summers are equally mild, and the regularity of the seasons appears remarkable to a stranger. To the north and north-west of this the winters are severe. The desert-region of the centre and east, and the country on its border, endure most oppressive heat during summer and piercing cold in winter. The Caspian provinces, from their general depression below the sea-level, are exposed to a degree of heat in summer almost equal to that of the West Indies, and their winters are mild. Rains, however, are frequent and heavy, and many tracts of low country are marshy and extremely unhealthy. Except in the Caspian provinces, the atmosphere of Persia is remarkable above that of all other countries for its dryness and purity.



Ispahan, looking south.

The cultivated portions of Persia, when supplied with moisture, are very fertile, producing an immense variety of crops. The chief cultivated products are wheat (the best in the world), barley, and other cereals, cotton, sugar and rice (in Mazanderan), and *tumbaku* or tobacco for the *narghileh* or water pipe. The vine flourishes in several provinces, and the wines of Shiraz are celebrated in eastern poetry. Mulberries are also largely cultivated, and silk is one of the most important products of the kingdom. Owing, however, to the silkworm disease and the neglect of the Persian government to procure healthy *grain* from abroad, the silk cultivation has of late years greatly diminished.

The forests of the Elburz abound with wild animals, as wolves, tigers, jackals, boars, buffaloes, foxes, and the Caspian cat. Leopards abound in Mazanderan, and lions in parts of Fars and Arabistan. Among domestic animals the horse, the ass, and the camel hold the first place. The horses have always been celebrated as the finest in the East. They are larger and more handsome, but less fleet than the Arabian horses. The Caspian rivers abound with fish, especially sturgeon, great quantities of which are cured and exported to Russia. The mineral products of Persia are insignificant, with the sole exception of salt. Iron is abundant in Azerbijan, but is not worked; copper occurs in considerable quantity in the mountains of Mazanderan and Kerman; and lead, antimony, sulphur, and naphtha also abound. Long before Dr Tietze's report (1874) coal had been successfully worked in the mountains near Teheran.

Inhabitants.—The settled population are chiefly Tajiks, the descendants of the ancient Persian race, with an intermixture of foreign blood. To this class belong the agriculturists, merchants, artisans, &c. The Tajiks are Mohammedans of the Shiite sect, with the exception of the remaining Parsees (some 9000 in number), who are found chiefly at Yezd, and still retain their purity of race and religious faith. The Tajiks have been spoken of as timid, cunning, and servile, but Vambéry testifies to their industry, and their capacity for and love of culture. The nomad or pastoral tribes, or eylats (*eyl*, 'a clan'), often spelt *illyats*, are of four distinct races—Turks (not Osmanli Turk), Kurds, Lúurs, and Arabs. Their organisation is very similar to that which formerly subsisted among the Highland clans of Scotland, with the exception that the former are nomad, while the latter inhabited a fixed locality. Each tribe is ruled by its hereditary chief (*ujak*), and under him by the heads of the cadet branches (*tirehs*) of his family. Of the four nomad races the Turk is the most numerous, and to it belongs the present Kajar dynasty. The Kurds are few in number, the greater part of their country and race being under the sway of Turkey. The Arabs are also few in number, and at the present day can hardly be distinguished from the Persians, having adopted both their manners and language. The Lúurs are of nearly pure Persian blood. The nomad races are distinguished from the Tajiks by their courage, manliness, and independence of character; but they are inveterate robbers, and have been the cause of many civil wars and revolutions. There is a small population of native Christians—the Nestorians of Urumiah and Telmais, and Armenians, whose principal settlement is at Julfa (Ispahan), where there is an archbishop and a cathedral. Including those who have joined the Roman Catholic and Protestant churches, the whole number of Christians can hardly exceed 50,000. The Jews number 15,000.

We have no certain information regarding the population of Persia. There can be no doubt that in antiquity, and even during the middle ages, while the irrigation-works still fertilised great tracts of country, it supported a great population. In the 17th century the French traveller, Chardin, thought 40 millions not too high a figure. Recent travellers, however, reduced these sums to numbers varying from 15 to 8 millions. Much surprise was accordingly expressed when in 1868 Sir Ronald Thomson reported that the entire population did not exceed 5 millions, and was probably not over 4 millions. His estimate has since been generally accepted as the most trustworthy we have, although the official estimate in 1881 was 7,653,600. He divides the total roughly into a million inhabitants of cities, 1,700,000 nomads, and 1,700,000 peasants and villagers; and the following are his estimates of the population of the chief cities: Tabriz, 110,000; Teheran, 85,000; Meshhed, 70,000; Ispahan, 60,000; Yezd, 40,000; Kerman, 30,000; Kermanshah, 30,000; Hamadan, 30,000. Teheran has largely increased since this estimate was made, and in 1891 was said to have 210,000 inhabitants. There can be no doubt that the population of Persia has been long diminishing, a fact attributable to misrule and extortion, neglect of the great irrigation-works, and the frequent occurrence of famines in a dry country where cultivation depends on an artificial supply of water.

The roads are utterly neglected. The houses, those of the wealthiest people not excepted, appear contemptible, being generally built of earth or mud, and are grouped, even in the towns, with little attention to uniformity or order. They scarcely ever exceed one story in height, and they are surrounded by high blank walls. The public buildings, such as mosques, colleges, and caravanserais, are of similar appearance to the ordinary houses, and built of the same materials. The interiors, however, of the houses of the rich are sometimes perfect paradises of luxury and elegance. The miserable look of the towns is, moreover, greatly redeemed by the beauty of the gardens which surround them.

Manufactures and Trade.—The trade of Persia is comparatively of little importance. The silk used to be the great staple, and is produced in almost every province, but chiefly in Ghilan, Kashan, and Yezd. The repeated failure of the crop has, however, interfered very seriously with this branch of industry. Cotton and woollen fabrics, shawls, carpets, and felts are largely manufactured for use and export in different parts of the country. Trade is carried on by caravans with the interior of Asia and the chief towns of Persia. These caravans exchange the products of Persia for cloth, printed calicoes, shirting, copper sheets, hardware, glass and porcelain, tea, coffee, sugar, candles, paraffin-oil, lucifer matches, and fancy goods. The principal trade centres are Tabriz, Teheran, Ispahan, and Bushire. European goods are brought to Tabriz by Constantinople and Trebizond; to Teheran partly by Tabriz, partly by the Caspian, and partly by Bushire; while to Ispahan they are brought almost exclusively by Bushire. In recent times the communication between Persia and foreign countries has been greatly increased by way of the Caspian owing to the development of the copious petroleum-wells at Baku. By means of the cheap fuel thus obtained the Russian commercial fleet on the Caspian has increased fourfold, and railways have been made from Batoum on the Black Sea to Baku on the Caspian, and from the eastern coast of the Caspian to Askabad, Bokhara, and Samarcand. On the former sea there is a considerable Russian fleet of schooners and screw-steamers. Vessels sail weekly from Astrakhan and bi-weekly from Baku with merchandise for the Persian coast, touching at Enzelli, Mashadisar, and Ashurada. In the Persian Gulf the British India Steam-navigation Company have a regular line of fine steamers running weekly from Bombay to Basra, and touching at Bender-Abbas and Bushire. Fortnightly steamers were started in 1889 by an English firm on the Karun to ply between Mohammerah and Ahwaz in virtue of the concession of free navigation granted by the Shah in 1888. In 1890 Mr Curzon affirmed that in the north-west, north, and north-east districts a decided Russian superiority in trade was met and in parts disputed by British and Indian competition; in the south and west British ascendency is established and is being increased. The exports consist of wheat, rice, wine, raisins, almonds and nuts, olive-oil, tobacco, drugs, gums, resins, manna, opium, colouring matters, boxwood, walnut-wood, silk, wool, carpets, skins and furs, wax, pearls, turquoises, sulphur, naphtha, salt; the chief imports are cotton goods from Britain, and broadcloths, jewellery, arms, cutlery, watches, earthen, glass, metal wares, &c. The whole foreign trade of Persia has been estimated roughly at—imports, £2,500,000; exports, £1,500,000. The imports of British produce into the three ports of Bushire, Lingah, and Bender-Abbas amounted in 1889 to over £420,000, and of Indian and colonial produce to over £943,000; while the exports to Britain thence were worth £94,000, and those to India and the colonies £729,106. It is doubtful how far the existing commerce of Persia will make the construction of railways a profitable speculation. Many projects of railways have been formed, but up to 1891 only one of them had been carried out—viz. from Teheran to Shah Abul Azim, a place of pilgrimage distant only 6 miles. Tramways were laid down in Teheran, and an imperial bank established with branches in the other large towns, in 1889.

Government, Taxation, Education, &c.—The government of Persia is a pure despotism, limited only by the power and influence of the Mohammedan mollahs or priests, domestic intrigues, dread of private vengeance, and an occasional insurrection. The first named is the principal check against unjust government on the part of the monarch, while the latter three operate as powerful restraints on his ministers. The monarch, who has the title of 'Shah' and 'Padishah,' possesses absolute authority over the lives and property of his subjects. His deputies, the governors of provinces and districts, possess similar authority over those under them; their actions are, however, liable to revision by the Shah, who may summarily inflict any punishment upon them for real or alleged misgovernment. Oppression of the sedentary agricultural classes is almost a necessity of such a form of government. The central government consists of a ministry, nominally modelled somewhat after the cabinets of European states. Usually, however, the power falls actually, if not nominally, into the hands of one of their number. The Shah, nevertheless, is in reality his own prime-minister, and even trivial matters are submitted for his personal decision. The principal ministers are those for the Interior (practically the head of the government), for Foreign Affairs, for Finance, for War, for Telegraphs, &c., for Justice, and the President of the Council, who is at the same time postmaster-general and general secretary of state. The law both in civil and criminal cases is administered by the governors, who not unfrequently refer points of law, which is based upon the Koran and its commentaries, to mollahs and mushteheds. The punishments commonly inflicted are fines, flogging (the bastinado), and death, either by decapitation, stabbing, or torture. The principal Hákim or governors of provinces are chosen for the most part from among the members of the royal family. As a rule life and property are much more secure than is generally supposed. The revenue is derived from (1) a tax on the gross produce of land—25 per cent. may be taken as the average assessment; (2) duties on cattle and flocks—in case of goats, sheep, and cows, 8 per cent. on value of wool and butter yielded; (3) customs dues; and (4) duties on provisions brought to market. It will thus be seen that the direct taxation falls almost exclusively on the land and its cultivators. In theory these are the taxes authorised by the government, but in practice a frightful system of bribery and extortion prevails. The wealthy and influential escape the rapacity of the provincial governors, but as much as possible is taken from the hard-working peasants. It is believed that the irregular exactions amount to a sum equal to the legal assessments, and that not a penny of the money so extorted is applied to public purposes. The annual revenue in 1888–91 may be stated at from £1,600,000 to £1,775,000.

Elementary education is very generally diffused among all classes. There are a large number of colleges where students are instructed in religion and Persian and Arabian literature. Among a considerable section of the upper classes it is asserted that the Mohammedan religion is losing its hold, and that unbelief is widely prevalent.

Political Divisions, &c.—From the earliest times down to the present century Persia was divided into seven or eight great divisions; but about the time when it was attempted to introduce European civilisation into the country, and discipline into the army, the country was anew divided into twenty-five provinces. There are many interesting ruins of ancient, populous, and celebrated cities in Persia—e.g. Persepolis (q.v.), and Istakhr, Rhages or Rhé, Shahpur, Tûs, Merv, Shushan, Hamadan, &c.

Army.—The standing army, according to the recent army laws, consists of 200,000 men, but the majority of these exist only on paper. The regular army is really composed of about 30,000 infantry and 1000 artillery, while there are about 10,000 irregular cavalry, a few thousand irregular infantry, and the guards. The officers in the Persian army are for the most part ignorant and inefficient, but the soldiers are obedient, sober, intelligent, and capable of enduring great fatigue. The irregular cavalry, which forms the bravest portion of the Persian army, is equal to the Cossacks in the Russian army, and much superior to the Turkish Bashi-Bazouks.

History.—According to the *Shah Nameh* of Firdausi, the history of Persia begins some thousands of years before the Christian era. Little has been done towards extracting the grains of historical truth that may be contained in the mass of fable that constitutes the native Persian annals, and as yet we must rest contented with the accounts derived from Greek writers. The north-western part of Iran, anciently called Media (q.v.), was, at the earliest period known to the Greeks, a part of the Assyrian empire, but the Medes revolted, and in 708 B.C., under Dejoces, established an empire which subdued both that of Assyria and their own kindred tribes of Persia. About 537 the Persians under Cyrus (q.v.)—the Kai-Khusru of the Persians—rebelled, subdued their former masters, the Medes (who from this time became amalgamated with them), and established a mighty empire, which included, besides Persia, as far as the Oxus and Indus, Asia Minor, Syria, Palestine, and Mesopotamia. His son, Cambyses, a most ferocious and bloodthirsty tyrant (529–522), subdued Tyre, Cyprus, and Egypt. After the brief rule of the usurper Smerdis (522-521), Darius I. (q.v., surnamed Hystaspes—the Gushtasp of the Persians—521-485) mounted the throne. He was a politic and energetic prince, and succeeded in firmly establishing his dynasty, and adding Thrace and Macedonia to his empire; but his two attempts to subdue Greece were completely foiled, the first by the Thracians, and the second by the Athenians at Marathon (490). His son, Xerxes I. (485–465), renewed the attempt to subdue the Greek states, and, though at first successful, was compelled by the defeats of Salamis and Platæa to limit himself to a defensive warfare, which exhausted the resources of his kingdom. His son, Artaxerxes I. (465–425), surnamed Longimanus (the Bahman of the Persians, better known as Ardeshir Dirazdust), was a valiant prince, but he was unable to stay the decadence of Persia, which had now commenced. He, however, crushed a formidable rebellion in Egypt, though his wars with the Greeks and Ionians were unsuccessful. The empire now became a prey to intestine dissensions, which continued during the reigns of his successors, Xerxes II., Sogdianus, Darius II., Artaxerxes II., and Artaxerxes III. Darius III. Codomannus (336–329), the last of the dynasty, was compelled to yield his throne to Alexander the Great (known as Iskander or Secunder by the Persians), who reconquered all the former provinces of Persia, and founded a vast empire, which at his death, in 324, was divided into four parts, Persia along with Syria falling to the share of the Seleucidæ, and its old dependency, Egypt, to the Ptolemies.

The Seleucidæ soon lost Bactria (now Balkh), which became independent under a series of Greek sovereigns; and about 246 Parthia (q.v.; now Northern Khorassan) also rebelled under Arsaces I., who founded the dynasty of the Arsacidæ, under whom the greater part of Persia was wrested from the Greeks, and maintained against both the Greeks and Romans. The Greek empire of Bactria, which is said to have included a great part of India, was overthrown by an influx of nomad tribes from Turkestan (160–140); and these invaders having been driven out by the Parthians, Bactria was added to their empire (138). But the dynasty of the Arsacidæ, which maintained itself for four hundred and fifty years, was brought to an end by a Persian named Ardashir Babegan, who managed to gain possession of Fars, Kerman, and nearly the whole of Irak, before Arduan, the Parthian king, took the field against him. At last a great battle was fought (218 A.D.) on the plain of Hormuz, in which the Persians were completely victorious. Babegan was now hailed as Ardashir (Artaxerxes), king of Persia, and 'Shahan Shah,' or king of kings, his dynasty being named Sassanidæ from his grandfather Sassan. The Sassanian kings raised Persia to a height of power and prosperity such as it never before attained, and more than once imperilled the existence of the eastern empire. The most notable kings of the dynasty were Shahpur I. or Sapor (240–273), who routed the Romans, and took the Emperor Valerian captive at Edessa; his grandson, Shahpur II., who also maintained an equal conflict with the Romans; and Chosroes I. and II. (q.v.), the latter of whom was ultimately crushed by Heraclius (q.v.) in 628.

The last Sassanian king, Yezdigerd (Yazdajird), was driven from the throne, after a great battle at Nahavend (639), by the Arabs, who now began to extend their dominion in all directions; and from this period may be dated the gradual change of character in the native Persian race, for they have been from this time constantly subject to the domination of alien races. During the reigns of Omar (the first of the Arab rulers of Persia), Othman, Ali, and the Ommiades (634–750) Persia was regarded as an outlying province of the califate, and was ruled by deputy governors; but after the accession of the Abbaside dynasty (750) Bagdad became the capital, and Khorassan the favourite province of the early and more energetic rulers of this race, and Persia consequently came to be considered as the centre and nucleus of the califate. But the rule of the califs soon became merely nominal, and ambitious governors, or other aspiring individuals, established independent principalities in various parts of the country. Many of these dynasties were transitory, others lasted for centuries, and created extensive and powerful empires. The chief were the Taherites (820–872), a Turkish dynasty in Khorassan; the Soffarides (Persian, 869–903), in Seistan, Fars, Irak, and Mazanderan; the Samani, in Transoxiana, Khorassan, and Seistan; the Dilemi (Persian, 933–1056), in western Persia; and the Ghaznevids (q.v.), in eastern Persia. These dynasties supplanted each other, and were finally rooted out by the Seljuks (q.v.), whose dominion extended from the Hellespont to Afghanistan. A branch of this dynasty, which ruled in Khaurezm (now Khiva), gradually acquired the greater part of Persia, driving out the Ghaznevids and their successors, the Ghurids; but they, along with the numerous petty dynasties which had established themselves in the south-western provinces, were all swept away by the Mongols under Genghis Khan (q.v.) and his grandson, Hulagu Khan, the latter of whom founded a new dynasty, the Perso-Mongol (1253–1335). This race, becoming effeminate, was supplanted by the Eylkhanians in 1335; but an irruption of the Tartars of Turkestan under Timúr (q.v.) again freed Persia from the petty dynasties which misruled it. After the death of Timúr's son and successor, Shah Rokh, the Turkomans took possession of the western part of the country, which, however, they rather preyed upon than governed; while the eastern portion was divided and subdivided among Timúr's descendants, till, at the close of the 15th century, they were swept away by the Uzbegs (q.v.), who joined eastern Persia to their newly-founded khanate of Khiva.

A new dynasty (Sufi) now arose (1500) in western Persia, the first prince of which (Ismail, the descendant of a long line of devotees and saints), having become the leader of a number of Turkish tribes who were attached by strong ties of gratitude to his family, overthrew the power of the Turkomans, and seized Azerbijan, which was the seat of their power. Ismail rapidly subdued the western provinces, and in 1511 took Khorassan and Balkh from the Uzbegs; but in 1514 he had to encounter a much more formidable enemy—to wit, the mighty Selim, the Sultan of Turkey, whose zeal for conquest was further inflamed by religious animosity against the Shiites (q.v.). The Persians were totally defeated in a battle on the frontiers; but Selim reaped no benefit from his victory, and after his retreat Ismail attacked and subdued Georgia. The Persians dwell with rapture on the character of this monarch, whom they deem to be not only the restorer of Persia, but the establisher of the faith in which they glory as the national religion—viz. the *Shiah*, as distinguished from the *Sunni* sect of Mohammedanism. His son Tamasp (1523–76), a prudent and spirited ruler, repeatedly drove out the predatory Uzbegs from Khorassan, sustained without loss a war with the Turks, and assisted Homayun, the son of Baber, to regain the throne of Delhi.

After a considerable period of internal revolution, during which the Turks and Uzbegs attacked the empire without hindrance, Shah Abbas I. the Great (1585–1628) ascended the throne, restored internal tranquillity, and repelled the invasions of the Uzbegs and Turks. In 1605 he inflicted on the Turks such a terrible defeat as kept them quiet during the rest of his reign, and enabled him to recover the whole of Kurdistan, Mosul, and Diarbekir, which had for a long time been separated from Persia; and in the east Kandahar was taken from the Great Mogul. Abbas' government was strict, but just and equitable; roads, bridges, caravanserais, and other conveniences for trade were constructed at immense expense, and the improvement and ornamentation of the towns were not neglected. His tolerance was remarkable, as he encouraged the Armenian Christians to settle in the country. Of his successors, Shah Sufi, Shah Abbas II., and Shah Soliman, the two former were sensible and judicious rulers, and advanced the prosperity of their subjects. During the reign of Sultan Hussein, a weak and bigoted fool, priests and slaves were elevated to the most important and responsible offices of the empire, and all who rejected the tenets of the Shiites were persecuted. The consequence was a general discontent, of which the Afghans took advantage to declare their independence and seize Kandahar (1709). Their able leader, Meer Vais, died in 1715; but his successors were worthy of him, and one of them, Mahmud, invaded Persia (1722), defeated Hussein's armies, and besieged the king in Ispahan till the inhabitants were reduced to the extremity of distress. Hussein then abdicated the throne in favour of his conqueror, who, on his accession, immediately devoted his energies to alleviate the distresses and gain the confidence of his new subjects. Becoming insane, he was deposed in 1725 by his brother Ashraf; but the atrocious tyranny of the latter was speedily put an end to by the celebrated Nadir Shah (q.v.), who first raised Tamasp (1729), of the Suffavean race, to the throne, then deposed him and made his young son the nominal sovereign, and finally, on the latter's early death, himself seized the sceptre (1736). But on his death (1747) anarchy again returned; the country was horribly devastated by the rival claimants for the throne; Afghanistan and Beluchistan finally separated from Persia, and the country was split up into a number of small independent states till 1755, when a Kurd, named Kerim Khan, re-established peace and unity in western Persia, and by his wisdom, justice, and warlike talents acquired the esteem of his subjects and the respect of neighbouring states. After the usual contests for the succession, accompanied with the usual barbarities and devastations, Kerim was succeeded in 1784 by Ali-Murad, Jaafar, and Lutf-Ali, during whose reigns Mazanderan became independent under Aga-Mohammed, a Turkoman eunuch of the Kajar race, who repeatedly defeated the royal armies, and ended by depriving Lutf-Ali of his crown (1795).

The great eunuch-king, the first of the present dynasty, on his accession announced his intention of restoring the kingdom as it had been established by Kerim Khan, and accordingly invaded Khorassan and Georgia. The Georgians besought the aid of Russia; but the Persian monarch, with terrible promptitude, poured his army like a torrent into the country, and devastated it with fire and sword. His conquest was, however, hardly completed when he was assassinated (1797). His nephew, Fath-Ali (1797–1834), after numerous conflicts, fully established his authority, and completely subdued the rebellious tribes in Khorassan. But the great commotions in western Europe produced for him bitter fruits. He was dragged into a war with Russia soon after his accession, and by a treaty concluded in 1797 surrendered to that power Derbend and several districts on the Kur. In 1802 Georgia was declared to be a Russian province. War with Russia was recommenced by Persia at the instigation of France; but, after two years of conflicts disastrous to the Persians, the treaty of Gulistan (1813) gave to Russia all the Persian possessions to the north of Armenia, and the right of navigation in the Caspian Sea. In 1826 a third war, equally unfortunate for Persia, was commenced with the same power, and cost Persia the remainder of its possessions in Armenia, with Erivan, and a sum of 18,000,000 rubles for the expenses of the war. The severity exercised in procuring this sum by taxation so exasperated the people that they rose in insurrection (1829), and murdered the Russian ambassador, his wife, and almost all who were connected with the Russian legation. The most humiliating concessions to Russia, and the punishment by mutilation of 1500 of the rioters, alone averted war. The death of the crown-prince, Abbas Mirza, in 1833, seemed to give the final blow to the declining fortunes of Persia, for he was the only man who seriously attempted to raise his country from the state of abasement into which it had fallen. By the assistance of Russia and Britain Mohammed Shah (1834–48), the son of Abbas Mirza, obtained the crown. Mohammed resolved to demand reacknowledgment of sovereignty from his alleged vassals in parts of Afghanistan, Beluchistan, and Khiva, but an attempt he made to reannex Herat, 'the key to India,' was resisted by England. The war was terminated in 1838 by the landing of a small sepoy force on the shores of the Persian Gulf.

Nasr-ed-Din succeeded to the throne on his father's death in 1848. The new government announced energetic reforms, but at first failed as completely as those which had preceded it in carrying them out. Following his father's example, the new Shah resolved to reassert his claims in Afghanistan and Beluchistan. The ruler of Herat having recognised the claims of Persia, the English government remonstrated with the Shah, and he was compelled to sign an engagement (1853), by which he became bound not to interfere further with the internal affairs of Herat. In 1856, however, on the pretext that Dost Mohammed, the Ameer of Kabul, was about to invade Herat, the Persians again took the city. Thereupon a British army was landed on the coast of the gulf, and, under Generals Outram and Havelock, repeatedly defeated the Persians, and compelled them to restore Herat (July 1857). Since that time the Persians have not interfered with the 'key to India,' but they have been engaged in a long series of disputes with regard to their frontier north and south of it. After the war of 1857 their encroachments became systematic. In 1868 they occupied Seistan, a province claimed by the Afghans, and extended their jurisdiction over part of Beluchistan; but at length they agreed with the Ameer of Afghanistan and the Khan of Kelat to refer the questions in dispute to an English commissioner, General Sir Frederick Goldsmid, who in 1872 fixed the Persian frontier substantially as it now is—a large triangular tract to the east of Lake Zirreh, watered by the Helmund, being annexed to Persia. By the treaty of Berlin in 1878 the town and territory of Khotour, on the Turco-Persian frontier, was ceded to Persia by Turkey. The north-eastern frontier was settled by a treaty between Russia and Persia in 1881. The great extension of Russian territory and Russian power on the north-east, while overshadowing Persia to some extent, have had the effect of sheltering the adjoining regions of Persia from the terrible inroads of the Tekke and other Turkomans, now under Russian authority. English officers, including Sir John Bateman-Champain, Sir R. Murdoch Smith, Sir Oliver St John, and Captain Pierson, did much to explore and indirectly to improve the local government of Persia in connection with the establishment, in 1864, of the Indo-European telegraph line through Mesopotamia, Persia, and the Persian Gulf. A second portion was subsequently established in 1869 by the Indo-European Company to connect London with the above government lines at Teheran, and thus to complete overland telegraph communication between London and India *viâ* Germany, Russia, and Persia.

See Goldsmid's *Eastern Persia* (1876); Arnold's *Through Persia* (1876); Wills's *In the Land of the Lion and the Sun* (1883), and *Persia as it is* (1886); Benjamin's *Persia and the Persians* (1886); Hon. G. Curzon's *Persia and the Persian Question* (1891); and Morier's *Hajji Baba;* Khanikoff's *Ethnographie de la Perse* (1866); Madame Dieulafoy's *La Perse, la Chaldée, et la Susiane;* Barbier de Maynard, *Dictionnaire Géographique, Historique, et Littéraire de la Perse* (1861); Schwabe, *Bibliographie de la Perse* (1876); and German works by Petermann (1861), Polak (1865), Vambéry (1867), Stolze and Andreas (1885), and Brunnhofer (1889). See also the histories by Sir John Malcolm (2d ed. 1828), R. G. Watson (1866), and Clements Markham (1874); Rawlinson's *The Seventh Great Oriental Monarchy* (1876); and German works by Justi (1879), Nöldeke (1887), and Gutschmid (1888).

Persian Architecture.—The architecture of Persia and that of Assyria closely resemble one another, and, owing to the mode and the materials in which they were constructed, their remains serve to illustrate and complete each other's history. In Assyria, where no solid building-materials exist, the walls are composed of masses of sun-dried brickwork, lined on the inside, to a certain height from the floor, with large sculptured slabs of alabaster. These have been preserved to us by the falling in of the heavy earthen roofs, with which, as the later Persian buildings explain to us, the Assyrian palaces were covered. The explorations of Layard and Botta have made these sculptures familiar to us. The Assyrian remains are all of palace-temples, buildings somewhat resembling the Egyptian temples (which were also palaces); and many of the sculptures represent the exploits of the king in war and in peace. The palaces are always raised on lofty artificial mounds, and approached by magnificent flights of steps.

The buildings of Assyria extend over a very long period, the oldest at Nimroud being from 1300 to 800 B.C., and the more recent at Khorsabad and Koyunjik from 800 to 600 B.C. To these succeeded Babylon in the reign of Nebuchadnezzar, and the Birs Nimroud; but these are mere masses of decomposed brickwork, without any sculptures of harder material (see ASSYRIA).

After Babylon came Pasargadæ, where the splendid palaces of Cyrus and Cambyses still exist in ruins, and Persepolis, the capital of Darius and Xerxes (560–523 B.C.); and some remains are still to be found at Susa, Ecbatana, and Teheran. At Persepolis we find the very parts preserved which at Nimroud and Khorsabad are wanting; for here there is abundance of stone, and the pillars, walls, doorways, &c. (which in the early examples were no doubt of wood, and have decayed), being of stone, are still preserved. This enabled Fergusson to 'restore' these buildings; the subject has been further studied and illustrated with great care by M. Dieulafoy in *L'Art Antique de la Perse* (1884).

The halls at Persepolis were square in plan, having an equal number of pillars in each direction for the support of the roof, which was flat. In the centre a portion was left open for the admission of light, and sheltered by another roof raised upon pillars. The remains of the seventy-two columns with which it was adorned are still extant (fig. 1). The hall had thirty-six columns, six on each side, and on three sides had an external portico, each with two rows of six columns. These columns had capitals, composed of bulls' heads and shoulders (fig. 2), between which the beams of the roof rested; while others were ornamented with scrolls like the Ionic order (fig. 3). The bases also are suggestive of the origin of that Greek style. This hall was 350 feet by 300, and covered more ground than any similar buildings of antiquity, or any mediæval cathedral except that of Milan. The palaces of Persepolis stand on lofty platforms, built with walls of cyclopean masonry, and approached by magnificent flights of stairs, adorned, like the palaces, with sculptures somewhat similar to those of Assyria. The interiors were ornamented with paintings. The use of the arch was known in Assyria, as has been shown by the subterranean arched conduits discovered by Layard, and the gates of Khorsabad discovered by M. Place. The arches of the latter spring from the backs of sculptured bulls, and are beautifully ornamented with enamelled bricks.

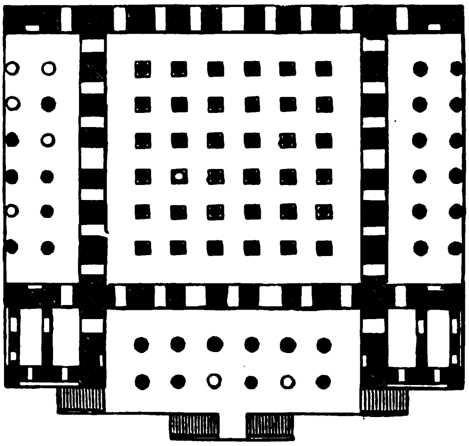


Fig. 1.—Plan of Great Hall of Xerxes at Persepolis.

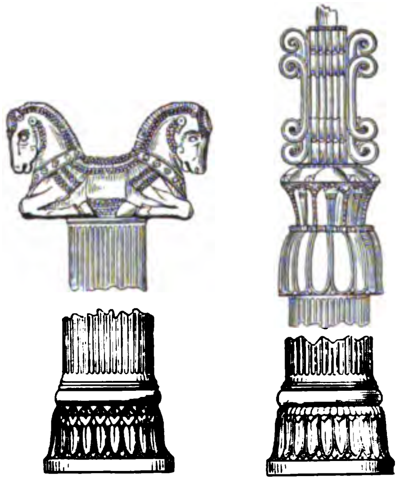


Fig. 2. Fig. 3.

Details of Persian Architecture.

In 1886 some extremely interesting discoveries were made at Susa (Shushan) in south-western Persia by M. and Madame Dieulafoy, who unearthed and sent to the Louvre a splendid frieze in coloured enamelled bricks with life-sized figures of warriors from the palace of Darius I., and another similar frieze with lions from the palace of Artaxerxes. A fac-simile reproduction of the warrior frieze is in the Edinburgh Museum of Science and Art.

Modern Persian architecture is separated by a wide historic gap from that of ancient Persia, and, all posterior to the Moslem conquest, belongs to the type known as Saracenic or Arabian. But it seems that the old art of Persia has a more direct influence on that of modern Persia than has been sometimes admitted; and even the Egyptian type of Saracenic art (see Arabian Architecture) may have been moulded by Persian as well as by Byzantine artists, working for the Moslem conquerors. In Persia itself there seems no doubt that architecture of Mohammedan Persia, which in its palmiest days rivalled in splendour that of Egypt, Bagdad vying with Cairo, is in many respects a reproduction of the ancient palaces of Nineveh and Babylon. In the mosques thick walls of imperfectly burnt bricks are covered with brilliantly coloured decorations of glazed and painted tiles and bricks. Fig. 4 is a view of the gateway of the Masjid Shah, or Great Mosque of Ispahan, dating from the reign of Shah Abbas the Great (1585–1628 A.D.).

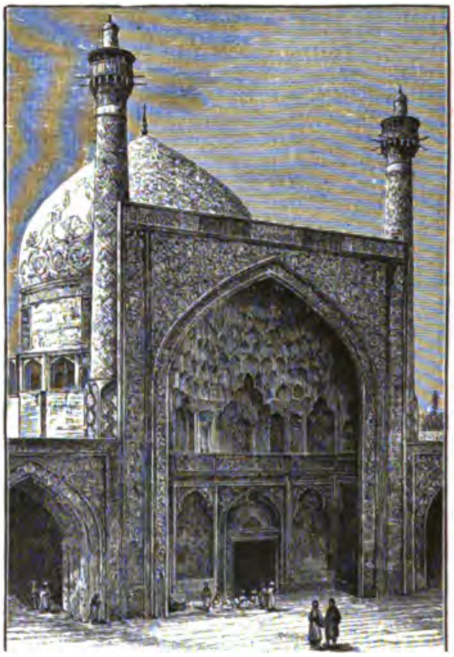


Fig. 4.—Gateway of Masjid Shah, Ispahan.

Persian Language and Literature.—The ancient and modern idioms of Persia, which are in general designated as Iranian or West Aryan, belong to the great class of the Indo-European languages; but the term Persian itself applies more particularly to the language as it is now spoken, with a few exceptions, throughout Persia, and in a few other places formerly under Persian dominion, like Bokhara, &c. The more important and better known of the ancient idioms are (1) the *Zend* (the East Iranian or Bactrian language, in two dialects—the 'Gâtha idiom' and the 'ancient' or 'classical Zend'), which died out in the 3d century B.C.—one of the most highly developed idioms, rich in inflections, in the verbs as well as in the nouns, and in the former almost completely agreeing with Vedic Sanskrit; yet such as we find it in the small remains which have survived it is no longer in the full vigour of life, but almost decaying, and grammatically somewhat neglected. Geographically, this idiom may be placed in northern Persia. Its alphabet is of Semitic origin, and the writing goes from right to left (see Zend, Zend-Avesta). (2) *Ancient Persian*, the chief remnants of which are found in the cuneiform inscriptions of the time of the Achæmenides, discovered in the ruins of Persepolis, on the rock of Behistun, and some other places of Persia (see Cuneiform). Some relics, chiefly consisting of proper names for gods and men, and terms for vessels and garments, have survived in the writings of the classical period, and in the Bible, chiefly in Daniel. This idiom is much nearer to Zend and Sanskrit than to modern Persian. (3) *Pehlevi* (West Iranian, Median, and Persian), in use during the period of the Sassanides (3d to 7th century A.D.), an idiom largely mixed with Semitic words, and poorer in inflections and terminations than Zend. Its remnants consist of a certain number of books relating to the Zoroastrian religion, of coins and inscriptions; and the language is not quite the same in all cases—according to the larger or smaller infusion of foreign words. The non-Iranian element is known as Huzvaresh, and is simply Chaldee; while the Iranian element is but little different from modern Persian. There are three distinct idioms to be distinguished in Pehlevi, and the writing varies accordingly, yet it is not certain whether the difference arises from their belonging to different districts or periods. When, however, Pehlevi ceased to be a living language, and the restoration of the pure Iranian had begun, people, not daring to change the writings (chiefly of a sacred nature, as having descended to them from the Sassanian times), began to substitute in reading the Persian equivalents for the Huzvaresh words. At last a new form of commentaries to the sacred writings sprang up, in which more distinct and clear Zend characters were used, where each sign had but one phonetic value, and where all the foreign Huzvaresh words were replaced by pure Persian ones; and this new form was called (4) *Pázend*. The transition from the ancient to the modern Persian is formed by the *Parsee*, or, as the Arabs and the modern Persians themselves call it, *Farsi*, in use from 700 to 1100 A.D., once the language purely of the south-western provinces, and distinguished chiefly by a peculiarity of style, rigid exclusion of Semitic words, and certain now obsolete forms and words retained in liturgical formulas. It is the Persian once written by the Parsees or fire-worshippers, and is in other respects very similar to the present or *modern Persian* (which also is invariably called *Farsi* by the modern Persians), the language of Jami, Nizami, and Háfiz—from 1100 to the present time—with its numerous dialects. The purest dialect is said to be that spoken in Shiraz and Ispahan and their neighbourhood. In general, the language is pronounced by universal consent to be the richest and most elegant of those spoken in modern Asia. It is the most sonorous and muscular, while at the same time it is the most elegant and most flexible of idioms; and it is not to be wondered at that in Moslem and Hindu realms it should have become the language of the court and of the educated world in general, as French used to be in Europe. Its chief characteristic, however, is the enormous intermixture of Arabic words, which, indeed, make up almost half its vocabulary. Respecting its analytical and grammatical structure, it exhibits traces only of that of the ancient dialects of Zend and Achæmenian, of which it is a direct descendant. The elaborate system of forms and inflections characteristic of those dialects has been utterly abandoned for combinations of auxiliary words, which impart fullness and an incredible ease to speech and composition. The grammar of the Persian language has been called 'regular;' but the fact is that there is hardly any grammar worth mentioning. Thus, there is no gender distinguished in declension; the plural is always formed in the same manner, the only distinction consisting in animate beings receiving the affix *án*, while the inanimate are terminated in *há*. Imported Arabic nouns, however, invariably take their Arabic plural. Not even the pronouns have a gender of their own; the distinction between masculine and feminine must be expressed by a special word, denoting male or female. There is no article, either definite or indefinite. The flexion of the verb is equally simple. As to syntax, there is none, or, at all events, none which would not come almost instinctively to any student acquainted with the general laws of speech and composition. The time of its greatest brilliancy may be designated as that in which Firdausí wrote, when Arabic words had not swamped it to the vast degree in which they have since done, and were still, as far as they had crept in, amenable to whatever rules the Persian grammar imposed upon the words of its own language.

In the history of the Persian writing three epochs are to be distinguished. First, we have the Cuneiform (q.v.), by the side of which there seems, however, to have been in use a kind of Semitic alphabet for common purposes. This, in the second period, appears to have split into several alphabets, all related to each other, and pointing to a common Syriac origin (such as the different kinds of Pehlevi characters and the Zend alphabet) cleverly adapted to the use of a non-Semitic language. In the third period we find the Arabic alphabet enlarged for Persian use by an addition of diacritical points and signs for such sounds as are not to be found in Arabic (*p*, *ch*, *zh*, *g*). The writing is but slightly different from the usual Arabic Neskhi.

Of the literature of the Persians before the Mohammedan conquest we shall not speak here, but refer to the article Zend. The literary period now under consideration is distinguishable by the above-mentioned infusion of Arabic words into the Persian language, imported together with the Koran and its teachings. The writers are one and all Mohammedans. With the fanaticism peculiar to conquering religions, all the representatives of old Persian literature and science, men and matter, were ruthlessly persecuted by Omar's general, Saad Ibn Abi Wakkas. The consequence was that for the first two or three centuries after the conquest all was silence. The scholars and priests who would not bow to Allah and his Prophet took with them what had not been destroyed of the written monuments of their ancient culture, while those that remained at home were forced to abandon their wonted studies. Yet, by slow degrees, as is invariably the case under such circumstances, the conquered race transformed the culture of the conquerors to such a degree that native influence soon became paramount in Persia, even in the matter of theology. It is readily granted by later Mohammedan writers that it was out of the body of the Persians exclusively that sprang the foremost, if not all, the greatest scholars and authors on religious as well as grammatical subjects, historians and poets, philosophers and men of science; and the only concession they made consisted in their use of the newly-imported Arabic tongue. A further step was taken when the Persians, under upstart native dynasties, returned also to the ancient language of their fathers during the first centuries of Mohammedanism. The revived national feeling, which must have been stirring for a long time previously among the masses, then suddenly burst forth in prose and in verse, from the lips of a thousand singers and writers. The literary life of Persia, the commencement of which is thus to be placed in the 9th century A.D., continued to flourish with unabated healthy vigour for five centuries, and produced a host of writers in every branch of science and belles-lettres, of whom we can only here give the most rapid of surveys, referring for the most important names to special articles.

About 952 Abul Hasan Rudegi, the Blind, rose by the king's favour to such an eminence that he had two hundred slaves to wait upon him; but little has remained of his 1,300,000 distichs, and of his metrical translation of Bidpai's Fables. About 1000 we hear of Kabus, the Dilemite prince, as the author of *The Perfection of Rhetoric*, and poems. In the time of the Ghaznevids, chiefly under Mahmud, who surrounded himself with no less than four hundred court-poets, we find those stars of Persian song, Ansari (1039), author of *Wamik and Asra;* Ferruchi, who, besides his own poems, wrote the first work on the laws of the Persian metrical art; Esedi, from Tus; and, above all, Firdausí (q.v.), the author of the *Shah-Nameh*. Under the Atabek dynasty was the panegyrist Anhad-ed-Din Anwari, who, with his praise, well knew how to handle satire. Nizami (about 1200) is founder of the romantic epos. Conspicuous in Persia is the mystic (Sufistic) poetry, which, under Anacreontic allegories, in glowing songs of wine and love, represented the mystery of divine love and of the union of the soul with God (see SUFISM). In this province we find the famous Omar Khayyam (q.v.; died 1123), and Farid-ed-Din Attar (born 1216), the renowned author of *Pend-Nameh* ('Book of Counsel'), a work containing the biographies of saints up to his own time; such is the depth and hidden meaning of his mystic poems that for centuries after him the whole Moslem world has busied itself with commentaries on the meaning of his sacred poetry. He died about 1330, more than a hundred years old, as a martyr. Greater still in this field is Jelal-ed-Din Rumi (died 1273), whose poem on *Contemplative Life* has made him the oracle of oriental mysticism up to this day; he wrote also a great number of lyrical poems. The 13th century cannot better be closed than with Sádi (q.v.), the first and unrivalled Persian didactic poet. But far above all shines Háfiz (q.v.), who sang of wine and love, and nightingales and flowers. After him the full glory of Persian poetry begins to wane. Among those that came after him Jami (1419–92) stands highest, a poet of most varied genius, second only in every one of the manifold branches to its chief master—in lyric and in didactic to Sádi, in romance to Nizami, in mysticism to Jelal-ed-Din; but most brilliant as a romantic poet. Of prose works we have by him a history of the Sufís, and an exceedingly valuable collection of epistolary models. The dramatic poetry of the Persians is not without merit, but is of small extent.

The numerous tales, stories, novels, anecdotes, anthologies, and all the miscellaneous entertaining literature in which Persia abounds form a fit transition from poetry to prose. Able rivals of the great Arabic historiographers sprang up at an early period. For the mythical times Firdausí's gigantic epos remains the only source. Reshid-ed-Din, the vizier of Ghazan (born 1247; executed in 1320), wrote a summary of the history of all Mohammedan countries and times, containing besides a complete history of sects. His contemporary Wassaf is the model of the grand rhetorical style. His most successful imitator in the 15th century is Sherif-ed-Din, who wrote the history of Tamerlane. Up to that period pomposity of diction was considered the principal beauty, if not the chief merit, of a classical Persian history. From the 15th century downwards a healthy reaction set in, and simplicity and a striving after the real representation of facts became the predominant fashion. Foremost among the modern historians is Mirkhond, whose Universal History comprises the period from creation to the reign of Sultan Hasan Beikara. His son Khondemir also wrote history. Among Indian historians who wrote in Persian we have Mohammed Kasim Ferishtah (1640), who wrote the ancient history of India up to the European conquest, Mohammed Hashim, Abul Fadel Mobarrek, and others. The *Measiri Sultaniye*, which contains the history of the present dynasty of Persia, and was published at Teheran in 1825, was translated by Bridges (Lond. 1833).

Biographies, legends, histories of martyrs, and the like are legion. Most of the biographies of the Prophet, however, are taken from the Arabic. Works on geography—generally treated together with history—are those of Mestafi, Ahmín Ahmed Rasi, Berdshendi, &c. In theology little beyond translations of the Koran, commentaries, and some portions of the Traditions has been produced. Jurisprudence has likewise to show little that is original, and not mere translation, partial commentary, or adaptation in Persian. The *Hedadshah*, the *Inadshah*, the *Futawa Alemgiri* are the most important legal works. Much has been written on medicine, surgery, pharmacy, and physical sciences by Persians, but nearly all their chief works are in Arabic. Mathematics, astronomy, and philosophy have not been neglected; rhetoric, works on letter-writing, and on metrical and poetical arts are numerous. Grammar and lexicography found their principal cultivators in India. Translations from Greek, Indian, Arabic, Turkish, and other languages into Persian exist in abundance.

There is no good history of Persian literature; but there is much information in the great catalogues of Stewart (1809), Ouseley (1831), Morley (1854), Sprenger (Calcutta, 1854), Rieu (Lond. 1879), and others. See the articles in this work on FIRDAUSÍ, HÁFIZ, &c. Dictionaries, besides the native ones, are those of Johnson and Richardson, Vullers (1867), Palmer (1876–84), and Wollaston (1889).

Persian Gulf, an arm of the Indian Ocean which penetrates between Arabia and Persia to the extent of 650 English miles in a general northwesterly direction. Its breadth varies from 55 miles at the mouth to 250 miles, and the area is estimated at 77,450 sq. m., not including the islands, which are scattered over the western half, or lie close inshore along the eastern side. The chief of these islands are Ormuz, at the mouth; Kishm, 810 sq. m. in extent; and the Bahrein Islands. The Great Pearl Bank stretches along the western side from Ras Hassan to nearly half-way up the gulf. The coast is mostly formed of calcareous rocks. On the Arabian side it is low and sandy, occasionally broken by mountains and cliffs; while on the Persian side it is higher and abrupt, with deep water close inshore, owing to the mountain-ranges of Fars and Laristan running close to the water's edge. The islands are partly of limestone and partly of ironstone, and are generally destitute of springs, barren, desolate, and presenting numerous traces of volcanic eruptions. Except the Shat-el-Arab (see EUPHRATES), the Persian Gulf receives only insignificant streams. Its eastern side presents abundance of good anchorage, either in the numerous bays or in the lee of islands. The greater portion of its southern shores now belongs to the Imam of Muscat, while the whole of the northern shore belongs to Persia. The order of the periodic currents in this gulf is precisely the reverse of that of the Red Sea (q.v.) currents, as they ascend from May to October, and descend from October to May. The greatest depth does not exceed 50 fathoms; and Dr John Murray calculates its total cubic contents at 2200 cubic miles of water. Oriental geographers give to this gulf the name of the 'Green Sea,' from a remarkable strip of water, of a green colour, lying along the Arabian coast.

The submarine telegraph cables belonging to the government of India, and forming part of the system of the Indo-European Telegraph, pass through the whole length of the Persian Gulf, from Fao at the mouth of the Shat-el-Arab, where they connect with the Turkish lines, to Bushire, where they connect with the Persian, and thence to Jask, Gwadur, and Kurrachee, where they connect with the general telegraph system of India. Among the ports are Bender Abbas (q.v.), Bushire (q.v.), and Lingah (pop. 8000).

Persian Powder. See Insect-powder.

Persigny, Jean Gilbert Victor Fialin, Duc de, an adherent of Napoleon III., was born at Saint-Germain-l'Espinasse (dept. Loire), 11th January 1808, entered the cavalry school at Saumur in 1826, and the 4th Hussars in 1828; but he was expelled from the army for insubordination in 1831. Then, having been introduced to Louis Napoleon, he secured his favour, and commenced a career of Bonapartist propagandism throughout France and Germany. He had the chief hand in the affair of Strasburg (1836) and in the descent on Boulogne (1840), but was captured there, and condemned to twenty years' imprisonment. On the breaking out of the revolution in 1848 Persigny was one of the men who secured the election of Napoleon as President of the Republic; he also took a prominent part in the *coup d'état* of December 1851. In January 1852 he succeeded De Morny as minister of the Interior; from 1855 to 1860 (except for one year) he was ambassador at the English court; then he resumed the office of minister of the Interior until June 1863. In September of the same year he was created duke. Thereafter he sat in the senate until the fall of the empire, when he escaped to England. He died at Nice on 12th January 1872.

Persimmon. See Date Plum.

Persius (Aulus Persius Flaccus), third in the line of Roman satirists, being later than Lucilius and Horace and earlier than Juvenal, was in some respects the ablest, certainly the most dramatic, of the four. Born of a distinguished equestrian family, 4th December 34 A.D., at Volaterræ in Etruria, he lost his father when six years old, was educated till twelve in his native town, and thereafter in Rome under the grammarian Remmius Palæmon and the rhetorician Verginius Flavius. In early manhood he came under the ennobling influence of the Stoic philosopher Cornutus, who imbued him with the tenets of his school and gave his mind and character an impress which ever deepened and strengthened. But he died before completing his twenty-eighth year (62 A.D.). The admiration and affection entertained by the master for his pupil was shared by the friends of the latter—Lucan, Cæsius Bassus, the lyric poet, and other contemporaries of light and leading, among whom, however, Seneca had little attraction for the young author. The noble and virtuous Pætus Thrasea accompanied him on several tours through Italy, finding a kindred soul in the modest, prepossessing youth, whose integrity and piety were conspicuous in his worldly as in his family relations. The austere discipline of Cornutus affected the style of Persius, who in consequence wrote fastidiously and sparingly, leaving at his death six brief satires, the whole not exceeding 650 hexameter lines. These, slightly corrected by Cornutus and edited by Cæsius Bassus, enjoyed, even through the early mediæval darkness till the Renaissance and down to our own day, the highest esteem, fathers of the church like Augustine and Jerome, humanists like Buchanan and Casaubon, anticipating later schools of literature in evolving and interpreting the poet's pregnant, if sometimes obscure, ridicule of the rapidly degenerating life of 1st-century paganism. The best satire is, on the whole, the first, on the prevailing false taste in poetry. 'Probably no writer ever borrowed so much and yet left on the mind so decided an impression of originality,' says Conington, who further indicates the striking resemblance between the genius of Persius and that of Carlyle. He has had many editors, of whom the most helpful have been Casaubon (1605), Otto Jahn (1843–68), and Conington, whose edition, revised by Nettleship (Oxford, 1878), gives text, prose translation, and notes embodying the best results of previous criticism. He has had a host of translators in the chief modern languages—that of the Italian Sacchi of Faenza surpassing all others, not excepting the English versions by Dryden and Gifford.

Person (Lat. *persona*, 'a mask') came to be applied to the person wearing the mask, and thus to mean a personage, an individual, a numerically distinct being. In theology there is a special use of the word for the three Persons of the Trinity (q.v.). The name *Persona*, Person, was first applied to the Trinity by the Latins; the corresponding Greek word, *Prosōpon*, being of later use. The earlier Greek Fathers used the word *Hypostasis*, 'substance,' where the Latins used *Persona*, and considerable controversy for a time grew out of this diverse use; after the condemnation of the Sabellian heresy, and still more after the Council of Nicæa, all ambiguity of words being at an end, the controversy turned upon the substance of the doctrine, in the form of the Arian controversy. See Arius.

Personal Equation. See Equations.

Personal Exception, in the law of Scotland, the equivalent of the English *Estoppel* (q.v.); a ground of objection which applies to an individual and prevents him from doing something which, but for his conduct or situation, he might do.

Personality, as used in philosophy, signifies the distinctive attribute or attributes which distinguish a person from an animal or a thing. A thing we ordinarily consider to be unconscious, an animal to be conscious, a person to be self-conscious. That is to say, we suppose the animal to have intelligent experience of a kind, without being able to reflect upon that experience, and so to be conscious of itself as the unitary subject whose the experience is. The last is the essential mark of personality in the intellectual sphere. 'A person,' says Locke, 'stands for a thinking intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking being in different times and places' (*Essay*, ii. 27). In the moral sphere personality means self-determination or reason-directed will, and may be said to be the foundation of moral responsibility. Hence the central position which it occupies in the ethics of Kant and Hegel. The consciously realised unity and identity of the individual thus constitutes what is most distinctive of personality as such. But under the name of *Double Personality* or *Double Consciousness* the records of medical science contain many cases of mental disorder, in which the sense of personal identity is curiously interfered with. Cases are, of course, of constant occurrence in which the patient mentally affected conceives himself to be some one else (e.g. Napoleon or a Scripture characters). Others conceive that parts or properties of their frame belong to another person, or that they are inhabited and ruled by a spirit or entity acting in opposition to their will and interests. Others, again, are possessed by the idea that they are two persons at once, or rather that their body is the seat of two beings who are often in strife with one another, one being generally identified more strictly with the self, and the other being regarded as a hostile power and a *mauvais sujet* who prompts the better self to evil courses. The struggle between the two persons of this duality often takes bodily shape, and the patient maltreats his own body under the impression that he is castigating the vicious 'other one' who haunts him. This alienation or extrusion of part of the individual's experience from the inner circle of the personality may be due, it has been suggested, to a morbid alteration in the cœnæsthesis or organic sensations which represent in consciousness the state of the body as a whole. Any part of the body in which this common sensibility is wanting or disturbed is regarded by the patient as no longer a part of himself, and even as belonging to some hostile being. It even happens in extreme cases of such somatic insensibility that the individual doubts or denies his own existence, as in the case of a patient cited by Ribot, who declared that he had been dead two years, though (according to his own account) he still continued to exist in a mechanical fashion in which he was not consciously interested.

These manifestations, however, are not what is meant by double consciousness in the strict sense of the term. Double consciousness does not necessarily imply the presence of any insane delusion as to the patient's present existence and surroundings, but consists in the fact that a certain portion of his past life is temporarily withdrawn altogether from his conscious memory, to reappear, however, at a later period, when he will have as completely forgotten his present experiences and the whole section of his life connected with them. In the normal human being the memory is unitary, and consequently the life-experiences of the individual are felt and recalled as parts of one whole. In these morbid cases, on the contrary, the conscious life seems, as it were, to be cut into sections or lengths which are entirely dissevered, and retained, so to speak, in separate memories. These mutually exclusive sections are remembered by the individual intermittently in successive periods, generally separated from one another by a swoon, a fit, or some violent nervous crisis. Now, as it is our memory of past experiences that may be said to form the anchor of personal identity, it follows that in such cases we shall have, in greater or less completeness, the extraordinary phenomenon of two separate and independent trains of thought—consequently two separate personalities—in the same physical individual.

Perhaps the most clearly defined and complete instance on record is that of the young American woman reported by Macnish in his *Philosophy of Sleep*. She fell without forewarning into a profound sleep lasting several hours beyond the usual term. Before her sleep she was well informed and possessed an excellent memory. 'On waking she was discovered to have lost every trace of acquired knowledge. It was found necessary for her to learn everything again. She even acquired by new efforts the art of spelling, reading, writing, and calculating, and gradually became acquainted with the persons and objects around, like a being for the first time brought into the world. In these exercises she made considerable proficiency. But after a few months another fit of somnolency invaded her. On rousing from it she found herself restored to the state she was in before the first paroxysm, but was wholly ignorant of every event and circumstance that had befallen her afterward. She is as unconscious of her double character as two persons are of their respective natures. For example, in her old state she possesses all the original knowledge, in her new state only what she acquired since. In the old state she possesses fine powers of penmanship, while in the new she writes a poor, awkward hand, having not had time or means to become an expert.' A similar experience is observable in the case of somnambulists, who are totally ignorant, in the waking state, of their somnambulistic experience, but when again in the somnambulistic state recall what happened in the previous crisis. Lost objects have been recovered, and even crimes brought to light by taking advantage of this peculiarity. The same phenomenon is also said to have been observed in cases of intoxication, what is done in one fit of drunkenness being remembered in the next, but forgotten in the sober interval. Instances of double consciousness, however, are not always of the precise type mentioned by Macnish. Thus, in one of the most interesting of recent cases (that of Félida X., reported by Dr Azam), the woman was conscious during the second state of her whole life-experience, but during the first or original state knew nothing of anything that had happened in the second. The alternations began in this case in 1856, and continued for upwards of thirty years, and it is remarkable that the second state, which at first appeared only in short dream-like periods, has gradually supplanted the first state, which now recurs only at long intervals, and for a few hours. The second state is physically and mentally superior to the first, and the patient herself speaks of the first as *état bête*. A still more extraordinary case, reported from Paris, is that of Louis V., a young man of epileptic and hysterical temperament and criminal tendencies (born 1863), where the medical record signalises not two, but six states which are mutually exclusive, but which, taken together, embrace his whole past life. These and other cases are commented upon by Ribot in his *Diseases of Memory* and his *Maladies de la Personnalité*, and by Mr F. W. Myers in an article on 'Multiplex Personality' (*Nineteenth Century*, November 1886). The phenomena of double consciousness have also been aptly described as periodic amnesia. They evidently depend upon morbid action of the brain—it has been suggested, upon an abnormal severance and consequent independent action of the two hemispheres—but the physiological conditions are still full of obscurity. An ingenious literary use of the notion of double personality, on completely different planes of morality, is seen in Mr R. L. Stevenson's creation of Dr Jekyll and Mr Hyde.

Personalty, all the property which, when a man dies, goes to his executor or administrator, as distinguished from the realty, which goes to his heir-at-law. Personalty consists of money, furniture, stock in the funds; while realty consists of freehold land and rights connected with land. See INTESTACY, KIN (NEXT OF), and (under Real) REALTY. In Scots law, the corresponding phrase is Movables; see HERITABLE AND MOVABLE.

Perspective (Lat. *perspicio*, 'I look through') is the art of representing natural objects upon a plane surface in such a manner that the representation shall affect the eye in the same way as the objects themselves. The distance and position of objects affect both their distinctness and apparent form, giving rise to a subdivision of perspective into *linear perspective*, which, as its name denotes, considers exclusively the effect produced by the position and distance of the observer upon the apparent *form* and *grouping* of objects; while *aerial perspective* confines itself to their *distinctness*, as modified by distance and light. The necessity of attending to the principles of perspective in all pictorial drawing is apparent when we consider, for instance, that a circle when seen obliquely appears to be not a circle but an ellipse, with its shortest diameter in line with the spectator, and its longest at right angles to this. A square, when looked at from a position opposite the middle of one of its sides, appears as a trapezoid, the sides which are perpendicular to the direction of vision appearing to be parallel, while the other two appear to converge to a point in front of the spectator, &c. For the same reason two rows of parallel pillars of equal height, seen from a point between and equidistant from each row, appear not only to converge at the further end, but to become gradually smaller and smaller. An excellent idea of a perspective plan can be easily obtained by interposing a vertical transparent plane (as of glass—a window, for instance) between the observer and the objects of his vision, and supposing that the objects he sees are not seen *through* the glass, but painted *on* it. A sketch made on a glass plane in this position by following with a pencil all the lines and shades of the objects seen through it, the eye being all the time kept quite steady, would form a picture in perfect perspective. In practice, however, it is found unfortunately that glass is not a suitable material for sketching on, and that the vertical position is not the most convenient; it is therefore preferable to make a careful study of the effects produced by change of position and distance on the appearance of objects in nature, and from the results of this to compile a body of rules, by the observance of which painters may be enabled to produce an effect true to nature. After the 'scope' (i.e. the number of objects to be introduced, and the distance at which they are to be viewed) of the picture has been determined, and before the design is commenced, it is necessary to draw upon the perspective plan three lines: (1) The *base line*, or *ground line*, limits the sketch towards the operator, and is the base line of the picture. (2) The *horizontal line* represents the ordinary position of the sensible horizon. The height of the horizontal line is about one-third of the height of the picture, when the sketcher is placed at or little above the level of the horizon; but it may rise in a degree corresponding to his increase of elevation till it reaches near to the top of the perspective plan. The general rule is to have a high horizontal line when the view is taken, or supposed to be taken, from an eminence; but when the station is on a level, either actual or assumed, as is the case when a statue or a mountainous landscape is figured, the horizontal line must be low. The horizontal line in nearly all cases is supposed to be level with the spectator's eye. (3) The *vertical line* is drawn from the supposed position of the sketcher, perpendicular to the *ground* and *horizontal* lines, meeting the latter in a point which is called the *point of sight*, or centre of the picture. The vertical line has no representative in nature, and is merely a mechanical adjunct to the construction of the picture, all vertical lines in nature being parallel to it in the picture. The point of sight, being the point directly opposite to the observer, is properly placed in the centre of the picture, for it is most natural that the view should lie symmetrically on each side of the principal visual line; but this is not by any means a universal rule, for we very frequently find it on the right or left side, but always, of course, on the horizontal line. All lines which in nature are perpendicular to the ground line, or to a vertical plane which is raised upon it as a base, meet in the point of sight, which is thus their *vanishing point* (see the line of the tops and bottoms of the pillars in fig. 1). The *points of distance* are two points in the horizontal line on each side of the point of sight, and in a 'direct' sketch are at a distance from it equal to the horizontal distance of the sketcher's eye from the ground line. The equality of distance of these points from the point of sight is not, however, necessary, as it occurs only in those cases where the lines, of which the points of distance are the *vanishing points*, are inclined (in nature) at an angle of 45° to the base line; but in all cases the two points of distance are about twice as far apart as the eye is from the picture. One important use of the points of distance is to define the distance of objects in a row (fig. 1) from each other. For this purpose two points of distance are not necessary, as when the position of one pillar is found, that of the one opposite is at once obtained by drawing a line parallel to the base or ground line. We have seen that the point of sight is the vanishing point of all level lines which meet the ground line or a vertical plane on it at right angles, and that the points of distance (in a *direct* picture) are the vanishing points of all lines which cut the ground line at an angle of 45°; but there are many other groups of parallel lines in a picture which have different situations, and therefore different vanishing points. Such lines with their vanishing points (called for distinction's sake *accidental points*) are represented in fig. 2. If the accidental point is above the horizontal line, it is called the *accidental point aerial*; if below, the *accidental point terrestrial*; and a little consideration makes it evident that these points may or may not be situated within the plane of the picture. Such are the points and lines necessary for the construction of a plan in true perspective; and from the above explanation we may deduce the two general principles: (1) that all parallel straight lines in nature are no longer parallel when projected on the perspective plane, but meet in a point which is called the vanishing point, and is some one of the three above described, unless these lines happen to be also parallel to the ground line or the vertical line, in which case they remain parallel when transferred to the picture; and (2) that, since the bodies drawn below the horizontal line are seen as if from above, those above as if from below, and those to the right and left of the point of sight as if observed from the left and right, it follows that straight lines which in the picture are above the horizontal line lower themselves, those below raise

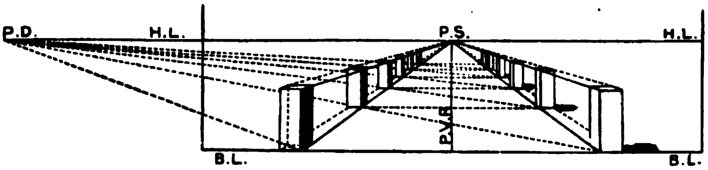


Fig. 1.
Illustrating the more important points and lines; PVR is the principal visual ray.

themselves to it, whilst those to the left, following the same law, direct themselves to the right, and *vice versâ*.

Aerial perspective consists in a modulation of the brightness and colours of objects in accordance with the state of the atmosphere, the depth of the body in the perspective plane (i.e. distance in nature from the ground line), and other accidents of place and time. As the distance of objects increases, their illuminated parts are made less brilliant and their shaded parts more feeble. The bluish tint imparted by a large mass of the atmosphere to the bodies seen through it is frequently imitated by the mixing of a slight tint of blue with the colours to be applied; a yellow object thus assumes a greenish tint, a red one a violet tint, &c. The air when charged with vapour is represented by a diminution of the brightness of colours, and by the grayish tint imparted to them. But in this part of the subject rules are of little avail, for experience alone can guide the painter in faithfully copying the myriad aspects presented by nature.

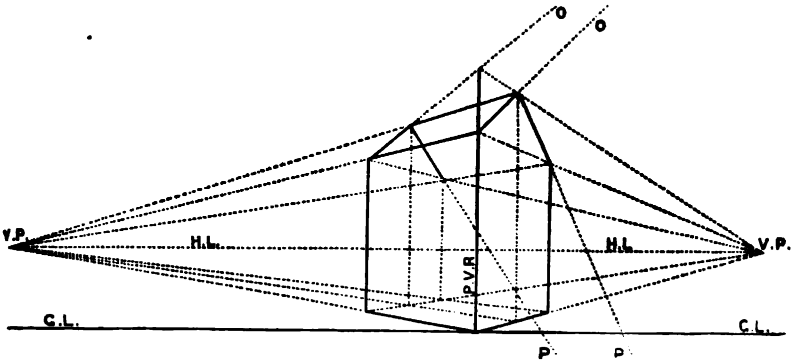


Fig. 2.

The lines O, O converge to the accidental point aerial, and P, P to the accidental point terrestrial.

A thorough knowledge of perspective is a *sine quâ non* to the painter or designer, and though many are inclined to think it a superfluity, and that the sketcher has only to make use of his eyes and copy justly, the very fact that such is their opinion shows that they have never made the attempt; for it is impossible for the painter, and much more so for the designer, to execute a copy of nature with sufficient accuracy by the sole aid of the eye and hand, a fact that is unfortunately much too frequently proved by many of the sketches exhibited in fine-art collections. Perspective was known to the ancients, but seems to have become extinct during the disturbances that convulsed Italy, and was revived by Albert Dürer and Bramantino of Milan (*c.* 1470–1535), whose body of rules was extended and completed by Peruzzi and Ubaldi about 1600. Dr Brook Taylor in 1715 and 1719 was the first Englishman who discussed the subject scientifically.

There are works on perspective by Tyrwhitt (1868), Humphris (1869), Collins (1872), Dennis (1877), Pellegrin (New York, 1874), Burchett (1881), Miller (1887), and James (1888).

Perspiration. See SWEAT.

Perth, the county town of Perthshire, on the right bank of the tidal Tay, 43 miles NNW. of Edinburgh, 22 WSW. of Dundee, and 62 NE. of Glasgow. The beauty of its surroundings—the noble river; the two wooded heights, Moncreiffe and Kinnoull Hills, 725 and 730 feet high; and, away to the north, the Grampians—makes the 'Fair City' worthy of the name. A handsome nine-arch bridge (1772; widened 1871), 840 feet long, and stretching over a waterway of 590 feet, leads to the suburb of Bridgend, where Ruskin spent much of his childhood, on the east bank of the Tay; along the west bank extend two beautiful public parks, the North and South Inches, 98 and 72 acres in area. St John's Church, whose restoration was undertaken in 1891, is the only old building—a cruciform Decorated pile, with an earlier central square tower. Other edifices are St Ninian's Episcopal Cathedral (1850–90), an Early Middle Pointed structure, by Butterfield; the Tudor municipal buildings (1879), the Grecian county buildings (1819–67), the city hall (1844), the infirmary (1837–69), and the penitentiary and general prison for Scotland (1812–59), besides which may be noticed the water-works (1830–80), two museums, the Albert statue (1864), and the auction-mart (1875). Railways have largely diverted the river-trade; and dyeing is now the leading industry, with manufactures of ink, gauge-glasses, linen, iron, beer, &c. A royal burgh since 1210 or earlier, and taking precedence of all others save Edinburgh, Perth returns one member. Pop. (1831) 19,238; (1861) 25,250; (1891) 30,525.

Perth, or St Johnstoun, as it was formerly called, has a wealth of historic memories—the bloody combat on the North Inch between sixty members of the clans Chattan and Kay (1396); the murder of James I. (q.v., 1437); Knox's 'thundering sermon against idolatry' in St John's (1559); the Gowrie Conspiracy (q.v., 1600); and Montrose's victory of Tippermuir (1644); besides sixteen ecclesiastical councils and fourteen parliaments, and visits innumerable from royal personages, including both the Pretenders and Queen Victoria. James, fourth Lord Drummond, was in 1605 created Earl of Perth—a title forfeited in 1695 by the Jacobite fourth earl (titular Duke of Perth), and restored in 1853 to George Drummond, sixth Duc de Melfort.

The *Five Articles of Perth*, memorable in the ecclesiastical history of Scotland, were agreed upon in a meeting of the General Assembly, convened at Perth, by command of James VI. in 1618. They enjoined kneeling at the Lord's Supper, the observance of Christmas, Good Friday, Easter, and Pentecost, and confirmation, and sanctioned the private administration of baptism and of the Lord's Supper. Highly obnoxious to the Presbyterians as having been adopted in mere compliance with the king's will, they yet were ratified by the parliament, and enforced by the Court of High Commission. They became one of the chief subjects of that contention between king and people which produced results so grave and sad for both in the subsequent reign. The General Assembly of Glasgow in 1638 declared that of Perth to have been 'unfree, unlawful, and null,' and condemned the Five Articles.

See *Perth Memorabilia* (1806), Maidment's *Chronicle of Perth* (Maitland Club, 1831), and works by Penny (1836), Lawson (1847), Peacock (1849), and J. Wilson (1860).

Perth, the capital of Western Australia, occupies a picturesque site on the north bank of the Swan River, 12 miles from Fremantle, its port, at the mouth of the river. Perth is the headquarters of banking for the colony, and the centre of the principal railway lines, including the Great Southern Railway to Albany. The more important buildings are the town-hall, the Protestant (1888) and Roman Catholic cathedrals, churches, mechanics' institute and museum, and the governor's residence. Pop. (1881) 5044; (1891) 9617.

Perth, capital of Lanark county, Ontario, on the river Tay, 141 miles by rail WSW. of Montreal, contains mills and manufactories of machinery, leather, woollens, &c. Pop. (1891) 3136.

Perth Amboy, a port of entry of New Jersey, on the Kill van Kull, 26 miles by rail SW. of New York. There is a steam-ferry to Tottenville, Staten Island, opposite. The manufactures include corks, bricks, white-ware, and drain-pipes. Pop. (1890) 9512.

Perthes, FRIEDRICH CHRISTOPH, German publisher, was born at Rudolstadt, 21st April 1772, learned his business in Leipzig, and started on his own account in Hamburg in 1796, and soon pushed himself into the front rank of German publishers. An ardent patriot, he in 1810 started the *National Museum*, with contributions from the most influential writers of the day, and took an active personal part in resisting the establishment of French authority in Hamburg and Germany. Having built up his business again during the first years of peace, he removed in 1821 to Gotha. There his greatest publication was the historical series of works on all European nations, edited by Heeren, Ukert, and Giesebrecht. He died at Gotha, 18th May 1843. See Life (6th ed. 1872; Eng. trans. 1878) by his son Clemens Theodor.—JOHANN GEORG JUSTUS PERTHES (1749–1816), an uncle to Friedrich, established a publishing-house at Gotha in 1785, which has acquired in the hands of his sons a great reputation as a geographical institute; it issues *Petermann's Mitteilungen*, Stieler's *Atlas*, numerous books of travel and geography, and the *Almanach de Gotha*.

Perthshire, the fourth largest county of Scotland, bounded by Inverness, Aberdeen, Forfar, Fife, Kinross, Clackmannan, Stirling, Dumbarton, and Argyll shires. Its greatest length, from east to west, is 77 miles; its greatest breadth, from north to south, 68 miles; and till 1891 its area was 2601 sq. m., or 1,664,690 acres, of which 38,274 were water. In that year no fewer than eighteen alterations were made by the boundary commissioners, Perthshire receiving eight small enclaves from Forfar, Fife, Kinross, and Stirling shires, whilst giving off to the last three a like number, including the Culross and Tulliallan portion (13,125 acres). Partly Lowland, but mainly Highland (Strathmore the dividing line), it is called by Scott 'the fairest portion of the northern kingdom;' and such, indeed, it is, with its mountains and glens, its rivers and lakes, its forests and fertile vales. The chief rivers are the Forth and Tay, the former receiving the Teith, Allan, and Devon, the latter the Tummel, Lyon, Isla, Braan, Almond, and Earn; whilst amongst upwards of eighty lakes are Lochs Tay, Ericht, Earn, Rannoch, Lydoch, Katrine, Achray, Vennachar, and Menteith. In the south rise the Ochils, with Dunmyat (1375 feet) and Blairdenon Hill (2072); in the south-east the Sidlaw Hills, with Dunsinane (1012) and King's Seat (1235); and the Highland area is largely occupied by the Grampians, of whose forty-six summits exceeding 2300 feet may be mentioned Ben Lawers (with cairn, 4004), Benmore (3843), Ben-y-Gloe (3671), Schiehallion (3547), Ben Vorlich (3224), Ben Ledi (2875), Ben Vrackie (2757), and Ben Venue (2393). The soil is extremely varied, in places of great fertility—e.g. in Strathearn and in the Carse of Gowrie, which skirts the north side of the Tay's estuary; but barely a fifth of the entire surface is in tillage, the rest being pasture, woods, deer-forests, mountain, and desolate moorland, such as Rannoch. The woods cover nearly 100,000 acres; and the annual rental of the Perthshire deer-forests, grouse-moors, and rod- and net-fishings exceeds in some years £70,000. Ancient divisions were Athole (N.), Rannoch (NW.), Breadalbane (W.), Balquhidder (SW.), Menteith (S.), Perth (SE.), Gowrie (E.), Stormont and Strathearn (central). The county since 1885 returns two members, one for the eastern and one for the western division; and Perth itself is a parliamentary burgh. Other towns and villages are Aberfeldy, Abernethy, Auchterarder, Birnam, Blair-Athole, Blairgowrie, Callander, Comrie, Coupar-Angus, Crieff, Doune, Dunblane, Dunkeld, Pitlochry, Scone, and Stanley. The Roman camp at Ardoch is a famous antiquity; and Perthshire contains the battlefields of the Grampians, Tippermuir, Killiecrankie, and Sheriffmuir; whilst it possesses memories of Bruce, Queen Mary, Rob Roy, Burns, Scott, Lady Nairne, Wordsworth, and Queen Victoria. The mansions, which are very numerous, include Taymouth, Drummond, and Blair castles. Pop. (1801) 125,583; (1831) 142,166; (1881) 129,007; (1891) 126,184, of whom 14,150 were Gaelic-speaking.

See separate articles on many of the above-named places; also works by Drummond (1879), Marshall (1880), Hunter (1883), and Millar (1890).

Pertinax, HELVIUS, Roman emperor, was born, according to Dio Cassius, at Alba-Pompeia, a Roman colony of Liguria, August 1, 126 A.D. He received a good education, and, entering the military service, rose through the various grades till he obtained the command of the first legion, at the head of which he signalised himself in Rhætia and Noricum against the native tribes. In 179 he was chosen consul, aided to repress the revolt of Avitus in Syria, and was governor successively of the provinces of Mœsia, Dacia, and Syria. The Emperor Commodus sent him to take the command of the turbulent legions in Britain, who against his will proclaimed him emperor; thereupon he solicited to be recalled, and was appointed pro-consul of Africa, prefect of Rome, and consul (a second time) in 192. On the death of Commodus his assassins almost forced Pertinax to accept of the purple, which with great hesitation he did; but, in spite of his promise of a large donation, he was unable to gain over the prætorian guard. His accession was, however, hailed with delight by the senate and people, who were rejoiced to have as ruler an able captain instead of a ferocious debauchee; and Pertinax, encouraged by this favourable reception, announced his intention of carrying out an extensive series of reforms, having reference chiefly to the army, in which he hoped to re-establish the ancient Roman discipline. Unfortunately for his reforms and himself, he was attacked by a band of the rebellious prætorians, two months and twenty-seven days after his accession, and, disdaining to flee, was slain, and his head carried about the streets of Rome in triumph.

Perturbations, in Physical Astronomy, are the disturbances produced in the simple elliptic motion of one heavenly body about another by the action of a third body, or by the non-sphericity of the principal body. Thus, for instance, were there no bodies in space except the earth and moon, the moon would describe accurately an ellipse about the earth's centre as focus, and its radius-vector would pass over equal areas in equal times; but only if both bodies were homogeneous and truly spherical, or had their constituent matter otherwise so arranged that they might attract each other as if each were collected at some definite point of its mass. The oblateness of the earth's figure, therefore, produces perturbations in what would otherwise be the fixed elliptic orbit of the moon. Again, when we consider the sun's action it is obvious that in no position of the moon can the sun act equally upon both earth and moon; for at new moon the moon is nearer to the sun than the earth is, and is therefore more attracted (in proportion to its mass) than the earth—i.e. the *difference* of the sun's actions on the earth and moon is equivalent to a force tending to draw the moon away from the earth. At full moon, on the other hand, the earth (in proportion to its mass) is more attracted than the moon is by the sun; and the perturbing influence of the sun is again of the nature of a force tending to separate the earth and moon. About the quarters, again, the sun's attraction (mass for mass) is nearly the same in amount on the earth and moon, but the *direction* of its action is not the same on the two bodies, and it is easy to see that in this case the perturbing force tends to bring the earth and moon nearer to each other. For any given position of the moon, with reference to the earth and sun, the *difference* of the accelerating effects of the sun on the earth and moon is a disturbing force; and it is to this that the perturbations of the moon's orbit, which are the most important, and amongst the most considerable, in the solar system, are due. See MOON, PLANETS, &c.

Peru, a republic of South America, extending from near 2° to 17° 20′ S. lat. Previous to the annexations by Chili, the Peruvian territory stretched southward to 22° 10′, with a length along the Pacific coast of 1400 miles, and a width of 300 miles. It borders on the Pacific, Ecuador, Brazil, Bolivia, and Chili. The area is not accurately known, but has been roughly estimated at 440,000 sq. m. The population in 1876, the date of the last census, was 2,704,998, the aboriginal Inca Indians forming 57 per cent., the *Mestizos* or half-castes 23 per cent., and the people of pure Spanish descent, negroes, Chinese, and foreigners 20 per cent. Peru is, therefore, still the country of the original Inca people.

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Surface of the Country.—The surface of Peru is extremely varied. It is divided longitudinally into three well-marked regions. (1) The *Coast* extends from the base of the Andes to the Pacific Ocean, and consists of a sandy desert crossed at intervals by rivers, along the banks of which there are fertile valleys. (2) The *Sierra*, or region of the Andes, about 250 miles wide, contains stupendous chains of mountains, elevated plains and tablelands, warm and fertile valleys and ravines. (3) The *Montaña*, skirting the eastern slopes of the Andes, is the third region. It consists of tropical forests traversed by great tributaries of the Amazon. The coast region has been upraised from the ocean at no very remote period. The absence of rain on this strip of land between the mountains and the sea is caused by the action of the lofty uplands of the Andes on the trade-wind. Reaching the snow-capped summits the last particle of moisture is wrung out of the wind that the very low temperature can extract, and it rushes down to the Pacific coast, cool and dry. Its moisture is deposited as snow on the tops of the cordillera, and feeds the mountain-streams which flow down to irrigate the coast-valleys. From November to April there is usually constant dryness on the coast, from June to September the sky is obscured for weeks by mist, sometimes accompanied by drizzling rain. The maximum temperature is about 78° in summer and 60° in winter. When it is hottest and driest on the coast it is raining heavily in the Andes, and the rivers are full. When the rivers are lowest mists and *garuas* or drizzling rains prevail on the coast. The deserts are divided from each other by forty valleys of great fertility, and the cultivable area on the coast might be considerably extended by irrigation. The coast has few protected anchorages, and the headlands are generally abrupt and lofty. This region is subject to frequent and severe earthquakes, the most destructive in modern times having been that of 1868, which nearly destroyed Arequipa and Arica, and that of 1877. Since 1570 there have been seventy destructive earthquakes recorded on the west coast of South America.

The Peruvian Andes contain peaks attaining heights of 21,000 and 22,000 feet; but they have never been measured with scientific accuracy. The mountain-system consists of three chains or *cordilleras*. Two of these chains, running parallel and near each other, are of identical origin. The western one is the maritime cordillera and comprises the volcanoes. The eastern cordillera is a magnificent and almost continuous range, in great part of Silurian formation, with clay-slates and eruptive granitic rocks. The western cordillera is cut through by several streams which flow into the Pacific, and the eastern cordillera by six tributaries of the Amazon, but the central chain is an unbroken water-parting. It consists mainly of crystalline and volcanic rocks, on each side of which are strata of aqueous, in great part of Jurassic, rocks. The valleys and plateaus between these ranges form the *Sierra* of Peru, and include every variety of climate and scenery. They may be divided, from a geographical point of view, into four sections, commencing from the north. The first, 350 miles long by 100 broad, comprises the upper basins of the Marañon and Huallaga. The second extends for 200 miles from Cerro Pasco to Ayacucho, including the lake of Chinchay-cocha and the valley of Jauja. The third extends for 250 miles to the knot of Vilcañota, comprising the upper valleys of the Apurimac, the Vilcamayu, and the Paucartambo. Here is Cuzco, the capital of the Incas, the centre and heart of Peru. The fourth section is the basin of Lake Titicaca, about 150 miles in length and breadth. The lake itself is 80 miles long, and 12,545 feet above the level of the sea. A number of rivers, which are of considerable volume during the rainy season, fall into it, and it is drained by the Desaguadero flowing out of the south-west angle. But a great proportion of the water is also taken up by evaporation, and the waters are gradually receding. The Sierra of Peru is the original home of the potato. Its lofty heights also produce several other edible roots, and the grain called *quinua* (*Chenopodium quinua*), while splendid crops of maize are grown in the valleys. The animals which specially belong to the Peruvian Sierra are the domestic llamas and alpacas, and the wild vicuñas. The llamas were the beasts of burden in the time of the Incas, each carrying a weight of about 100 lb. Alpacas have always been prized for their long and soft wool, and are tended with great care, being kept in large flocks. The other animals of the Peruvian Sierra are the *taruco* or deer, two rodents called *viscacha* and *chinchilla*, a native dog, and a fox. The largest bird is the condor, and there is another bird of the vulture tribe called *alcomari*. Partridges, called *yutu*, and plovers are met with on the lofty plateaus. The large and handsome geese called *huachua* and *huallata*, several ducks, a gull, flamingoes, and other wading-birds frequent Lake Titicaca and the banks of the rivers. In the valleys there are many kinds of finches, and a green parrakeet has been seen at a height of 12,000 feet above the sea.

The *Montaña* is the region of tropical forests within the basin of the river Amazon, including the wooded slopes of the eastern watershed of the Andes, which may be called the subtropical portion of the Montaña. This part of Peru is traversed by great navigable rivers. Here the Marañon and Huallaga, after separate courses of 600 and 400 miles respectively, unite and flow eastward to the Brazilian frontier. At 150 miles from their point of junction they are increased by the waters of the Ucayali, a great navigable river with a course of 600 miles. The forests drained by the Marañon, Huallaga, and Ucayali form the northern portion of the Peruvian Montaña. The southern half is watered by streams flowing down from the eastern Andes in the Sierra sections of Cuzco and Titicaca, and forming the Madre de Dios, a great tributary of the Bolivian river Beni, which has not yet been fully explored. The whole length of the Peruvian Montaña, from the Marañon to the Bolivian frontier, is 800 miles. In the subtropical portion, comprising the eastern slopes of the Andes, which sometimes extend for a distance of 60 or 80 miles before they subside into the Amazonian plain, there are very important products. This is the region of the quinine-yielding cinchona-trees, and of the coca (*Erythroxylon coca*), and here coffee and cacao of the finest quality are cultivated. From the forest-covered plains come india-rubber, sarsaparilla, and a great variety of useful and ornamental timber. The *fauna* of the forests is naturally much more numerous and varied than that of the Sierra. Here is the silver-gray monkey, the largest in South America, and other species. Bats of several kinds are numerous, and there are flocks of coatis. The Andean bear, called *ucumari*, is found on the upper borders of the forests. The puma also roams over the higher slopes, where he has an almost undisputed hunting-ground. Lower down there are jaguars, and several kinds of wild cats. Squirrels and other rodents swarm, and the heavy tapir, called *danta* or *gran bestia*, reposes in the soft marshy lands. Deer frequent the open ground, and herds of peccaries traverse the forests. The chief game-bird is the large black curassow, and there are several pigeons. Spoonbills, ibis, cranes, snipe, and curlew frequent the lagoons, while parrots, toucans, and other birds of bright plumage are innumerable. Snakes abound among the dense underwood, frogs raise their far-sounding voices through the night, and insects swarm in myriads. But the knowledge of the fauna of the Peruvian forests is still very incomplete.

Productions and Commerce.—The chief crops of the fertile valleys on the coast of Peru are sugar, cotton, and grapes. The exportation of sugar amounted to 45,000 tons in 1889, but it was double that figure in 1879, previous to the disastrous war with Chili. Peruvian cotton is chiefly grown in the valleys of Piura and Ica, and is a perennial. In 1889 the quantity of cotton exported from Piura and Ica was 2,946,400 lb. The vine has been a profitable industry ever since the Spanish conquest, in several valleys on the coast, and also in the Sierra. Good wine is made at Pisco and Ica, and also a famous spirit from the grape, called *Pisco* and *Italia*. The yield of wine in 1889 was 17,600,000 pints, and of spirits 5,280,000 pints. Rice of excellent quality is raised in the coast-valley of Lambayeque, and there are establishments for preparing it at Lambayeque and Ferreñafe. In 1889 the crop was 24,750,000 lb. Olives are grown in the Tambo valley near Arequipa, and before the Chilian war mulberries, silkworms, and cochineal were successfully cultivated. The rocky islets and barren deserts of the coast were once a source of enormous wealth to Peru, but are so no more. The exportation of Guano (q.v.) from the Chincha Islands began in 1846 and ended in 1872, the supply being exhausted; and the nitrates of Tarapacá were seized and annexed by Chili, as the result of the war.

The staple exports of the Sierra of Peru are silver and wool. The silver-mines extend along the whole length of the cordilleras, and are worked here and there, the great centre of mining industry being at Cerro Pasco. In 1877 the Cerro Pasco mines produced 1,427,592 oz. of silver, and there are others of equal value round Puno, in the south of Peru. In the above year the value of exported silver was £575,000; of copper, £330,000. Up till 1891 there were no later returns; and there are no returns of gold exported, although there are rich washings in the Caravaya province.

Mollendo is the principal port for the export of wool; but wool is also shipped from Salaverry, Pacasmayo, and Chala. There are no reliable returns of the quantity and value. From the Montaña the exported products are cinchona bark, coca (of which 3044 lb. of leaves were exported in 1889), coffee of the finest quality, cacao, tobacco, india-rubber, sarsaparilla, and some other medicinal roots. Maize is also exported to Chili, and large quantities of wheat are imported from Chili and the United States.

Public Works.—The system of railways consists of a dozen short lines in the coast-valleys—varying in length from 80 to 20 miles, constructed to bring the produce down to the seaports—and of two long lines across the Andes. The first of these, from Callao and Lima to Oroya, in the lofty valley of Jauja, is to be 136 miles long, and was commenced in 1870. It threads the intricate gorges of the Andes by a winding path along the edges of precipices, through tunnels, and over bridges that seem suspended in the air. It tunnels the Andes at an altitude of 15,645 feet, and the bridge of Verrugas spans a chasm 580 feet wide, on three piers, the centre one being 252 feet high, of hollow wrought-iron. Of this railroad 86¾ miles had in 1891 been completed at a cost of £4,625,887. The other great line across the Andes connects the port of Mollendo with Puno on the shores of Lake Titicaca, passing by Arequipa. The summit is crossed at a height of 14,660 feet, and the line is 346 miles long. In 1874 steamers were first launched on Lake Titicaca. In order to supply the port of Mollendo with water a pipe has been laid alongside the line from Arequipa for a length of 85 miles, discharging 433,000 gallons in twenty-four hours—the longest iron aqueduct in the world. The construction of these great public works, chiefly between 1868 and 1872, involved the finances of Peru in grave difficulties. Previously the debt, mainly incurred during the war of independence, was £4,400,000, the interest of which was paid from the proceeds of the guano. But by 1872 the debt had been increased to £49,000,000, requiring an annual sum of £2,450,000 to pay the interest. The payment of interest ceased in 1876, having been regularly paid since 1849. The financial difficulties culminated with the disastrous war with Chili, when the nitrate of Tarapacá, the chief resource of Peru, fell into the hands of the enemy.

The People.—The bulk of the Peruvian population is composed of the aboriginal Inca Indians, whose language, called Quichua, is still spoken in the Sierra. The Incas had attained to a high state of civilisation before the arrival of the Spaniards. They cultivated many of the arts, and had some knowledge of astronomy. They had domesticated the llamas and alpacas, had brought under cultivation maize and quinoa, potatoes and many other edible roots, understood mining and the working of metals, and excelled as masons, weavers, potters, and farmers. They brought the science of government to a high pitch of perfection. The Incas composed songs and dramas; and as soldiers their skill and prowess enabled them to conquer and consolidate a vast empire. Three centuries of oppression under Spanish rule have deteriorated the character of the Inca Indian, but he is still industrious and honest, and retains some of the virtues of his ancestors. The wild Indians of the Montaña were never subjugated by the Spaniards. Spanish administration caused a rapid diminution of the population. The Indians of the Sierra were decimated, while those of the coast-valleys disappeared altogether. Negro slaves were then introduced to cultivate the estates in the coast-valleys, and this system continued during Spanish colonial rule, and until 1855. In that year slavery was abolished, and the emancipation of the negro population gave rise to difficulties in obtaining labour. Chinese immigration schemes were resorted to, and from 1860 to 1872 as many as 58,646 Chinese coolies were imported.

Civil Divisions, Cities, and Towns.—Peru is divided into departments, which are subdivided into provinces. On the coast, commencing from the north, the departments are Piura, Lambayeque, Libertad (formerly Trujillo), Ancachs, Lima, Ica, and Arequipa. The capital of Piura is San Miguel de Piura, founded by Pizarro, with a seaport called Payta at a distance of 63 miles. The next department of Lambayeque has a capital of the same name, with three small seaports of San José, Eten, and Pimentel. Libertad has the episcopal city of Trujillo as its capital, which was founded by Pizarro in 1535. The seaports are Huanchaco, Salaverry, and Huañape. Ancachs does not contain any city of note. Lima (q.v.), the capital of Peru, is nearly in the centre of the coast region, and has a population of almost 200,000. The department of Ica, south of Lima, is composed of the two provinces of Ica and Chincha, each with a city, and has its principal seaport at Pisco. Arequipa is at present the most southern department of Peru, the rest of the Peruvian coast still being occupied by the Chilian invaders. Besides Mollendo (107 miles by rail from the city of Arequipa), it also has small ports for export at Islay, Quilca, and Chala.

The departments of the Sierra of Peru are Cajamarca, Huanuco, Junin, Huancavelica, Ayacucho, Apurimac, Cuzco, and Puno. Five of these have provinces also in the Montaña; and there are two departments, those of Amazonas and Loreto, entirely in the Montaña. On the coast the houses are built of *adobes* or large sun-dried bricks, and are flat-roofed. In the Sierra the houses are generally of stone, with high-pitched red-tiled roofs. The most northern department contains the cities of Cajamarca and Jaen. Huanuco has a capital of the same name. Junin contains the mining-town of Cerro Pasco, and the cities of Tarma, Jauja, Concepcion, and Huancayo. Huancavelica is a mountainous department, and its chief town owed its existence to the proximity of a quicksilver-mine. Ayacucho received its name from the battle in which Peru gained her independence. Its chief city of Guamanga, now called Ayacucho, was founded by Pizarro in June 1539. The Apurimac department comprises the two valleys of Andahuaylas and Abancay. Cuzco is the central department of the Sierra of Peru. Its capital was formerly the capital of the Inca empire, and the cathedral and other churches are raised on the palaces of the Incas. A few miles from Cuzco is the warm and fertile valley of the Vilcamayu, containing the delightful towns of Urubamba, Calca, Sicuani, and Tinta. The department of Puno comprises the basin of Titicaca and the rich province of Caravaya in the Montaña. Its capital, on the north-western shore of the lake, owes its origin and former prosperity to the rich veins of silver ore in the surrounding hills. The other cities of the department are Lampa and Chucuito.

Church and Education.—When the Spaniards conquered Peru the Catholic religion was enforced on all natives, and a determined attempt was made to crush out the modes of thought, traditions, and culture of the Inca civilisation, and to substitute new ideas and beliefs. This destructive system was resolute and well organised, and was in great part successful. Education and literature were in the hands of an intolerant priesthood. The cruel Friar Valverde was made Bishop of Cuzco in 1534. The archbishopric of Lima was created in 1541, and the bishoprics of Guamanga, Arequipa, and Trujillo were added in 1612 and 1614. Swarms of clerics followed the bishops, numerous monasteries were founded, and an inquisitorial system of catechising and punishing penetrated into every village and hamlet in the land. Schools were established in the towns for the education of young Spaniards and half-castes; and the university of San Marcos at Lima, the most ancient in the New World, was founded in 1551. It had professorial chairs of medicine, philosophy, rhetoric, Latin, mathematics, divinity, and for a short time of Quichua—the language of the Incas. In 1793 there were 313 doctors of San Marcos. The college of San Carlos at Lima, which still flourishes, was founded in 1770, and the school of medicine was established in 1792. At Cuzco the university of San Antonio Abad was founded in 1598, and the viceroy, Prince of Esquilache, also endowed the college of San Borja there, for the education of noble Indians. At Arequipa the college of San Geronimo was founded in 1616, for teaching Latin and theology, and similar colleges were founded at Trujillo in 1621 and at Guamanga in 1680. These universities and colleges produced historians and other writers of eminence, the best known in Europe being Dr Peralta y Barnuevo, who wrote *Lima Fundada*, and Leon Pinelo, the author of a well-known bibliography. In later times, and since the independence, Peru has produced numerous meritorious writers, including the learned Dr Vigil, the antiquary Rivero, the historians Lorente and Palma, the geographers Paz Soldan and Unanue, the poets Marquez, Althaus, and 'Juan de Arona,' and the biographer Mendiburu. Additional colleges have been established in the large towns, and numerous schools in the villages, within the last fifty years. Besides the university of Lima, there are now five lesser universities at Cuzco, Arequipa, Ayacucho, Puno, and Trujillo. The state also supports 33 colleges for men and 18 for women, 157 schools for boys and 129 for girls. Yet in 1877 there were only 38,906 scholars, or about one child at school for every eighty inhabitants.

History.—From very ancient times there were agricultural communities in the Sierra of Peru, gradually advancing in the arts of government and of peace, and there were people of a different race in the coast-valleys, who were also civilised. The plants they had brought under cultivation, and the animals they had domesticated, are among the proofs of the great antiquity of Peruvian civilisation. Eventually all the different communities were united under one empire, and the Incas, in the course of some five centuries, developed a highly centralised system of government. Civilisation never attained to such a height among any other of the indigenous races of America. The Incas attempted the administration of a purely socialistic government, and their attempt was successful. The great Inca Huayna Capac died, after a long and prosperous reign, at about the time when Pizarro first visited Tumbez. On his death there was a war of succession between his two sons, which had just terminated in favour of Atahualpa when Pizarro (q.v.) landed a second time and marched into the interior. Peru was soon overrun by the Spaniards, and the beneficent rule of the Incas came to an end. At about the time of the assassination of Pizarro the representations of Las Casas (q.v.) respecting the cruel treatment of the Indians had obtained a hearing, and the 'New Laws' were promulgated. The grants conceded to the conquerors were not to be hereditary, all men who had been engaged in civil wars were to be deprived, and personal service from Indians was forbidden. Blasco Nuñez Vela was sent out to Peru as viceroy to enforce these reforms. He landed in 1544, and proclaimed the 'New Laws.' The Spanish conquerors were thrown into a state of exasperation and dismay, and appealed to Gonzalo Pizarro (q.v.) to leave his retirement and protect their interests. The result was that the viceroy was defeated and killed, and Gonzalo virtually became governor of Peru. But he was not recognised by the Spanish government, and an ecclesiastic named Pedro de la Gasca was despatched to Peru, with a commission to restore order. Gonzalo Pizarro was defeated near Cuzco, and beheaded on the battlefield. Gasca reversed the humane legislation advocated by Las Casas, and made a hasty distribution of grants to his followers. The announcement of his awards caused much discontent, but Gasca hurriedly sailed for Spain in January 1550, leaving the country in a most unsettled state, in the hands of the four judges who were his colleagues. He had arranged that the emperor's decree against forced labour should be promulgated after he was safe out of the country. This gave rise to a formidable rebellion, led by Francisco Hernandez Giron. The judges made head against it, but it was not put down until two pitched battles had been fought, and Giron had been beheaded at Lima in December 1554.

The Marquis of Cañete arrived as viceroy of Peru in May 1555. His policy was to employ the unquiet spirits among the Spanish settlers on expeditions of discovery into unknown regions, and to treat the natives with liberality and justice. During the five years of his government he restored order among the conquerors, and established the heir to the Incas in a dignified retirement. But it was Don Francisco de Toledo, the viceroy from 1569 to 1580, whose legislation finally fixed the colonial policy of Spain in this part of the New World. He reversed the kindly treatment of the ancient dynasty which had distinguished the Marquis of Cañete, and unjustly beheaded young Tupac Amaru, the last of the Incas, at Cuzco in 1571. At the same time he wisely based his legislation on the system of the Incas. His elaborate code, called the 'Libro de Tasas,' was the textbook of all future viceroys. He fixed the amount of tribute to be paid by the Indians, exempting all males under the age of eighteen and over that of fifty. He recognised the position of the native chiefs, assigning them magisterial functions, and the duty of collecting the taxes and paying the money to the Spanish officials. But he enacted that one-seventh part of the population of every village should be subject to forced labour, generally in the mines. This was called the *Mita* system.

It was the habitual infraction of the rules established by Toledo, and the abuse of the *Mita*, which caused all the subsequent misery and the depopulation of the country. Compliance with the continual demand for treasure from Spain, a demand which was insatiable, was incompatible with humane treatment of the people. For more than two centuries the people of Peru toiled and died. At length their sufferings became intolerable. They rose as one man in the autumn of 1780, and a descendant of the Incas, taking the revered name of Tupac Amaru, placed himself at their head. After a long and formidable resistance the insurgents were finally subdued, and their leader was put to death under circumstances of revolting cruelty. But he did not die in vain. In his fall he shook the colonial power of Spain to its foundation. From the cruel death of the Inca Tupac Amaru may be dated the rise of that feeling which ended in the expulsion of the Spaniards from South America. Some of the demands of the Inca were conceded soon after his death. He was the foremost pioneer of the independence of Peru. The desire for liberty among Peruvians of Spanish descent had its birth in Lima; but Lima was the residence of the viceroy. Here the power of Spain was concentrated. Consequently it was in the more distant colonies of Buenos Ayres, Carácas, and Chili that insurrectionary movements first broke out and that independence was first secured.

At length a fleet under Lord Cochrane (see DUNDONALD), equipped in Chili, brought the Argentine General San Martin to Peru with troops, and the independence of the land of the Incas was proclaimed at Lima on the 28th of July 1821. Another liberating force, from Colombia, under General Bolivar, embarked at Guayaquil, and when the Liberator arrived at Lima, in September 1823, San Martin retired. The Spanish viceroy, La Serna, with his army, retreated into the interior, and the patriots followed on his heels. On 9th December 1824 the decisive battle of Ayacucho was fought, the Spanish viceroy and all his officers were made prisoners, and the colonial government finally gave place to a free republic. Bolivar and his Colombians left the country in 1826, but it was eighteen years before the government became settled. In August 1829 General Gamarra, a native of Cuzco and a hero of Ayacucho, was elected president of Peru, but at the end of his term of office there were troubles which culminated with an attempt to form a Peru-Bolivian Confederation under General Santa Cruz. This was defeated by Peruvian malcontents, aided by a Chilian army, the cause of Santa Cruz and his confederation having been ruined after the decisive battle of Yungay on January 20, 1839. Gamarra again became president, the confederation was dissolved, and a constitution was proclaimed. But Gamarra fell in a deplorable war with Bolivia, and the contentions of his officers caused a succession of civil wars until 1844.

At length a man arose who restored peace to the distracted country. Ramon Castilla was a native of Tarapacá, and was a veteran of Ayacucho. He was brave as a lion, prompt in action, and beloved by his men. His firm grasp of power secured a long period of peace. He was elected constitutional president of Peru in 1844, and ten years of peace followed. Castilla commenced the payment of interest on the foreign debt in 1849. A revised constitution was promulgated in 1856, and the slaves were emancipated. Castilla retired from office in 1862, and died in 1866. The next important event was the election of Colonel Balta. This president held office from 1868 to 1872, during which time public works were undertaken on a gigantic scale with the aid of foreign loans. Don Manuel Pardo, a scholar and a man of letters as well as a statesman, was the first civilian president. He held office from 1872 to 1876, and inaugurated a policy of retrenchment. But it was too late to save the credit of the state, and the payments of interest on the loans ceased in 1876. Pardo reduced the army, regulated the Chinese immigration, promoted the exploration of navigable rivers in the Montaña, organised an efficient plan for the collection of statistics, and actively encouraged literature and education. He was the best president Peru has ever known, and in August 1876 he was peacefully succeeded by General Prado.

In 1879 Peru was confronted with the overwhelming misfortune of a Chilian invasion. Chili coveted the possession of the nitrate deposits in the Peruvian coast province of Tarapacá. A successful defence of Peru depends on the mastery of the sea. Peru had two old-fashioned ironclads. Chili also had two, but of new construction and with thicker armour-plates. One of the Peruvian ironclads was shipwrecked. The other, commanded by the heroic Admiral Grau, a native of Piura, was captured, after a most gallant defence, maintained against the combined attack from the two Chilian ironclads. On the 8th October 1879 he and nearly all his officers fell in defence of the *Huascar*, the ship on which the fate of their country depended. Tarapacá was occupied after the loss of two well-contested battles. In 1880 the battle of Tacna sealed the fate of that department; and, after the two desperate battles of Chorillos and Miraflores in 1881, Lima itself was occupied by the Chilians. Public works were demolished and private estates devastated along the coast, while in the capital the invaders even destroyed the valuable public library. General Caceres still kept up a patriotic resistance to the invaders in the interior.

In the autumn of 1883 the Chilians induced one of the Peruvian leaders, named Iglesias, to submit to their terms. In October he signed a treaty of peace and was allowed to enter Lima. Tarapacá was ceded to Chili; Tacna and Arica were to be held by Chili for ten years, after which a popular vote should decide whether they were to belong to Peru or Chili, the country chosen paying the other $10,000,000; and there were some articles, favourable to Chili, respecting the guano-deposits. The Chilians evacuated Peru in August 1884, and their nominee, Iglesias, followed them in December 1885. On 3d June 1886 General Caceres, who had gallantly defended his country against the Chilians from first to last, became constitutional president of Peru. His policy was retrenchment and the protection of the Indian population. Payment of interest of the foreign debt had become impossible. But a scheme was arranged in 1890 by which the foreign bondholders formed themselves into a company to receive all the railways for a term of sixty-six years, with mining, emigration, and other privileges. In return the company is to complete the railway system, and cancel the debt through the profits. Peru was slowly recovering from the disastrous effects of a great calamity, when in 1894 another insurrection broke out. General Caceres, re-elected president in that year, was after much desultory fighting forced to flee in March 1895, and a provisional government was installed.

For the history of the Incas and their civilisation, see the works of Cieza de Leon, Molina, Balboa, Garcilasso de la Vega, Montesinos, and Acosta, all, except Montesinos, translated into English for the Hakluyt Society; also Rivero's *Antiguedades Peruanas* (with Von Tschudi, Vien. 1851), of which an English translation appeared afterwards at New York; and the histories of Robertson, Lorente, Prescott, Helps, and Winsor (vol. i.), and the travels of D'Orbigny, Squier, Wiener, and Reiss and Stübel. For the Conquest, see, besides Robertson, Prescott, and Helps, the narrative of Xeres, Pizarro's secretary (Eng. trans. Hakluyt Soc.), and the writings of Herrera, Gomara, Zarate, Pedro, Pizarro, and Fernandez. For the period of the viceroys, see Figueroa's *Life of the Marquis of Cañete*, the *Chronicle of Calancha*, and the *Memorias de los Vireyes*; also the more recent works of Don Ricardo Palmas, published at Lima, and Saldamando's *History of the Jesuits in Peru*. The documents relating to the great rebellion of Tupac Amaru were published by Angelis at Buenos Ayres, and there are further particulars in the work of Dean Funes; see also Weddell's *Voyage dans le Nord de Bolivie*, and Markham's *Travels in Peru and India* (1862). For the war of independence, see works by Stevenson, the Chilian author Vicuña Mackenna, General Garcia Camba, the Memoirs of General Miller (Lond. 1828), the Autobiography of the Earl of Dundonald, and the great biographical work of General Mendiburu; for the war with Chili, narratives from the Chilian point of view by Barros-Arana and Mackenna, and from the Peruvian by Paz Soldan, and the present writer's *History of the War between Peru and Chili* (1883). For the geography, the *Geografía del Peru*, by Paz Soldan, and the 3 vols. on Peru by Raimondi are important works. There are further English works on Peru by Hill (1860), Hutchinson (1874), Duffield (1877), Guillaume (1888); French works by Grandidier (1863) and Chérot (1876); and German works by Wappäus (1864), Tschudi (1866), and Middendorff (3 vols. 1894–95). See also Von Tschudi's *Kechua Sprache* (1853), the present writer's *Quichua Grammar and Dictionary* (1863), Middendorff, *Die Einheimischen Sprachen Peru's* (1890 *et seq.*), and the present writer's *History of Peru* (Chicago, 1892).

Peru, (1) a city of Illinois, at the head of navigation on the Illinois River, 100 miles by rail WSW. of Chicago. It contains zinc-works, a foundry, a plough-factory, and several ice-houses. Pop. (1880) 4632.—(2) Capital of Miami county, Indiana, on the Wabash River, and on the Wabash and Erie Canal, 75 miles by rail N. of Indianapolis. Its mills and factories produce woollens, bagging, furniture, basket-ware, &c. Pop. (1890) 6731.

Perugia, a city of Italy, stands (1706 feet above sea-level) on the right bank of the Tiber, 11 miles E. of the lake of Perugia (anc. *Lacus Trasimenus*) and 127 miles by rail N. of Rome. It is surrounded with walls pierced by gates (one of them very old). The broad Corso, which contains the handsomest edifices, unites two squares, in one of which stands the Gothic cathedral of St Lawrence, dating from the end of the 15th century, and adorned with many paintings, carvings, &c. The church of St Dominic (1632) contains the tomb of Pope Benedict XI. by Giovanni Pisano, and stained windows (1402); the remarkable church of St Peter (11th century) has granite pillars, and pictures by Raphael, Perugino, Parmigiano; these are only two out of several noteworthy churches. In the cathedral square stand also the Gothic municipal palace (1281), with the valuable art gallery, especially rich in productions of the Umbrian school; the great fountain, adorned with statues by Niccolo and Giovanni Pisano; the statue of Pope Julius III. (1555), described in N. Hawthorne's *Marble Faun*; and the old money-changers' hall (1453–57), decorated with some of Perugino's best works. In the vicinity of the city a number of Etruscan tombs were discovered in 1840; they contained cinerary urns, lamps, vases, bronze armour, ornaments, &c. The university (1307) has 20 teachers and 130 students, a botanical garden, an observatory, a valuable antiquarian museum, and a library (1852) of 30,000 vols. There is also an academy of fine arts, with an art school. Silk and woollen goods, wax-candles, and liqueurs are manufactured. Pop. (1881) 17,395. Perugia, the ancient *Perusia*, was one of the twelve Etrurian republican cities. It was besieged and captured by the Romans in 310 B.C., and again in 40 B.C., and by Totila (549). At different periods during the next thirteen centuries it was subjected to the popes, especially after the middle of the 16th century; at other times it was independent, though in the power of native despots. In the 15th century it became the centre of the Umbrian school of painting. In 1860 it was made a part of the kingdom of Italy.

Perugia, LAKE OF. See TRASIMENE LAKE.

Perugino, a celebrated Italian painter, whose real name was PIETRO VANNUCCI, was born at Citta della Pieve in Umbria, in 1446, but established himself in the neighbouring city of Perugia, whence his usual appellation. Vasari says he studied under Verrocchio at Florence. He executed important works, no longer extant, at Florence, Perugia (1475), and Cerqueto (1478). At Rome, whither he went about 1483, Sixtus IV. employed him in the Sistine Chapel; his fresco of 'Christ giving the Keys to Peter' is the best of those still visible—others by him being destroyed to make way for Michelangelo's 'Last Judgment.' During his next sojourn at Florence (1486–99) he had Raphael for his pupil. Here he was fined for waylaying and assaulting a citizen, and became somewhat too fond of money, repeating his works and leaving much of the execution to pupils. At Perugia (1499–1504) he adorned the Hall of the Cambio, with the assistance of Raphael and other pupils; but after 1500 his art visibly declined. In his second Roman sojourn (1507–12) he also, along with other painters, decorated the Stanze of the Vatican; and one of his works there, the Stanza del Incendio, was the only fresco spared when Raphael was commissioned to substitute his works for those formerly painted on the walls and ceilings. The new school, with Leonardo da Vinci, Michelangelo, and Raphael, was now in the ascendant, and Perugino's popularity waned. He was again at Perugia in 1512, and painted a number of pictures there. He was painting frescoes in a church at Castello di Fontignano, near Perugia (one of which frescoes is now at South Kensington), when he was seized by the plague, of which he died in 1524.

Perugino's art was religious, though he is said by Vasari (biased in all regards by Michelangelo's contempt for Perugino) to have been an open disbeliever in the immortality of the soul. In his figures, very unequally drawn, there is a peculiar tenderness of expression verging on mawkishness; his execution was delicate, his colour admirable. But he is not remarkable for originality or intensity.

Peruvian Bark. See CINCHONA.

Peruvian Gooseberry. See PHYSALIS.

Pes'aro (the ancient *Pisaurum*), a town of Italy, stands on the right bank of the Foglia, here crossed by a bridge of Trajan's age, 1 mile from the Adriatic and 37 miles NW. of Ancona by rail. Its streets are broad, and adorned with palaces and churches, and the town is surrounded with walls and defended by a citadel (1474) and a fort. It is a bishop's seat; there are two cathedrals, one new, the other old. Silks, pottery, iron, and leather are manufactured; and an active trade is carried on in these goods and in wine, olive-oil, and fruits. Pop. 12,547. The city is associated in literary history with the name of Tasso, some of his MSS. being preserved in one of the town museums; it is also the birthplace of Rossini. Made a Roman colony in 184 B.C., it was destroyed by the Goths; then, having been rebuilt by Belisarius, it became one of the Pentapolis. From 755 to 1285 it belonged to the popes, then to the Malatestas till 1445, then to the Sforzas and Delle Roveres, in 1631 again to the popes, and finally in 1860 to Italy.

Pescadores Islands. See FORMOSA.

Peschiera, a fortress of Italy, a member of the Quadrilateral (q.v.), stands partly on an island in the Mincio and partly on the right bank of that river, at its outlet from the Lake of Garda, 14 miles by rail W. of Verona and 77 E. of Milan. Besides a strong citadel and an arsenal, there is a fortified camp. The fortress has played a prominent part in the warlike events which have taken place in North Italy, especially after the Napoleonic wars began down to 1859. Pop. 1653.

Peshawar, or PESHAWUR, a town of India, 10½ miles from the entrance of the Khyber Pass, 190 E. by S. of Kabul, and 276 by rail NW. of Lahore. Although a frontier town and occupying a strategic position of the utmost importance, its only defences are a mud wall and a small fort; but 2 miles west of the city are the cantonments, with a garrison of six regiments and a battery of Royal Artillery. Pop. of town (1891) 83,930; of cantonments, 25,000. It is the seat of extensive commerce between Afghanistan and India; gold, silver, lace, hides (all four from Bokhara), horses, mules, fruits, woollen and skin coats (all five from Kabul) being exchanged for tea, English piece-goods, wheat, salt, rice, butter, oil-seeds, oil, and sugar.—The *district* has an area of 2504 sq. m. and a pop. of 592,674; the *division*, an area of 8381 sq. m. and a total pop. (1891) of 1,421,210.

Peshito (Syriac *pĕshîttâ*, 'the simple'), the Syriac Vulgate. See BIBLE, Vol. II. p. 126.

Pessimism is the doctrine that on the whole the world is bad rather than good. It does not necessarily mean that the world is the worst possible of all conceivable worlds, as the fact of its being the verbal opposite to Optimism, the term employed to describe the Leibnitzian philosophy, would seem to imply; it means simply that the world is so bad that it would be better if it did not exist. Pessimism presents itself in a twofold aspect—(1) as a settled attitude of mind or permanent mood of feeling, and (2) as a philosophical system. The former springs out of the contemplation of the antagonism that exists in the world between natural laws and moral laws, between the world as it actually is and the world as it ought to be; it is the outcome of reflection, and is largely conditioned by individual temperament. Thus it is coeval with the dawn of conscious intelligence, and early found fit literary expression. The problem of the existence of evil, the connection between suffering and sin, is the burden of the ancient Hebrew Book of Job; and the Jewish thinker who wrote Ecclesiastes rings the changes upon the nothingness of life, and sums up his plaint in the hopeless refrain, 'Vanity of vanities, saith the Preacher, all is vanity.' Different forms of the same temper of mind are given utterance to with more or less of moral indignation in Innocent III.'s *De Miseria Humanæ Conditionis*, and the satirical works of Juvenal and Carlyle and others. The same 'world-sadness' (*Weltschmerz*), though expressed in more personal and passionate language, colours deeply the poetry of Omar Khayyam, Leopardi, Heine, and Byron; and the negation of the problem, 'Is life worth living?' forms an undercurrent in much of our best modern literature. But the pessimistic temper, culminating in the persuasion of the nothingness and vanity of human life, has had more than an individual expression; it has entered deeply into the substance and structure of two of the world's greatest religious beliefs—viz. Christianity and Buddhism. The Christian is familiar with the doctrine that this earthly life is a vale of tears and woe, and that its pleasures and joys are illusory, being always accompanied with sin and suffering and evil, from which he can only escape by fixing his hopes upon a better life in the world to come. Buddha's practical teaching (see BUDDHISM) turns in great part upon the desire to escape from the sorrows of life and the deceptive illusions of existence (*maya*).

But here, in this latter point, the pessimistic mood assumes something of a philosophical character. It also enters, though principally as an unconscious element, into the philosophical doctrines of the Stoics and the Neoplatonists, in that they regarded man's sensual (sense) nature as opposed and inferior to his intellectual. The mediæval mystics (Eckhart) combined the religious with the philosophical tendencies of the mood that 'despiseth the earth,' but not in a conscious, deliberately philosophical fashion. But it is only in the most recent times that pessimism has been elaborated into a philosophy or complete theory, in the systems of Schopenhauer (q.v.) and his successor, E. von Hartmann (q.v.). Schopenhauer is generally considered to be the father of philosophical pessimism: he regards the world principle as an omnipotent, blindly struggling and striving Will, which is incapable of satisfying itself or of delivering itself from its eternal cyclic misery. Hartmann formulates as world principle the Unconscious, whose primal error, for which it eternally atones in the endless misery of the world, was its kindling—just as Schopenhauer's Will did—a light for itself in the brain, or the consciousness of organised life. Both philosophers build on the pain and misery and struggle which they see everywhere in the world, from chemical decomposition and stellar movement up through the endless struggle of organisms for existence to the acute suffering exhibited in the many forms of human passion, and chiefly of all in exalted passionate love or sexual desire (*Romeo and Juliet*, or *Kabale und Liebe* of Schiller); and to both all this is only the outward expression of the terrible, irrational, or non-logical cosmic agency. It is extremely difficult to state shortly the metaphysical grounds of pessimism; they are far from being merely superficial, and may be said to be rooted in the old antitheses between nature and man. Nature thwarts man at all points, and modern science has shown us what a small twig human life is on the great tree. Both Schopenhauer and Hartmann lay a firm hold on the fact (emphasised especially by Schopenhauer in opposition to Hegel and to theism) that not only the Idea or Logos must be used in replanning the world, but also Force, Impulse, Will, Strife. Thus in a sense they represent the substitution of the scientific or cosmic attitude towards the world for the merely introspective attitude of a Descartes or a 'common-sense' moralist. It is not, of course, in the least to be assumed that what we call 'naturalism,' as opposed to speculation or supernaturalism, leads to pessimism, mental and spiritual facts being just as ultimate as chemical protoplasm. The full force of pessimism lies in the assertion that all the ends and aims of life are illusory, that life, in fact, brings only illusion; the illusion of illusions being man's innate and inveterate belief that he is born to be happy and to have pleasure. There are here two main contentions: (1) All ends are illusory, even cosmic ends, for nothing is ever attained in the world, seeing that the essence of the world—that which holds it together—is strife and change. Pessimism, that is, really denies teleology, as Darwinism does, in the old sense of the term. (2) In the case of the individual life there is excess of unhappiness and pain over happiness and pleasure. But there is no reason for despising the realisation of certain ends because there always arises a limitless number of new ends to be realised; of course we do not wish to limit the world process. Pessimism thus really comes to stake its case on the individual, which (let us say) to a certain extent we do immediately know. The natural man wants to fill infinity, to gratify all his desires, to embrace in himself all the ends of the world, and because he cannot do this, but even fails to get immediate ends gratified, he votes the world execrable. The pessimists in the end do not escape the all-embracing human standpoint of anthropomorphism, anxious though Schopenhauer is to avoid the errors of metaphysicians and 'transcendental idealism.' They examine man, and what they find to be true of man they predicate of the world: he 'measures' all things—is the microcosm. Still, we must concede that, if to man the world brings only illusion, it is a failure—for him. The central position, then, of pessimism inevitably comes to be that living beings have as matter of fact an excess of pain over pleasure.

To this position the psychologist answers: (1) That pleasure and pain are not things that can be balanced one against the other. Both are *degrees* of *feeling*, which, though itself a constant element of experience, is only one element; and what we do as matter of fact measure and are conscious of is the amount of change or transition in our feeling, there being of course no absolute measure of amount of pleasurable or painful feeling. (2) Even if by the help of memory and calculation, and observation and reflection (for there is really enormous difficulty in the matter), we allow ourselves to think of sums of pleasures and sums of pains (there are writers who say the phrases are the purest nonsense), yet no one standard of pleasurableness or painfulness, no 'hedonistic calculus' or universal method of measuring pain against pleasure, can be fixed upon. (3) Even supposing we had an estimate of pleasures and pains, it is not psychologically legitimate to regard feeling of any kind as the *end* of action; it is only its relative and individual index or measure (i.e. whether normal or abnormal), while there are absolute measures of action in the ends or things accomplished. (4) There are actions which have a final value apart from their pleasurable character, although also as matter of fact the attainment of ends brings (as *accompaniment* and not as *end*) a feeling of immediate pleasure—e.g. the adaptation of the eye to a pleasing object or healthy muscular exercise in general. Schopenhauer went so far as to say that pleasure is only the absence of pain, pain alone being the positive and preponderating element in a sensitive consciousness. This is simply not true: pleasure—if we take the liberty of talking of pleasure as a thing—is as positive as pain is, and the strife which exists in all life is not necessarily painful.

If we ask the pessimist if there is any freedom or release from the 'bondage of man,' we are answered: (1) The light which the Unconscious Will has kindled for itself in the brain of man (pessimism has of course a pronouncedly naturalistic side) confers on us at least one advantage; employing this light, we may for brief moments pause, and survey with pity the awful slavery and strife of life. In a word, artistic perception, the insight into things of the man of genius, of the emancipated intellect, is freedom: art, asceticism, quietistic sympathy, is each the oasis and salvation in the howling wilderness of life. (2) While individual suicide is to be deprecated as the acme of the selfish assertion of the Will to be happy, it is to be hoped that some day the human race will be educated enough to see the contemptible character of life, and, by a united act of enlightened will, will shake off life and throw the world back into its primeval state of innocence, ignorance, and mere potentiality, and thus become the 'saviour' of the world. There is a basis of moral perception in all this, but it is fantastical: it is the exaggerated statement of the intellectual conditions of salvation often stated in philosophy, as in Aristotle's 'life of contemplation,' the gods of Epicurus, and Spinoza's view of things 'in the light of eternity.' If we demur that it is, then, only the few who can be saved, we are told that the lot of life is one; my life is the same as that in the plant or the planet, and there is, as matters at present stand, not the least fear that the 'will to live' will die out with the death of my life in quietism, agnosticism, and mysticism.

To the metaphysic of pessimism we may also say: (1) That it is not necessary to have a theory of the world in order to make action possible: no one lives because he chooses to live, but because he must, and this apart from the question whether a theory of life is attainable or already attained. (2) That the value of life cannot be measured altogether by the expectations or equations of the individual as to his own happiness, and that therefore pessimism is overthrown with the rejection of empirical Hedonism or the theory of ethical conduct that makes happiness the end of life. (3) Pessimism has done good in showing up the illusions to which an acceptance of the Hedonistic or the Epicurean ethic leads in theory and practice; it might be held in fact to give a negative account of man's perfection as consisting not in happiness for happiness' sake, but in the pursuit of ends which are absolutely real, apart from man's desire or aversion to them: to the self-seeking self everything is foreign and negative, and also to the perfection-seeking self the ends of appetite and desire are illusory. The various forms of pessimism—the practical, the biological, the sociological, the poetical, are all of value as provisional accounts of the ethical end. The unconditioned sympathy with all forms of life inculcated in modern pessimism is a valuable contribution to ethical theory and history, although of course it is not exactly original to pessimism. (4) The world which Schopenhauer and Hartmann theoretically conceive of is a world which baffles the individual, because in the first instance it appears to them that the world is incomprehensible. Both, in fact, tend to erect our ignorance of the world into a positive principle—the Unconscious; but this is an old metaphysical fallacy. The world which the individual does know—i.e. the small sphere of it he knows—is not a sphere in which he cannot realise himself, but in Kantian language a moral kingdom; it will baffle him if he is only bent on his own happiness. Thus it has been indicated how in a sense the pessimists are not to be held down to an Epicurean theory of morals, although they take their start from that.

BIBLIOGRAPHY.—Schopenhauer's chief work is the *World as Will and Idea* (Eng. trans. 3 vols. 1883–86). His ethic is contained chiefly in the fourth book, on the *Assertion and Denial of the Will to Live.* The appendices contain many exceedingly readable and lucid presentations of the main points of his system, and so do many of the sections of the *Parerga und Paralipomena*, which have a high literary value. See translations of these in Mr T. B. Saunders's 'Schopenhauer' series (1890 *et seq.*). Hartmann's views are expounded in *Philosophy of the Unconscious*, which is also translated into English (1884). An admirable short account of his system for the laic mind is that of Dr A. Drews (*Ed. v. Hartmann's Philosophie*, 1890). E. Wallace's account of pessimism in the *Westminster Review* (1876) is eminently instructive, and has chief reference to Hartmann. An introductory treatise is also that of A. Taubert, *Der Pessimismus und seine Gegner* (1873). Mr Sully's *Pessimism* (1877) is an admirable and careful psychological criticism of pessimism, and contains a good historical sketch. In it there is a list of pessimistic literature. As an introduction to pessimism some account of Leibnitz's philosophy ought to be read, and after it Voltaire's vigorous and drastic criticism of the same in *Candide;* the latter will help one to understand what Schopenhauer meant when he called optimism a 'wicked and otiose shallow philosophy.' The religious aspect of pessimism is touched on in an essay in Seth and Haldane's *Essays in Philosophical Criticism* (1883), and also in Professor Tulloch's *Modern Theories* (1884).

Pestalozzi, JOHANN HEINRICH, educational theorist, was born at Zurich, 12th January 1745. Eccentric, quixotic, eager to be an adjuster of social wrongs from his youth, he sought to realise his aims through educating the young. He shares with Rousseau, whose *Émile* greatly influenced his mind, the honour of conceiving a method which is the corner-stone of all sound theories of primary education. From his day onward two ideas of education co-existed—the older one, applicable to the children of the classes; his, applicable to the children of the masses; the former being in many ways improved by an encroachment of the latter upon its traditional domain. Pestalozzi, living during the period of the French Revolution and the wars of Napoleon, found in his disturbed country, in the misery inflicted by war, opportunity for the display of self-sacrifice, devotion to the oppressed, and that unselfish love of the children of the very poor which especially distinguished him. Illiterate, ill-dressed, a bad speaker, and a bad manager, Pestalozzi was unfit for the everyday business of life, and all his undertakings resulted in practical failure, though rousing the admiration of Europe, and calling forth down to the present day in many countries, more especially in Germany, a crowd of disciples, who have carried out the principles of their master with great enthusiasm. Although he was totally unable to cope with the world, Pestalozzi's personality was instinct with a loving sensibility; he awoke men to a sense of responsibility to childhood, and ushered the 19th century upon the stage of history as the educational age *par excellence*.

His life is soon told. Believing justly in the moralising virtue of agricultural occupations and rural environment, he chose a farm upon which to dwell with his collected waifs and strays as a father among his own. The farm Neuhof, in the canton Aargau, stranded on a faulty domestic economy after a five years' struggle (1780). Pestalozzi withdrew then from practical life, to think out the educational problem. His *Evening Hours of a Hermit* was the first fruit of his meditations, and develops the following thoughts: before undertaking to educate man, learn to know him; the method whereby to educate man should be founded upon his own nature; in his nature are hidden the forces that draw out his faculties, exercise them; exercise, the instrument of education, connects the wants of our nature with the objects that satisfy them; to rejoice in the fullness of your strength, make your education answer to your needs and to the inner call of your soul. Then came a social novel, *Leonard and Gertrude*, in four volumes. The former is a drunken stone-mason, the latter his wife, and a good one; the scene, a village given over to corruption. At last the minister, the schoolmaster, Gertrude with a few peasant-women, set about the reform of the village. This story created much attention, and was followed by a long period of literary activity on the part of its author. In 1798 he plunged into action again by opening his orphan school at Stanz. The picture he there makes of a moneyless, helpless, homeless lover of children, gathering homeless, helpless, children around him in an old convent in a township ruined by war, and set upon by a hostile and ignorant peasantry, is a noble and pathetic picture. But times and men proved too hard for Pestalozzi. At the end of eight months this establishment was broken up.

He next wended his steps to the people's school at Berthoud (Burgdorf), in canton Berne, only to be ejected from his subordinate position there, at the age of fifty-five, by the jealous and bigoted senior master. He knew then the bitterest pangs of poverty, and had even to keep away from church for want of clothes. In partnership with others, and under the patronage of the Swiss government, he opened an experimental school of his own, still at Berthoud. While there he published *How Gertrude Educates her Children.* Germany greedily devoured the book. It is the recognised exposition of the Pestalozzian method, and sets forth that the development of human nature should be in dependence upon natural laws, with which it is the business of every good education to comply; in order to establish a good teaching method, learn first to understand nature, its general processes in man, and its particular processes in each individual; observation, the result of which is a spontaneous perception (intuition) of things, is the method by which all objects of knowledge are brought home to us. This last affirmation, containing in essence the whole theory of so-called *intuitional* education, is the corner-stone on which the German Volkschule ('folk-school') is built, the guiding principle of numberless books written for children, and the subject of numberless treatises on education.

In 1805 Pestalozzi moved his school to Yverdon, which here drew upon him the eyes of all Europe; in spite, however, of this his greatest moment of popularity and promise of worldly success, he entered upon a course of mistakes that led him to the grave, a disappointed and unsuccessful man. Deviating from the field of primary teaching, he applied his method in a large secondary school for the sons of notable Europeans attracted by his fame. His old incapacity in practical affairs brought the school down step by step till it was closed in 1825, and Pestalozzi, aged eighty, distracted by the enmity of some of his former colleagues, sinking under difficulties of his own making, an object of mingled pity and respect, addressed to mankind the *Song of the Swan,* a last educational prayer, and withdrew to Brugg (Aargau), where he died, 17th February 1827. Pestalozzi's books are all written in German.

See the article 'Pestalozzi' in the last edition of Quick's *Essays* (1890); Morf, *Zur Biographie Pestalozzis* (4 vols. 1864–89); De Guimps' monograph, translated by John Russell (1890); Krüsi's *Pestalozzi* (New York, 1875); *Leonard and Gertrude* (Eng. trans. 1825); and, above all, *Pestalozzi, Étude Biographique* (1890), by J. Guillaume.

Pesth, or more correctly BUDAPEST, because since 1873 it has been united with BUDA (Ger. *Ofen*) into one municipality, is the capital of Hungary, and next after Vienna the second city of the Austro-Hungarian Empire. It stands on the Danube, Buda on the right bank and Pesth on the left, 173 miles by rail SSE. of Vienna. The two towns are connected by three bridges, a chain bridge (designed by Clark Brothers of England in 1842–49), 1280 feet long, uniting the busiest quarters of the two; another, built in 1872–75, a little higher up (1555 feet long); and a railway bridge near the southern end of both towns. Pesth is essentially a modern place, the growth principally of the 19th century; it has many fine streets and squares, the magnificent quays (3 miles long) beside the Danube being the favourite promenades; the buildings are chiefly noteworthy for their substantial appearance and frequently large size. Amongst them may be enumerated the Jewish synagogue (the handsomest place of worship in the city); the parish church (1500) and the new Leopold basilica (1851–68); the national museum (after 1850), containing collections of pictures, ethnography, natural history, mineralogy, botany, numismatics, and plaster-casts, and a library of 400,000 volumes and 63,000 MSS.; the academy of sciences (1862), containing a small collection of valuable old pictures, another of engravings and drawings, and a library of 90,000 volumes; the university (1635), established first at Tyrnau, then at Buda in 1777, and lastly at Pesth in 1873, with 210 lecturers and 3660 students, equipped with excellent scientific laboratories, &c., and a library of 186,000 volumes; and the parliament house, the old town-house, the redoubt (1859–65), the custom-house (1870–74), Charles, new, and other barracks, the military academy (1872), the slaughter-house (1870–72), the new industrial and commercial museums, and several private houses and offices.

Whilst Pesth stands on a plain, Buda straggles over small steep hills, and is backed by vine-clad slopes. It is a much older town, its central features being the castle in the citadel (1749–71), with the chapel of St Sigismund, in which are preserved the crown regalia of Hungary and the hand of St Stephen; the church of the Ascension and that of St John (13th century); the palaces of the Honved ministry, the premier, and Archduke Joseph; the monumental tomb of Gul Babas (1543–48), a Turkish saint; and the national lunatic asylum (1860–68).

Both towns are exceptionally well provided with baths, which are supplied both by the Danube and by numerous natural springs of mineral waters. Some of these last—Hunyadi Janos, Rakoczy, &c.—are exported in large quantities in bottles. The artesian well in the public garden of Pesth has been already referred to under ARTESIAN WELL. The water-works of Pesth were planned and built by the English engineer Lindley in 1868. Both towns possess an unusual number of philanthropic institutions, such as hospitals, asylums, &c. There is in Pesth a polytechnic (in Buda, 1846–72), with faculties of chemistry, architecture, and engineering, attended by 620 students, who are taught by 70 lecturers. A great number of learned and scientific societies flourish; and there is a music academy. The people are gay and fond of amusement, especially horseracing and rowing. There are two beautiful public gardens, one in Pesth, the other on Margaret Island in the Danube, just above the town. The squares and streets of both Pesth and Buda are adorned with many statues of celebrated Hungarians. The following figures will show the extraordinarily rapid growth of Budapest: pop. in 1813 was 36,153; in 1833, 63,148; in 1857, 116,683; in 1869, 270,476; in 1881, 370,767 (75,794 in Buda and 294,973 in Pesth); in 1889, 452,907, embracing 10,640 military and including about 71,000 Jews, mostly in Pesth. The total population, December 31, 1890, was 506,384. Budapest is the first manufacturing town of Hungary. The making of machinery and agricultural implements, wagons, and ships, the manufacture of spirits, tobacco, beer, gold and silver wares, cutlery, starch, glass, and innumerable other articles, the grinding of corn, washing of wool, and printing are all prosecuted on the large scale; there is here a small-arms factory. But the commerce is even more important: immense quantities of corn are brought into the town, and exported further either as corn or flour; wool, wine and spirits, oil-seeds and agricultural seeds, hemp, tobacco, plums (from Bosnia and Servia), honey and wax, bacon, hides, feathers, timber, coal, and manufactured wares are the principal articles of the extensive trade. Vast numbers of swine are fattened and killed in huge yards just outside Pesth.

The Romans had a military colony on the site of the modern Buda. In the 13th century there existed here a flourishing German town, Old Buda. This was destroyed by the Mongols in 1241; but it soon recovered from the blow. Buda was regarded as the capital of the country from the middle of the same century down to its capture by the Turks in 1527. From 1541 down to 1686 the Turks held Buda, though it was besieged half-a-dozen times by the Austrians. Pesth meanwhile was reduced to a heap of ruins; and it did not begin to recover until the first quarter of the 18th century. A century later it was rapidly outstripping its twin-sister Buda.

There are German books on Pesth by Hevesi (1873), Körösi (1882), Heksch (1882); and one in Hungarian, by Gerlóczy and Dulácsko (3 vols. 1879).

Pestilence. See EPIDEMIC, BLACK DEATH, CHOLERA, PLAGUE, SWEATING SICKNESS.

Petal. See FLOWER.

Petard, an instrument for blowing open the gates of a fortress, demolishing palisades, &c., consisting of a half-cone of thick iron filled with powder and ball; this was firmly fastened to a plank, and the latter was provided with hooks to allow of its being attached securely to a gate, &c. The petard, which was lighted by a slow-match, was superseded by the use of powder-bags. Large petards contained as much as 13 lb. of powder. See BOMB, and SHELL.

Petavius, DIONYSIUS, the name by which the great Catholic theologian Denys Petau is usually known. Born at Orleans, 21st August 1583, he studied at Orleans and Paris, became a teacher in the university of Bourges in 1602, in 1605 entered the order of Jesuits, and 1621 was made professor of Theology in the university of Paris. This post he held for twenty-two years, but in 1646 he retired and devoted himself to the completion of a remarkable series of works in philology, history, and theology. Of his 49 works among the best known are editions of Synesius (1611) and Epiphanius (1622); *De Doctrina Temporum* (1627); *Tabulæ Chronologicæ* (1628); *Rationarium Temporum*, an outline of universal history (1634); and *De Theologicis Dogmatibus*, a history of doctrines (1644–50; new ed. by Thomas, 8 vols. 1864 *et seq.*); besides polemical works against Grotius and Salmasius. He died in Paris, 11th December 1652.

Petchenegs. See RUSSIA, Vol. IX. p. 43.

Petchora, a large river of Russia, rises on the western slope of the Urals, flows north through the eastern parts of the governments of Vologda and Archangel, then south-east for 150 miles, and finally sweeping northwards into an estuary 30 miles wide and full of islands, falls into the Arctic Ocean, after a course of 975 miles. It is navigable by boats for upwards of 700 miles. The country through which the river flows is thinly peopled and quite uncultivated; dense forests extend on both sides, and the character of the scenery is wild, sombre, and melancholy. See Seebohm's *Siberia in Europe* (1881).

Petechiæ. This term is given to spots of a dusky crimson or purple colour, quite flat, with a well-defined margin, and unaffected by pressure, which closely resemble flea-bites. These spots result from a minute extravasation of blood beneath the cuticle. They occur most frequently on the back, at the bend of the elbow, and in the groin. They indicate an altered state of the blood, and are characteristic of the disease called *purpura;* but are often symptoms of very serious diseases, as of typhus fever, plague, scurvy, &c. They likewise occur in very severe cases of smallpox, measles, and scarlet fever, when their presence must be regarded as indicative of extreme danger.

Peter, ST, apostle, named originally SYMEON (Acts, xv. 14) or SIMON, was 'of Bethsaida' (John, i. 44) on the Lake of Galilee, but during the public ministry of Jesus had his house at Capernaum, which he appears to have shared with his brother Andrew, the household including his mother-in-law and probably children (Mark, ix. 33, 36). His father was called John (John, i. 42; xxi. 15, 16, R.V.) or Jonas (Jonah), and the name by which he himself is known in Christian history is the Greek translation of that given him by Jesus (Cephas, Græcised form of Aramaic *kepha*, meaning 'rock' or 'stone,' Gr. *Petra*, masc. *Petros*). He was a fisherman by occupation, and together with his brother Andrew was actually engaged in the pursuit of his calling on the Sea of Galilee when Jesus called both to be his disciples, promising to make them 'fishers of men.' For this invitation they had been prepared by previous acquaintance, formed perhaps for the first time when they were attending the preaching of John the Baptist (John, i. 40–42), and they both accepted it without hesitation. For the incidents recorded in the life of Peter as a disciple reference must be made to the four canonical gospels. It is plain, especially from the Synoptics, that he was regarded by Jesus with particular favour and affection. In many respects he was indeed an ideal disciple, warmly attached to his master, quick (on occasions at least) to apprehend new ideas, and ardent, energetic, and fearless in following them out. This is seen most clearly at that most important crisis in the life of Jesus when Peter was the first to see and say 'Thou art the Christ, the son of the living God' (Matt. xvi. 16–18); and it is not without reason therefore that Matthew significantly heads his list of the apostles with 'the first, Simon, who is called Peter.' This position of leadership among the twelve Peter continued to hold. In the earliest extant account of the resurrection (1 Cor. xv. 5) it is stated that the risen Christ appeared first 'to Cephas, then to the twelve;' and in the Epistle to the Galatians the apostle Paul tells us that his first errand to Jerusalem after his conversion was 'to visit Cephas' (Gal. i. 18). In the Acts of the Apostles Peter was the first mover in the election of a new apostle in the room of Judas Iscariot; he was the spokesman of the rest on the day of Pentecost, and also when they were brought before the council; he was the judge who condemned Ananias and Sapphira; along with John he was sent from Jerusalem to the Samaritan converts that they might receive the Holy Ghost; and he was the first to baptise a Gentile convert. He took a prominent part in the council or conference at Jerusalem, the result of which, though its events are somewhat differently related in Gal. ii. 1–10 and in Acts, xv. 4–29, was his acceptance of the policy of conciliation between the contending Jewish and Gentile parties. The date of this conference cannot be accurately fixed, but no recent scholar has placed it earlier than 47 A.D. or later than 53 A.D. He afterwards came to Antioch and for a time worked in harmony with Paul, but ultimately the famous dispute arose (Gal. ii. 11–21) which in conjunction with other causes led to the termination of Paul's ministry in that city. Peter, however, seems to have remained in Antioch, and was afterwards regarded as the founder of its church. His subsequent history is very obscure. On any theory of the authorship of 1 Peter that writing bears witness to an early belief that his missionary activity extended as far as to Pontus, Cappadocia, Galatia, Asia, and Bithynia; and, on one interpretation of 1 Peter, v. 13 (which, however, has little probability), he also laboured in Babylon. That he suffered martyrdom is clear from John, xxi. 18, 19, and is confirmed by the unanimous voice of ecclesiastical tradition: as to the manner of it, we have it on the authority of Eusebius (*H.E.* iii. 1, interpreted by some as resting on Origen) that he was impaled or crucified with his head downward; as to the place, tradition from the end of the 2d century invariably mentions Rome, and this also is most probably implied in the vague phraseology of Clemens Romanus (1 *Ep.* v. 4). Another circumstance that makes somewhat for a residence, however brief, of Peter in Rome is his probable connection with Mark and the second gospel (see MARK). It may be taken as certain that Peter was not in Rome when the Epistle to the Romans was written, if the 16th chapter of that epistle is to be accepted as genuine; and it is almost equally evident that he cannot have been there when Paul was writing to the Philippians. Thus the comparatively late tradition which assigns him a continuous bishopric of twenty-five years in Rome from 42 A.D. to 67 A.D. must be regarded as unhistorical. If he came at all to Rome it can only have been after 64 A.D. Of the duration of his stay we have no means of judging.

The dispute between Protestants and Catholics as to whether Peter was ever at Rome began as early at least as 1520, when Vehlen (Velenus) published his *Demonstratio contra Romani papæ primatus figmentum*; it was answered by Bishop Fisher of Rochester in his *Convulsio calumniarum Aldrichi Veleni*. For the arguments current in that and the following century, see Spanheim, *Dissertatio de ficta profectione Petri apostoli in urbem Romam* (1679). In later times the question has been the subject of equally acute controversy, but not with the same motives or entirely on the same grounds. The recent discussions began with Baur, who has been followed by Lipsius, Zeller, and others in a complete denial of any historical foundation for the 'Roman Peter-legend;' among those who have sought to vindicate for it some basis of truth may be named Credner, Wieseler, Ewald, Hilgenfeld, and Renan. For the apocryphal *Acts of Peter and Paul*, see Tischendorf (*Acta Apostolorum Apocrypha*); and for all that is known of the works usually cited as the *Gospel according to Peter*, his *Preaching*, his *Journeys*, his *Apocalypse*, and the so-called *Preaching of Peter and Paul*, see Hilgenfeld (*Nov. Test. extra can. rec.*). See also Littledale's *Petrine Claims* (1889); a dissertation in Lightfoot's *Apostolic Fathers*, part i. (2d ed. 1890); on the Catholic side, Allies, *The See of St Peter* (1850) and *St Peter* (2d ed. 1871); Döllinger's *First Age of the Church* (3d Eng. ed. 1877); and Johann Schmid, *Petrus in Rom*, where the literature on both sides of the question is very fully given. On the whole subject of the history and legends connected with the name of Peter the important work of Lipsius, *Die apokryphen Apostelgeschichten und Apostellegenden* (1883–90), ought to be consulted.

Peter, THE EPISTLES OF, constitute two of the seven canonical writings of the New Testament which towards the beginning of the 3d century began to be spoken of as 'catholic' epistles. Eusebius (*H.E.* iii. 3) tells us that 'as to the writings of Peter, one of his epistles called the first is acknowledged as genuine. For this was anciently used by the fathers in their writings as an undoubted work of the apostle. But that which is called the second we have not indeed understood to be embodied with the sacred books, yet, as it appeared useful to many, it was studiously read with the other scriptures.' Among the earliest witnesses to the antiquity of the first epistle the first usually cited is Clemens Romanus, who is supposed to be quoting from it when he uses the phrases 'his marvellous light' and 'charity covereth a multitude of sins.' It was known to the author of *The Shepherd of Hermas*, and to Basilides; Papias was acquainted with it; and Polycarp used it largely; but it is not mentioned as canonical in the Muratorian Canon. Coming to the internal evidence, it claims to have been written by the apostle Peter, by the hand of Silvanus, from 'Babylon' to 'the elect who are sojourners of the Dispersion in Pontus, Galatia, Cappadocia, Asia, and Bithynia,' and in substance it is a practical exhortation to a godly conversation, particularly in obedience to all constituted authorities, in the practice of the domestic virtues and in patience under persecution. The 'elders' are exhorted to feed their flocks, the 'younger' to obey, and all to be sober, watchful and constant in the faith, resisting their adversary the devil. Throughout it abounds with echoes of Pauline expressions and modes of thought; in particular the exhortations contained in Rom. xii. 1–xiii. 14 have been reproduced virtually verse by verse. This circumstance of its dependence on the Pauline writings is one of the main arguments with those critics (such as Baur, Schwegler, Keim, Lipsius, Pfleiderer, Weizsäcker, Hilgenfeld, Holtzmann) who fix its date at some period after 112 A.D. in the reign of Trajan, by whom formal proceedings were first instituted against Christians. They find confirmation of their view in the use of the name 'Babylon' for 'Rome;' a use that seems to have been first introduced by the author of the Apocalypse. The second epistle claims to be by 'Symeon Peter' (i. 1), the associate of Paul (iii. 15), and a witness of the resurrection (i. 17, 18); the expression 'your apostles' (iii. 2, R.V.), on the other hand, is held by many critics to be a confession of the author's non-apostolicity. The evidence supplied by itself as to its authorship has been variously interpreted, some affirming and some denying that its thought, expression, and vocabulary conclusively show that it cannot have been written by the author of 1 Peter. Its relation to the Epistle of Jude is also still under discussion, but the weight of opinion seems to be in favour of the priority of the latter. The external evidence as to its existence down to the end of the 2d century is very uncertain; and Origen is quoted by Eusebius as saying that even in his day 'there was some doubt' as to whether it was by Peter.

The genuineness of both epistles is argued for (to mention only two out of many weighty names) by Salmon (*Introduction to the New Testament*) and by Weiss (*Einleitung*; Eng. trans. 1888); the opposite view is taken by Holtzmann (*Einleitung*, 1886), who may be consulted for references to other authors, many of whom accept the first epistle while rejecting the second. There are commentaries on both by Fronmüller (in Lange's *Bibelwerk*), Huther (in Meyer's *Kommentar*; Eng. trans.), Lillie, and Plumptre. Leighton's *Practical Commentary* on 1 Peter is one of the classics of English theology.

Peter the Cruel. See PEDRO.

Peter the Great. Peter I., Alexandreievich, emperor of Russia, was the son of the Czar Alexei by his second wife, Natalia Narishkina, and was born at Moscow, 11th June 1672. His father died in 1676, leaving the throne to his eldest son, Feodor, Peter's half-brother. This prince, however, died in 1682 without issue, after naming Peter as his successor, to the exclusion of his own full brother, Ivan, who was weak-minded. This step immediately provoked an insurrection of the 'streltzi' or militia, fomented by Ivan's sister, the grand-duchess Sophia, who, after a carnage of three days, succeeded in obtaining the coronation (July 1682) of Ivan and Peter as joint rulers, and her own appointment as regent. Up to Peter's coronation his education had been greatly neglected, but after this time he had the good fortune to fall under the guidance of Lefort (q.v.), a Genoese, who initiated him into the sciences and the arts of civilisation, and by showing him how much Muscovy was in these respects behind the rest of Europe, influenced the whole of his future career. Lefort also formed a small military company out of the young men of noble family who attended Peter, and he rendered the czar himself all the while amenable to strict discipline. This course of training in all probability saved Peter from becoming the mere savage despot which his brutal and passionate disposition and indomitable energy inclined him to be; it also protected him from the jealousy of his half-sister, the regent Sophia, who thought him absorbed in military exercises, studies, and amusements. She, however, soon discovered her error, for Peter, contrary to her wishes, married (1689), by his mother's advice, Eudoxia Feodorovna

Lopukhin; and in October of the same year called upon his sister to resign the government. In the ensuing contest Peter was at first worsted, and compelled to flee for his life; but he was joined by the foreigners in the Russian service, with Patrick Gordon (q.v.) and Lefort at their head; and the streltzi flocking to his standard, Sophia resigned the contest, and was shut up in a convent, whence, till her death in 1704, she did not cease to annoy him by her intrigues. On October 11, 1689, Peter made his public entry into Moscow, where he was met by Ivan, to whom he gave the nominal supremacy and precedence, reserving the sole exercise of power for himself. Ivan only enjoyed his puppet sovereignty till 1696.

Peter's first care on assuming the government was to form an army disciplined according to European tactics, in which labour he was greatly aided by Gordon and Lefort, both of whom were military men. He also laboured to create a navy, both armed and mercantile; but at this period Russia presented few facilities for such an attempt, for she was shut out from the Baltic by Sweden and Poland (the former of whom possessed Finland, Ingria, and the Baltic provinces), and from the Black Sea by Turkey, leaving only the White Sea and the Arctic Ocean, with the solitary port of Archangel, available for the Russian navy. Peter, thinking the possession of a portion of the Black Sea would best supply the required facilities of accessible seaboard and port, declared war against Turkey, and took (1696) the city of Azov at the mouth of the Don, after a long siege. Skilled engineers, architects, and artillerymen were now invited from Austria, Venice, Prussia, and Holland; ships were constructed, and the army further improved both in arms and discipline. Many of the young nobility were ordered to travel in foreign countries, chiefly in Holland and Italy, and to take special notice of all matters in connection with shipbuilding and naval equipments; others were sent to Germany to study the military art. Peter was eager to see for himself the countries for which civilisation had done so much; and, after repressing a revolt of the streltzi and dispersing them among the various provinces, he left Russia in April 1697, in the train of an embassy of which Lefort was the head. In the guise of an inferior official of the embassy he visited the three Baltic provinces, Prussia, and Hanover, reaching Amsterdam, where, and subsequently at Zaandam, he worked for some time as a common shipwright; and to his practice of shipbuilding and kindred trades he added the study of astronomy, natural philosophy, geography, and even anatomy and surgery. On receipt of an invitation from William III. he visited England, and for three months, spent partly in London and partly at Deptford, laboured to amass all sorts of useful information. While in England he received the honorary degree of D.C.L. from the university of Oxford. He left England in April 1698, carrying with him English engineers, artificers, surgeons, artisans, artillerymen, &c., to the number of 500, and next visited Vienna, for the purpose of inspecting the emperor of Austria's army, then the best in Europe. He was about to visit Venice also, when the news of a formidable rebellion of the streltzi recalled him to Russia. General Gordon had already crushed the revolt, and Peter finally broke up the institution that had given him so much trouble. The Empress Eudoxia, who was suspected of complicity in the conspiracy, which had been the work of the old Russian or anti-reform party, was divorced and shut up in a convent, and the great reforms were begun. Peter put the press on a proper footing, caused translations of the most celebrated works of foreign authors to be made and published, and established naval and other schools. Ordinary arithmetic was first introduced, accounts having been previously kept by means of the Abacus (q.v.). Trade with foreign countries, which was formerly punished as a capital crime, was now permitted, or rather, in the case of the principal merchants, insisted upon. Many changes in dress, manners, and etiquette were introduced and enforced on the people at large. Even the organisation of the national church could not escape Peter's reforming zeal.

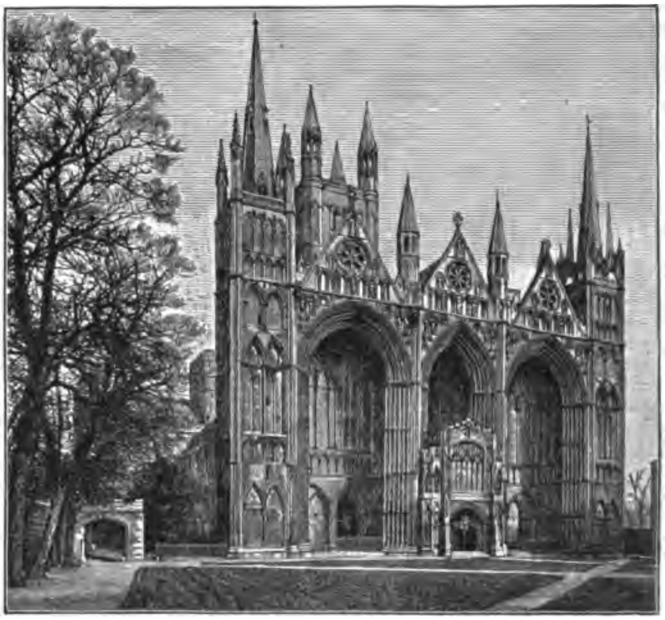
In 1700 Peter, desirous of gaining possession of Carelia and Ingria, provinces of Sweden which had formerly belonged to Russia, entered into an alliance with the kings of Poland and Denmark to make a combined attack on Sweden; but he was shamefully defeated at Narva, his raw troops being wholly unable to cope with the Swedish veterans. Peter was by no means disheartened, but quietly appropriated a portion of Ingria, in which he laid the foundation of the new capital, St Petersburg, 27th May 1703. Great inducements were held out to those who would reside in it, and in a few years it became the Russian commercial depôt for the Baltic. In the long contest with Sweden the Russians were almost always defeated; but Peter saw that these reverses were administering to his troops a more lasting and effective discipline than he could have hoped to give them in any other way. He had his revenge at last, in totally routing the Swedish king, Charles XII., at Pultowa (q.v.), 8th July 1709, and in seizing the whole of the Baltic provinces and a portion of Finland in the following year. His success against Sweden helped much to consolidate his empire and to render his subjects more favourably disposed towards the new order of things. After reorganising his army he prepared for strife with the Turks, who, at the instigation of Charles XII. (then residing at Bender), had declared war against him (see TURKEY). In this contest Peter was reduced to such straits that he despaired of escape. But, according to a somewhat doubtful tradition, the finesse and ability of his mistress, Catharine, extricated him from his difficulties; and a treaty was concluded (1711) by which Peter lost only his previous conquest—the port of Azov and the territory belonging to it. He was thus shut out from the Black Sea, so the possession of a good seaboard on the Baltic became the more necessary to him, and the war against Sweden in Pomerania was accordingly pushed on with the utmost vigour. In 1712 his marriage with his mistress, Catharine (see CATHARINE I.), was celebrated at St Petersburg, and the offices of the central government were transferred to the new capital. His arms in Pomerania and Finland were victorious, and in 1713 the latter province was completely subdued. In 1716–17, in company with the czarina, he made another tour of Europe, this time visiting Paris, and returned to Russia in October 1717, carrying with him quantities of books, paintings, statues, &c. It was soon after this time that his son Alexei (q.v.), who had opposed some of his father's reforms, was condemned to death, and died in prison—apparently through having been repeatedly tortured. Many of the nobles who had been implicated in his treasonable plans were punished with savage barbarity. In 1721 peace was made with Sweden, which definitely ceded the Baltic provinces, Ingria (now government of St Petersburg), and a portion of Finland, with the islands off the coasts. In 1722 Peter commenced a war with Persia, in order to open up the Caspian Sea to Russian commerce, and secured three Caspian provinces along with the towns of Derbend and Baku. For the last years of his life he was chiefly engaged in beautifying and improving his new capital and carrying out plans for the more general diffusion of knowledge and education among his subjects. In the autumn of 1724 he was seized with a serious illness, and he died 8th February (28th January o.s.) 1725. Catharine succeeded him. The 'Testament of Peter the Great,' inciting the Russians to aim at domination in Europe, is a forgery, based probably on Lesur's *Progrès de la Puissance Russe* (1807), and, it may be, inspired by Napoleon.

See Russian Lives by Golikov (30 vols. 1797) and Ustraljov (1863); English Lives by Barrow (new ed. 1883) and Schuyler (2 vols. 1884); and for a vindication of the authenticity of the 'Testament,' W. J. Thoms in the *Nineteenth Century* (1878).

Peter II. (Alexeievich) of Russia, was the sole male representative of Peter the Great, being the son of the unfortunate Alexei (see above), and was born 23d October 1715 at St Petersburg. On the death of the Czarina Catharine I. he ascended the throne (1727). Menschikoff, his guardian, affianced one of his daughters to the youthful czar, but his power was overturned by the Dolgorouki family; and the czar was seized with smallpox, and died at St Petersburg, January 29, 1730.

Peter III. (Feodorovich) of Russia, grandson of Peter the Great (being the son of his eldest daughter Anna Petrowna, wife of the Duke of Holstein-Gottorp), was born at Kiel, 29th January 1728, and in 1742 was declared by the Czarina Elizabeth (q.v.) her successor on the throne of Russia. From the time of his being publicly proclaimed heir he lived at the Russian court; and in obedience to the wishes of the czarina he married Sophia-Augusta, a princess of Anhalt-Zerbst, who on entering the Greek Church assumed the name of Catharina Alexeievna. Peter succeeded Elizabeth on her death in 1762; and his first act of authority was to restore East Prussia to Frederick the Great (whom he admired extravagantly), and to send to his aid a force of 15,000 men. He also recalled many of the political exiles from Siberia. When arranging in 1762 a campaign to take Sleswick from Denmark a formidable conspiracy, headed by his wife, and supported by the principal nobles, broke out against him—a conspiracy which originated in the general discontent at the czar's liberal innovations, the preference he showed for Germans, his indifference to the national religion, and his servility to Frederick the Great. The czar was declared to have forfeited his crown; his wife Catharine was proclaimed as Catharine II. (q.v.); and Peter, who supinely abdicated, was strangled by Orloff and some of the conspirators on the 17th July 1762.

Peterborough, a city partly in Huntingdonshire, but chiefly in Northamptonshire, the latter portion being on the left or north bank of the river Nen, at the edge of the fen-country, 76 miles N. of London and 42 NE. of Northampton. Here, at Medeshamstede, in 655, the Mercian thane Saxulf founded the great Benedictine abbey of SS. Peter, Paul, and Andrew, which, destroyed by the Danes in 870, was restored in 966, plundered by Hereward in 1069, and again burned down in 1116. Its noble church, the cathedral since 1541 of a new diocese carved out of that of Lincoln, was built between 1118 and 1528, and thus, whilst essentially Norman, offers every variety of architecture down to the Perpendicular. It is 471 feet long, by 202 across the transept, and 81 high. The Early English west front (*c.* 1200–22) consists of three mighty arches, and 'is perhaps,' says Freeman, 'the grandest conception for a single feature which mediæval architecture has produced, a Greek portico translated into Gothic language.' Noteworthy also are the flat painted wooden ceilings of the 12th century, the portrait of 'Old Scarlett' the sexton (1496–1594), the blue slab inscribed 'Queen Catharine, A.D. 1536,' and the grave for twenty-five years (1587–1612) of Mary Queen of Scots. In 1643 Cromwell and his troopers did hideous havoc to monuments, stained glass, and cloisters. In 1883 the fine central tower was condemned as unsafe; but it has been lovingly rebuilt, and in 1890 the cathedral was reopened after restoration. Of the abbots may be mentioned Ernulf, Bishop of Rochester (1115); and of the twenty-seven bishops, Lloyd and White the nonjurors, Richard Cumberland, Archbishop Magee of York, and Mandell Creighton the historian. Paley was a native. Two ancient gateways, the bishop's palace and the deanery (once the abbot's and prior's houses), and the chancel of a Becket chapel (now a museum) make up the remaining objects of interest. A training-college for schoolmasters (1864), a grammar-school, the town-hall (1671), the corn exchange (1848), a cattle-market of five acres (1867), and the bridge over the Nen (dating from 1140, but in its present form from only 1872) may be mentioned. Peterborough is an important railway centre, has manufactures of agricultural implements, and carries on a large trade in malt, coal, farm-produce, &c. Incorporated as a municipal borough in 1874, it has returned two members to parliament from 1547 till 1885, and since then one. Pop. (1841) 6959; (1881) 22,394; (1891) 25,172.



Peterborough Cathedral—West Front.

See works by Gunton (1686; new ed. 1825), Britton (1828), F. A. Paley (1849), Davys (3d ed. 1863), Sweeting (1869), and Poole (1881).

Peterborough, chief town of Peterborough county, Ontario, on the Otanabee River (here crossed by six bridges), 82 miles by rail NE. of Toronto. It exports lumber and agricultural products, and manufactures flour, woollens, farming implements, machinery, furniture, canoes, &c. Pop. (1881) 6812; (1891) 9717.

Peterborough, CHARLES MORDAUNT, EARL OF, was born in or about the year 1658. All particulars of his boyhood, even to the place of his education, seem to have been lost. The first definitely recorded event in his life is his voyage as a volunteer in Sir John Narborough's expedition against the Algerine corsairs in 1674. From this voyage, in which he saw actual service, he returned early in 1677, to find himself in his twentieth year Viscount Mordaunt, his father, John, first peer of that title, which he owed to his services in assisting to bring about the Restoration, having died in 1675. The new viscount shortly afterwards married Carey, daughter of Sir Alexander Fraser, and in 1678 started on another maritime expedition, this time apparently in the capacity of a passenger. Returning after a year's absence, he again volunteered for naval service, and sailed with the fleet sent under Lord Plymouth for the relief of Tangier. On his return to England he began to take an active part in politics, identifying himself with the extreme Whig party throughout the whole of the three or four eventful years which closed with the ruin and flight of Shaftesbury, and the final triumph of the indolent and dissolute but shrewd and able monarch, against whom that restless agitator had pitted himself. At the accession of James II. Mordaunt became a prominent parliamentary opponent of the first unpopular measures of the new king, and one of the earliest intriguers for his overthrow. Indeed he went at once so fast and so far as to press upon William of Orange a premature scheme for the invasion of England, which that prince with his usual cool judgment rejected. After the Revolution, in the military operations connected with which Mordaunt exerted himself vigorously and with success, he rose into high favour with the new king. Honour and emoluments of a varied description, from the post of a privy-councillor to that of a water-bailiff, were heaped upon him, and he was finally appointed First Commissioner of the Treasury, and created Earl of Monmouth. On William's departure for the campaign in Ireland the new earl was nominated of the committee of nine who formed the Queen's Council of Regency. In the House of Lords he was an extreme and active Whig, but it was probably as much his zealous anxiety to supplant William's ministers suspected of Jacobitism as to combat Jacobite designs themselves that led to his embroilment in those intrigues arising out of the Assassination Plot, and the Fenwick trial, which ultimately resulted (January 1697) in his committal to the Tower. He was liberated in less than three months, and for several years thereafter he seems to have played no prominent part in public affairs.

In 1702 the war of the Spanish succession broke out, and in 1705 Peterborough (for by his uncle's death he had succeeded to that title shortly after his release from imprisonment) was appointed to the command of an army of 4000 Dutch and English soldiers, with which he proceeded to Barcelona, there to begin the extraordinary campaign which has made his name famous in history. After successfully resisting the solicitations to attack the city which were addressed to him by the Prince of Hesse-Darmstadt, fresh from the capture of Gibraltar, and the Archduke Charles, the claimant to the Spanish throne, for whom the allies were fighting, Peterborough succeeded by a pretended retreat in surprising and capturing the strong fort of Monjuich on the south side of Barcelona, from which position of vantage he soon managed to reduce the city. The Catalan towns one after another now declared for Charles; Gerona, Tarragona, Tolosa, and Lerida opened their gates to Peterborough, who, marching southward in the depth of winter and driving his foes before him, reached Valencia early in February 1706. Meanwhile an army under the Duke of Anjou, the French claimant to the throne (afterwards Philip IV.), and Marshal Tessé had entered Catalonia, and was closely investing Barcelona, which was at the same time blockaded by a fleet under the Count of Toulouse. Hurrying back to the scene of his former exploit, and seeing that it was from the side of the sea that the town must be relieved, Peterborough threw himself on board one of the ships of the English squadron, took command in virtue of his commission, which gave him supreme control over the British forces at sea as well as on land, sent his orders to the admiral, and drove Toulouse and his fleet from before the port. This success was followed by the raising of the siege, and the retreat of Tessé's force. Encouraged by the splendid successes of Peterborough on the east coast, Galway, the British commander on the Portuguese frontier, advanced into the heart of Spain, and in June entered Madrid. Peterborough wished to march from Valencia, whither he had now returned, and to effect a junction with Galway, but the archduke dallied irresolutely at Barcelona. Precious time was lost, Berwick rallied his forces, and compelled Galway to evacuate the capital, and when at last Charles advanced and summoned Peterborough to join him, it was too late. A plan formed by him for the recovery of Madrid was rejected, and in disgust he obtained permission to depart for Genoa to raise a loan on the Spanish revenues. Returning with success from his mission, he acted for some time as a sort of adviser to his military successors in Spain, but his imperious temper seems to have unfitted him for anything but supreme command, and his differences with Lord Stanhope and others led to his recall in March 1707.

His career thenceforward till his death at Lisbon on 25th October 1735 is interesting only to the student of letters and not to the politician. He was, as is well known, an intimate friend of Pope, with whom he was in constant communication almost up to the last day of his life, and whose genuine esteem for him may satisfy us that under the somewhat theatrical exterior which he presented to the world there lay qualities which justly endeared him to his friends. In 1722 he was, it is said, privately married to the famous singer Anastasia Robinson, but the lady was not publicly acknowledged as his countess till shortly before his death. Recent military criticism has made an elaborate endeavour to show that Peterborough's fame as a conqueror rests wholly on a basis of imposture, and that the whole credit of his conquest of Valencia must be distributed among others. This extreme view, however, has been shown by Mr Stebbing in his judicious and impartial monograph to be untenable. His verdict is that 'the figure of the hero remains much where it was, though its pedestal may have been somewhat lowered.'

See the Memoir by Russell (2 vols. 1887), and Stebbing's *Peterborough* ('English Men of Action' series, 1890).

Peterhead, a seaport and burgh of barony of Buchan, Aberdeenshire, on a peninsula, 32 miles by road, but 44 by a branch-line (1862), NNE. of Aberdeen. Founded in 1593, it is somewhat irregular in plan, but clean and largely built of the celebrated 'Peterhead granite,' whose reddish variety is so much used for monumental purposes. The Keiths, Earls Marischal, were superiors of the place till the rebellion of 1715, when the Old Pretender landed here, and after which their forfeited estates were purchased by the Edinburgh Merchant Maiden Hospital, to whose governors many improvements are owing. Of Marshal Keith (q.v.) a bronze statue was presented to the town in 1869 by King William of Prussia; and the market-cross, a granite Tuscan pillar (1833), bears the arms of the Earls Marischal. The public buildings include the town-hall (1788), with a spire 125 feet high; the parish church (1803), with one of 118 feet; the free library and museum (1891); the academy (1846); and convict-prison (1889). Industries are woollen manufacture, boat-building, and granite-polishing. Peterhead was made a head-port in 1838. From 1788 it gradually became the chief British seat of the seal and whale fisheries, until in 1852 it sent out 30 ships; but since then there has been a great decline. At present Peterhead is chiefly important for its great herring-fishery, which employs upwards of 500 boats, and which during the herring season brings some 5000 persons to the place. The south harbour was commenced in 1773, and the north harbour in 1818, a canal being formed between them in 1850; whilst a new harbour was formed and the south harbour deepened under Acts of 1873 and 1876. Their three basins, hewn out of the solid rock, together cover about 22 acres, and have cost £300,000; but all three are as nothing compared with the great harbour of refuge, the works for which, designed by Sir John Coode, were commenced in 1886, and are to be completed in 1921 at a cost of £746,000. In the neighbourhood are the ruins of Inverugie, Ravenscraig, and Boddam castles, all strongholds of different branches of the Keiths; Buchan Ness, the most easterly point of Scotland, with a lighthouse (1827); and the Bullers of Buchan (q.v.). Since 1833 Peterhead has united with Elgin, &c. to return one member to parliament. Pop. (1801) 3264; (1851) 7298; (1881) 10,922; (1891) 12,198.

See Peter Buchan's *Annals of Peterhead* (1819), besides works by W. Laing (1793) and Arbuthnot (1815).

Peterhof, a palace of the emperor of Russia, on the southern shore of the Gulf of Finland, 18 miles W. of St Petersburg, was built by Peter the Great in 1711, contains a fine collection of paintings, and is surrounded by beautiful parks and gardens laid out on the model of those at Versailles, with cascades, terraces, and summer-houses. The town of Peterhof has 14,298 inhabitants.

Peter Lombard. See LOMBARD.

Peterloo Massacre, the name popularly given to the dispersal of a large meeting by armed force in St Peter's Field, Manchester, Monday, August 16, 1819. The assemblage, consisting chiefly of bodies of operatives from different parts of Lancashire, was called to consider the question of parliamentary reform, and the chair, on open hustings, was occupied by 'Orator' Hunt (q.v.). The dispersal took place by order of the magistrates; several troops of horse, including the Manchester Yeomanry, being concerned in the affair. Eleven persons (men, women, and children) were killed, and some 600 wounded. St Peter's Field is now the site of the Free-trade Hall. 'Peterloo' was a name suggested by Waterloo.

Peter Martyr, the patron saint of the Inquisition, a Dominican of Verona, who, for the severity with which he exercised his inquisitorial functions, was in 1252 slain at Como by the infuriated populace. His death formed the subject of a masterpiece by Titian, destroyed by fire at Venice in 1867.

Peter Martyr (Ital. *Pietro Martire Vermiglo*), Reformer, was born in Florence, September 8, 1500, entered at sixteen the order of the canons regular of St Augustine at Fiesole, studied at Padua, and became abbot of Spoleto, and later prior of St Peter ad Aram near Naples. Here he was drawn into the doctrines of the Reformers by the teaching of Juan Valdes and Ochino, yet was appointed visitor-general of his order in 1541. His rigour made him hateful to the dissolute monks, and he was sent to Lucca as prior of San Frediano, but soon fell under the suspicions of the Inquisition, and had to flee to Zurich (1542). At Strasburg he was welcomed by Bucer, and made professor of the Old Testament. In 1547 he came to England on Cranmer's invitation, lectured at Oxford on 1 Corinthians and Romans, and took an active part in the great controversy of the day. Mary's accession drove him back to Strasburg, now grown too Lutheran for his tastes, and at length in 1555 he repaired to Zurich, where he died, November 12, 1562. His admirable *Loci Communes* was printed at London in 1575. See the study by C. Schmidt (Elberfeld, 1858).

Peter Martyr Anglerius, historian, was born in 1459 at Arona, on the Lago Maggiore, of an ancient family belonging to Anghera, obtained a footing at the court of Ferdinand and Isabella in 1487, and rose to high ecclesiastical preferment in Spain. He was ultimately named Bishop of Jamaica, and died at Granada in 1525. He wrote *De Orbe Novo* (1516), giving the first account of the discovery of America; *De Legatione Babylonica* (1516); and *Opus Epistolarum* (1530). See Bernays, *Petrus Martyr Anglerius und sein Opus Epistolarum* (1890).

Petersburg, the third city of Virginia, on the south bank of the Appomattox River, 23 miles by rail S. of Richmond. The falls above supply water-power for foundries, cotton, flour, and paper mills, and especially tobacco-factories. Petersburg is a well-built place, and contains a fine park. In the campaign of 1864 Grant, failing to take Richmond, besieged Petersburg, and was repulsed in several attacks by General Beauregard, with heavy loss. Pop. (1890) 22,680.

Petersburg. See ST PETERSBURG.

Petersfield, a market-town of Hampshire, 20 miles NNE. of Portsmouth by rail. Till 1832 it returned two members, and then till 1885 one. Pop. 1646.

Peter's-pence (*denarius S. Petri*), the name given to a tribute offered to the Roman pontiff in reverence of the memory of St Peter. From an early period the Roman see had been richly endowed; but the first idea of an annual tribute came from Anglo-Saxon England. It is ascribed by some to Ina (721 A.D.), king of Wessex, by others to Offa of Mercia, and by Lingard to Alfred the Great. It was extended to Ireland by Henry II. The tribute consisted in the payment of a silver penny by every family possessing land or cattle of the yearly value of 30 pence, and it was collected during the five weeks between St Peter's and St Paul's Day and August 1. The tax, also called Rome-scot, varied greatly in amount, but continued to be paid with intervals till the reign of Henry VIII. By Gregory VII. it was sought to establish it for France; and traces of a similar payment appear also in Denmark, Sweden, Norway, and Poland. This tribute differed from the payments of the feudatory kingdoms, such as Naples, Aragon, and England under the reign of John. The tribute practically ceased at the Reformation. The pope having suffered a considerable diminution of his own revenue since the revolution of 1848, an effort was made in several parts of Europe to revive the payment of Peter's-pence, not as a tribute but by the collection of free-will offerings. In some countries it has been very successful; and since the total annexation of the Papal States to the kingdom of Italy the tribute has been largely increased in France, Belgium, England, and Ireland. In 1877, on occasion of the jubilee of Pius IX., the payment amounted to £660,000.

Peter the Hermit, the apostle of the first crusade, was of gentle birth, and a native of Amiens, where he was born about the middle of the 11th century. He served some time as a soldier, became a monk, and is usually said to have made a pilgrimage to the Holy Land before 1094, when he began the preaching campaign which was to render him famous, and leave such a mark on history. But it should be noted that Hagenmeyer in his monograph *Peter der Eremita* (1880) denies that Peter was ever in Palestine till he went with the crusaders, and asserts that the scheme of a crusade originated with the pope, not with the hermit. The article CRUSADES gives an account of his preaching, its results, and of poor Peter's faint-hearted attempt at desertion during the siege of Antioch. After the end of the crusade he returned to Europe, and founded a monastery at Huy in the Low Countries, where he died, 7th July 1115. His remains were translated to Rome in 1634.

Peter the Wild Boy was found in July 1724 in a wood near Hameln in Hanover; 'he was walking on his hands and feet, climbing up trees like a squirrel, and feeding upon grass and moss of trees.' He was taken to George I., brought over by him to England in 1726, and placed under the care of the celebrated Dr Arbuthnot, who had him baptised 'Peter.' He was fond of music, but could never be taught to articulate more than 'Ki Sho,' 'Qui Ca,' and 'Hom Hen,' for 'King George,' 'Queen Caroline,' and 'Tom Fen'—the last a Hertfordshire farmer with whom he lived after 1737. He would sometimes ramble away, on one occasion as far as Norwich, so was provided with a brass collar inscribed 'Peter the Wild Boy, Broadway Farm, Berkhampstead.' Lord Monboddo visited him in 1782, and in his *Ancient Metaphysics* describes him as only 5 feet 3 inches high, now about seventy years of age, quite tame, bearded, and fresh and healthy. But on the farmer's death Peter took to his bed, refused food, and in a few days died, February 1786. See *Notes and Queries* for 11th October 1884, and works there cited.

Peterwardein, one of the strongest fortresses in the Austrian dominions, is situated in a marshy, unhealthy locality on the right bank of the Danube, 44 miles by rail NW. of Belgrade, and is connected with Neusatz opposite by a bridge of boats. Pop. of town, 3603. The most ancient part of the defences, the Upper Fortress, is situated on a rock of serpentine, which on three sides rises abruptly from the plain. The fortress was held by the Turks from 1526 to 1687. In 1688 the fortifications were blown up by the imperialists, and the town was soon after burned to the ground by the Turks; but at the peace of Passarowitz (1718) it remained in the possession of the emperor. Here, on 10th August 1716, Prince Eugene obtained a great victory over the Grand Vizier Ali. The Hungarians were compelled to yield the fortress to the Austrians in September 1849.

Petiole. See LEAF.

Pétion de Villeneuve, JÉRÔME, a prominent figure in the French Revolution, was the son of a *procureur* at Chartres, and was born there in 1753. He was practising as an advocate in his native city when he was elected in 1789 its deputy to the *Tiers État*. An ardent republican and fluent speaker, he quickly became popular, although essentially windy, verbose, and of mediocre understanding. He was a prominent member of the Jacobin Club, and as 'Pétion the Virtuous' became a great ally of 'Robespierre the Incorruptible.' He was sent along with Barnave and Latour-Maubourg to bring back the fugitive royal family from Varennes, and in the execution of this commission he acted in a brutal and unfeeling manner. He afterwards advocated the deposition of the king, and the appointment of a popularly elected regency, and along with Robespierre received, 30th September 1791, the honours of a civic crown. On the 14th of November he was elected mayor of Paris in Bailly's stead, the court favouring his election to prevent that of Lafayette. The invasion of the Tuileries by the mob and the atrocious September massacres both fell within his year of office. He became the first president of the Convention, and was made ridiculous as 'roi Pétion' through Manuel's proposal to give the president the same authority as the president of the United States. On the triumph of the Terrorists Pétion's popularity declined, and he cast in his lot more and more with the Girondists, having become a *habitué* of Madame Roland's *salon*. Like them he voted at the king's trial for death, but with delay of execution and appeal to the people. He was elected to the first committee of general defence in March 1793, and on 12th April he headed the fatal because unsuccessful attack on Robespierre. Proscribed among the twenty-two, on the 2d of June, he escaped to Caen, and on the failure of the attempt to make armed opposition against the Convention fled to the Gironde with Guadet, Buzot, Barbaroux, Salle, and Louvet, and hid in a grotto at St Emilion. At length they were tracked and obliged to flee. The bodies of Pétion and Buzot were found in a cornfield, partly devoured by wolves. They were supposed to have died by their own hands.

His *Œuvres* fill 3 vols. (1792). See J. J. Regnault-Warin's hyper-eulogistic life (1792); C. A. Dauban's *Mémoires inédits* (1866); and C. Vatel's *Charlotte Corday et les Girondins* (3 vols. 1872).

Petition, a supplication preferred to one capable of granting it. The right of the British subject to petition the sovereign or either House of Parliament for the redress of grievances is a fundamental principle of the British constitution, and has been exercised from very early times. The earliest petitions were generally for the redress of private wrongs, and the mode of trying them was judicial rather than legislative. The earlier petitions were generally addressed to the House of Lords; the practice of petitioning the House of Commons first became frequent in the reign of Henry IV. Since the Revolution of 1688 the practice has been gradually introduced of petitioning parliament, not so much for the redress of specific grievances, as regarding general questions of public policy. Petitions must be in proper form and respectful in language; and there are cases where petitions to the House of Commons will only be received if recommended by the crown, as where an advance of public money, the relinquishment of debts due to the crown, or compensation for losses out of the public funds is prayed for. A petition must, in ordinary cases, be presented by a member of the House to which it is addressed. The system is, however, not without its disadvantages, as when the attempt is made to over-ride the courts of law by popular agitation—vast numbers of petitions being presented on behalf of murderers convicted after fair trial. For election petitions, see PARLIAMENT, Vol. VII. p. 775. The monster Chartist petition of 1848 claimed to bear six million signatures. In the five years ending 1842 the number of petitions presented to the House of Commons was 70,072; in the five years ending 1872, 101,573;

in the years 1873–81, 123,870. In one year (1875) there were as many as 20,610, signed by 3,088,970 persons. On the other hand, the year 1889 produced only 8317 petitions.

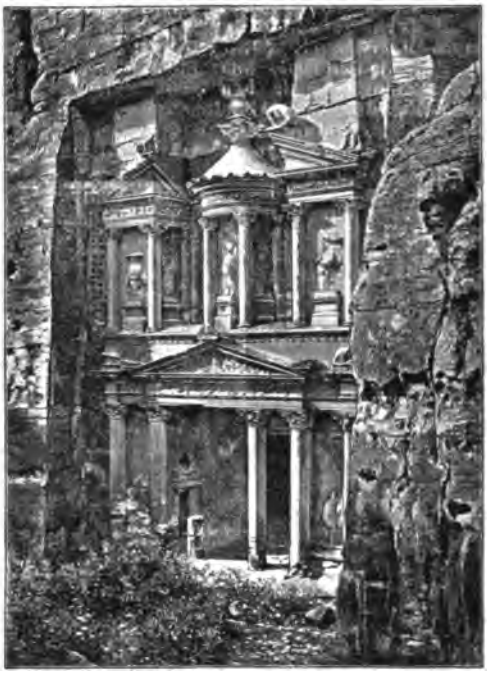
In the United States the right of the people to petition government is expressly secured by the First Amendment of the Constitution, and is thoroughly interwoven with the ideas and usages of the nation—although, during the conflicts on slavery, it was resolved that petitions relating to slavery or the abolition thereof should be laid on the table without being printed or read, and finally that such petitions should not be received at all.

Petition of Right, a declaration of certain rights and privileges of the subject obtained from King Charles I. in his third parliament—the first statutory restriction of the powers of the crown since the accession of the Tudor dynasty. It was so called because the Commons stated their grievances in the form of a petition, refusing to accord the supplies till its prayer was granted. The petition professes to be a mere corroboration and explanation of the ancient constitution of the kingdom; and after reciting various statutes that recognise the rights contended for, prays 'that no man be compelled to make or yield any gift, loan, benevolence, tax, or such like charge, without common consent by act of parliament; that none be called upon to make answer for refusal so to do; that freemen be imprisoned or detained only by the law of the land, or by due process of law, and not by the king's special command, without any charge; that persons be not compelled to receive soldiers and mariners into their houses against the laws and customs of the realm; that commissions for proceeding by martial law be revoked.' The king at first eluded the petition, expressing in general terms his wish that right should be done according to the laws, and that his subjects should have no reason to complain of wrongs or oppressions; but at length, on both Houses of Parliament insisting on a fuller answer, he gave an unqualified assent on the 26th of June 1628. The text of the Petition will be found most conveniently in Gardiner's *Constitutional Documents of the Puritan Revolution, 1628–60* (1889). See also his *History of England*, vi. 274–309.

Petitio Principii ('a begging of the principle or question') is the name given in Logic to that species of vicious reasoning in which the proposition to be proved is itself assumed in the premises of the syllogism.

Petöfi, SANDOR, Hungarian poet, was born on 1st January 1823 the son of a butcher, at Kis-Körös, in the county of Pesth, and after school-days was successively actor, soldier, and literary hack. His first poem, published in 1842, was followed by a volume in 1844 which secured his fame as a poet. He diligently studied German, French, and English, translated Shakespeare's *Coriolanus*, but in 1848 threw himself heartily into the revolutionary cause, writing numerous popular war-songs. He fell in the battle at Schässburg (Segesvár), 31st July 1849; but it was long believed by the Hungarians that he had escaped, and would reappear. His lyrical poetry breaks completely with the old pedantic style till then in vogue, and, warm with human and national feeling, began a new epoch in Hungarian literature. The first collected edition of his poems appeared in 1874; selections have been translated into English by Bowring and others. There are lives by Opitz (1868) and Fischer (1888).

Petra (the Greek equivalent of the Heb. SELA, both names signifying 'Rock'), anciently the stronghold and treasure-city of the Nabatæans (q.v.), was situated in the 'desert of Edom' in northern Arabia, near the points of intersection of great caravan-routes from Palmyra, Gaza, Egypt, and the Persian Gulf, four days' journey from the Mediterranean and five from the Red Sea. It was approached by a chasm or ravine, which in some places is only 12 feet wide, while the rocky walls of red sandstone tower more than 100 feet above. Along this ravine are the most famous ruin of Petra, the Khusna or 'treasury of Pharaoh,' and a theatre, both shaped out of the solid walls. All along the face of the rocks that overlook the valley are rows of cave-dwellings hewn out of the solid stone, and ornamented with façades. The floor of the valley, about two miles across, is strewn with ruins. The earliest name was probably Rekem; hence Petra has been identified with Kadesh Barnea, and as the place where Moses struck the rock so that water flowed out. The little stream that descends the ravine, flowing eastwards, has its origin in a spring called at the present day the Fountain of Moses. Petra was captured by the Romans in 105 A.D., and thereafter decayed, its place as a commercial centre being taken by Palmyra (q.v.). Nevertheless it continued to exist as a town; most of the ruined edifices belong probably to the first century of its decay.—It is from Petra, and not from the Greek word *petra*, that Arabia Petræa gets its name.



Rock Temple at Petra: El Khusna.

See De Luynes, *Voyage d'Exploration* (1875); Laborde and Dinant, *Arabie Petrée* (1830–34); Palmer, *Desert of the Exodus* (1871); Stanley, *Sinai and Palestine* (1866); and other works cited at EDOM.

Petrarch. Francesco Petrarca, one of the earliest and greatest of modern lyric poets, was the son of a Florentine notary, Petracco (diminutive of Peter) di Messer Parenzo, the name of Francesco Petrarca by which the poet is known being the Latinised form of Francesco di Petracco—viz. Francis of Peter. Petrarch's father was exiled from Florence (1302) along with Dante during the struggles between the two factions of the Bianchi and Neri, when the latter party obtained the upperhand. He took refuge with his family in Arezzo, where, on the 20th July 1304, Francesco was born.

The poet's infancy was passed in Tuscany until 1312, when his father determined to go to Avignon, whither the papal court had lately been transferred. There and in the neighbouring small town of Carpentras Petrarch's studies began, and were continued later at Montpellier and Bologna. His father intended him to enter the legal profession; but instead of jurisprudence he devoted himself with enthusiasm to the study of the classics, his favourite authors, on whose style he afterwards strove to model his own, being Cicero and Virgil. It was only later in life that he tried to learn Greek, in which he never attained to any proficiency. After his father's death, whom his brother did not long survive, Petrarch returned to Avignon (1326). As was the custom of the time, more especially at the papal court, he and that brother Gherardo, being without means, became ecclesiastics; but Francesco never took holy orders. His chief source of income became the small benefices conferred on him by his many powerful patrons; but in after-life he refused higher preferment, declining even the much-coveted post of papal secretary, rather than compromise his independence. Petrarch is reported to have been a handsome young man of winning manners, fond of rich clothing and all the refinements of court-life. It was at this period of his life that he first saw Laura, the lady whose name he was to immortalise in his lyrics, and who inspired him with a passion which has become proverbial for its constancy and purity. The meeting took place on April 6, 1327, in the church of St Clara at Avignon. This date, as well as that of Laura's death on the same day in the year 1348, stands recorded by Petrarch's own hand on the fly-leaf of his Virgil, now amongst the treasures of the Ambrosian Library at Milan. The identity of Laura has been a subject of much discussion, the most generally accepted hypothesis is that of the Abbé de Sade, who identified the poet's love, on somewhat slender evidence, with a member of his own family, Laure de Noves, married in 1325 to a Hugo de Sade; she became the mother of eleven children, and died in April 1348. It was also at this time that Petrarch's friendship began with the powerful Roman family of the Colonnas, and especially with Jacopo Colonna, Bishop of Lombez.

The dawn of the new birth of letters and art which was to illumine the following century was already altering the status of the poet and artist, and as the fame of Petrarch's learning and genius grew his position became one of unprecedented consideration. His presence at their courts was competed for by the most powerful sovereigns of the day, and such was the exceptional position he enjoyed that he has said of himself that princes had lived with him, not he with princes. His chief patrons were Pope Clement VI., the Emperor Charles IV., King Robert of Naples, the Viscontis of Milan, Jacopo da Carrara, Lord of Padua, Azzo da Correggio, Lord of Parma; in Venice the senate bestowed a palace on him in return for his promise to leave that town his library; Florence offered him the restoration of the confiscated possessions of his family if he would reside there, and in Arezzo the house where he was born was held as a sanctuary. When wearied by court-life he sought retirement and quiet in his country-house at Vaucluse, near Avignon. He travelled repeatedly in France, Germany, and Flanders, wherever he went searching diligently for manuscripts to enrich his collection. He made some valuable bibliographical discoveries, finding in Liége two new orations of Cicero, in Verona a collection of letters of the same writer, and in Florence a then unknown Institution of Quintilian's. In the cosmopolitan society of the papal court Petrarch became acquainted with learned men of all countries, whom he interested in his unwearied search for valuable manuscripts. The example given by Petrarch in his loving preservation of books probably gave the first incentive to the collection of manuscripts which bore such rich fruits in the following century. But the most glorious moment of Petrarch's honoured career was when, invited by the senate of Rome on Easter Sunday, 1341, he ascended the capitol clad in the robes of his friend and ardent admirer, Robert of Anjou, king of Naples, and there, after delivering an oration on poetry and the significance of the laurel, he was crowned poet-laureate amid the acclamations of thousands. After this pagan ceremony he went to leave his crown on the altar of St Peter's. In 1353, after the death of his beloved Laura and his friend Cardinal Colonna, he left Avignon for ever, disgusted with the corruption and vice of the papal court. The remaining years of his brilliant life were passed in various towns of Northern Italy, and in the retirement of a country-house at Arquà, near Padua, the only one of his many habitations still in existence. There, tenderly cared for by his natural daughter, Francesca, and her husband, and occupied to the last in his favourite studies, he quietly ended his life, 18th July 1374.

Petrarch may be considered as the earliest of the great humanists of the Renaissance and the founder of modern classic culture. His passionate admiration for antiquity and the classic authors was no longer that of Dante and the earlier writers, whose erudition was incorporated with the feelings and needs of their own time and stamped with their own individuality. The more contemplative and less original mind of Petrarch lent itself rather to an entire withdrawal from and disdain for all that later times had produced, and his constant effort was to imitate as closely as possible the modes of thought and expression of the great Latin writers. He attained to a surprising purity of style in his Latin works, and the admiration which these writings excited in his contemporaries was boundless. Petrarch himself chiefly founded his claim to posthumous fame on his epic poem *Africa*, the hero of which is Scipio Africanus, and his historical work in prose, *De Viris Illustribus*, a series of biographies of classical celebrities. His other important Latin works are the eclogues and epistles in verse; and in prose the dialogues, *De Contemptu Mundi* and *Secretum*, and the treatises *De Otio Religiosorum* (written while visiting his brother, who had joined a Carthusian brotherhood) and *De Vita Solitaria* (written at Vaucluse); and particularly important for historical and biographical purposes is the numerous collection of letters divided into *Familiares*, *Variæ*, *Ad Veteres Illustres*, *Seniles*, and *Sine Titulo*.

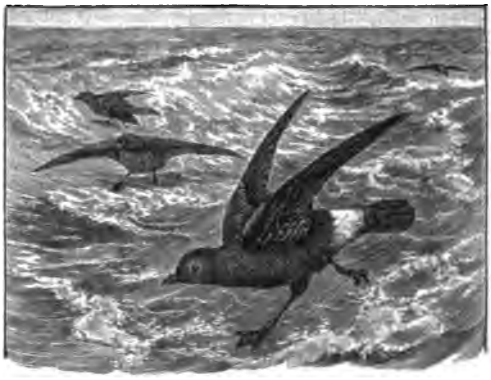
Petrarch was an ardent patriot, but he had little practical influence on the political life of his time. His ideas were those of a poet, and not of a statesman. However great his merits as patriot or student, his name would be little remembered now; it is by his lyrics alone that his fame has lasted for nearly six centuries. His title-deeds to fame are in his *Canzoniere*, in the sonnets, madrigals, and songs written in Italian, almost all inspired by his unrequited passion for Laura, and in which the character of the man and the reality of a strong sentiment find their expression. The history of Petrarch's love presents few incidents; its entire interest is psychological. In these poems we see the picture of a human soul in all its contradictions, pains, and struggles. Such self-analysis was unknown in mediæval writers, and Petrarch has therefore been called the first *modern* man. His last work was an allegorical poem in 'terzine,' *I Trionfi* ('Triumphs'), also in Italian, and is of unequal merit, the only remarkable passages being those which refer to the beginning of the poet's love ('Triumph of Love') and to Laura's death ('Triumph of Death'). Few of Petrarch's lyrics treat of other subjects, but amongst these few are three of his finest efforts—one, the famous address to his country (*Italia mia*), in which he reproaches the Italian princes for their dissensions, and for calling to their aid the mercenary 'barbarians' who were the scourge of Italy, words repeated by Machiavelli in his *Prince*, a century and a half later, and in our own day in the struggle for freedom from Austria; the second (*Spirto Gentil*), which some commentators consider to be addressed to the young Colonna, and others to the famous Cola di Rienzi, whose wild attempt to resuscitate the ancient forms of republican government in Rome had fired Petrarch with enthusiasm; and the third (*O Aspettata in Ciel Beata e Bella Anima*), addressed to his friend Jacopo Colonna, to incite him to join the crusade of Philip of France against the infidels. Petrarch was in constant correspondence with his great contemporary, Giovanni Boccaccio (*Lettere di Boccaccio*, ed. by Coraggini, Florence, 1877), and translated into Latin his friend's tale of Patient Griselda (*De Obedientia ac Fide Uxoria*). Chaucer alludes to this when he says of his Clerk's Tale:

> Lerned at Padowe of a worthy clerk,
> Frauncеys Petrark, the laureat poete,
> Highte this clerk, whose rethorike swete
> Enlumined al Itaille of poetrye.

The earliest complete edition of Petrarch's works is *Francisci Petrarchæ Opera Omnia* (Basel, 1554, fol.). His Italian lyrics were published as early as 1470 (Venice, 4to), and have since gone through innumerable editions with or without commentary. The most reliable is that of Marsand (Padua, 1819, 4to); his text is used by Leopardi for his important edition and commentary (Milan, 1826), often reprinted. The letters have been edited by Fracassetti, and partly translated into Italian, with a valuable commentary (Florence, 1859-63-69): See the Abbé de Sade, *Mémoires de Petrarque* (1764); Mezière, *Petrarque* (1868); Koerting, *Petrarcas Leben und Werke* (1878); the little monograph by Henry Reeve (1878); also Gaspary, *Italienische Literatur* (Berlin, 1885); Bartoli, *Litteratura Italiana* (Florence, 1884); De Sanctis, *Sagio sul Petrarca* (Naples, 1869); Zumbun, *Studii sul Petrarca* (Naples, 1878); Voigt, *Wiederbelebung des classischen Alterthums* (Berlin; 2d ed. 1880); and Symonds, *Renaissance in Italy* (1875–86).

Petre, an English Catholic family, descended from Sir William Petre, secretary of state in the reigns of Henry VIII., Edward, Mary, and Elizabeth. The most notable member was Edward Petre the Jesuit (1631-99), who shared the captivity of his kinsman Lord Petre in the Tower in connection with Oates's 'Popish Plot,' but released by James II. sat in the Privy-council. He was abhorred as James's evil genius, and escaping at the Revolution became rector of St Omer.

Petrel (*Procellaria*), a genus of sea-birds of the family Procellariidæ, which includes the albatrosses, shearwaters, fulmars, and petrels proper, and is allied to the gulls (Laridæ). The true petrels, of which there are eighteen widely distributed species, are long-winged birds of powerful flight; the tail is broad and of medium length; the hind-toe is very small; the claws are narrow and pointed; the bill is short and slender, and the tube-like nostrils are set close together. They are strictly oceanic, and visit coasts and islands only for breeding purposes. The best-known species is the Stormy Petrel (*P. pelagica*) or Mother Carey's Chicken (q.v.), which is scarcely larger than a lark, and is the smallest web-footed bird known. The head and back are sooty-black, the wings black, with streaks of white, the under surface grayish black, the bill black, and the feet reddish brown. The name Petrel—a diminutive of Peter—refers to its apparent walking on the water, the lightness of its body enabling it to skim up and down the waves, even in a storm, with only enough motion of the wings to keep the feet from sinking under the surface. Because of its frequent occurrence before or during stormy weather, when the molluscs and other animals upon which it feeds are driven to the surface, and possibly also because of its blackness, it is regarded by sailors as a bird of evil omen. Its flesh is so oily that the Faroe islanders, it is said, draw a wick through the body to make a lamp. See FULMAR.



Stormy Petrel (*Procellaria pelagica*).

Petri, LAURENTIUS, Swedish Reformer, was born at Örebro in 1499, studied under Luther at Wittenberg, was made professor of Theology at Upsala, and in 1531 first Protestant Archbishop of Upsala, and died in 1573. Along with his brother Olaus he was chiefly instrumental in converting Sweden to the Reformed doctrines, and with him superintended the translation of the Bible into Swedish (1541), a work that also helped to fix the language.—His brother OLAUS, born at Örebro in 1497, died at Stockholm in 1552, gained, a few years after his return (1519) from Wittenberg, the ear of Gustavus Vasa, who called him to the capital to preach the new doctrines, and eventually made him (1531) chancellor of the kingdom. This post he resigned in 1539, and spent the rest of his life as first pastor of Stockholm. He was a man of bold temperament, great activity, and powerful eloquence, and left several works, including memoirs, a mystery-play, hymns, and controversial tracts.

Petrie, GEORGE, a learned Irish archæologist, was born at Dublin in January 1790, son of a portrait-painter from Aberdeen. He studied art, and became famous for his Irish landscapes, but gave from the beginning the half of his heart to his favourite study. In 1828 he was set over the short-lived antiquarian and historical section of the Ordnance Survey of Ireland, and in 1832 he became editor of the *Dublin Penny Journal*. He was made LL.D. by Trinity College, Dublin, in 1847, received a Civil List pension of £300 in 1849, and died January 17, 1866. Petrie's admirable *Essay on Round Towers* received the Irish Academy's prize in 1830. It remains a work of the very greatest value, although all antiquaries do not accept its theory that the round towers were at once belfries and fortalices. Other writings are an *Essay on the Military Architecture of Ireland* and *History and Antiquities of Tara Hall*. See the study by William Stokes (1868).

Petrie, W. M. FLINDERS, an accomplished Egyptologist, was born in 1853, and educated privately. His earliest explorations bore fruit in his *Stonehenge* (1880), and he next turned his attention to the pyramids and temples of Ghizeh (book, 1887), subsequently, with the aid of the Egypt Exploration Fund, to the mounds of Said—the Scripture Zoar, the forgotten city of Naukratis, Am, and Defenneh. His *Memoirs* on Tanis (1885–89), on Naukratis (1886), and on Tel el Hesy, the site of Lachish (Palestine Exploration Fund, 1891), are examples of the most valuable work of their kind.

Petrifaction, a name given to organic remains found in the strata of the earth, because they are generally more or less mineralised or made into stone. The word has fallen very much into disuse, having given place to the terms Fossil (q.v.) and Organic Remains. The name petrifaction is also loosely used of an object which, from being exposed to the action of limy or other water, becomes covered with a crystalline deposit. See (under Fossil) Fossil Forests.

Petro-Alexandrovsk, the seat of administration of the Amû-Daria district, is little more than a fort, and is situated on the Lower Amû-Daria or Oxus (q.v.), 30 miles E. of Khiva.

Petrography is that branch of geological science which deals with rocks viewed as aggregates of mineral matter. It is a study, therefore, which is carried on chiefly indoors, its object being to ascertain the mineralogical composition, the texture, and other physical characters of rocks, for which various appliances and apparatus are required. Although petrography is properly only a description of rocks, it is hardly possible to describe rocks without reference to their geological relations and mode of origin. Hence by many geologists the term Petrology is preferred as a name for this branch of their science, while others use Lithology in a similar sense. For a general account of rocks from the point of view of their origin, reference may be made to the section Petrology under Geology.

Petrographers are hardly yet agreed on any particular classification of rocks, not certainly from the want of materials, for a very large number of so-called rock-species have been described. But in the case of the crystalline igneous rocks so many gradations exist between one kind and another that the definition of rock-species is often very difficult. As careful descriptions multiply and comparisons are made it is probable that many of the igneous rocks which flourish at present as species will come to be included as mere varieties of a few well-marked types.

In examining a rock the petrographer notes first those characters which can be seen by the naked eye (*macroscopic characters*), such as its structure (whether *crystalline*, *vitreous*, *compact*, or *clastic*, &c.); its state of aggregation or relative hardness; its colour; its composition; and specific gravity—which may vary from 0·6 among the hydro-carbon compounds to 3·1 among the basalts, the average specific gravity of rocks in general being about 2·5 or a little more. In the case of many coarse-grained rocks, especially those belonging to the derivative division, it is hardly requisite to go beyond a macroscopic examination. But when the rock appears to be homogeneous it is necessary to subject it to closer scrutiny. Thin slices are therefore prepared for microscopic study, after which it is frequently found that the apparently smooth compact mass turns out to be composed wholly or largely either of crystalline or of fragmental materials. Even in the case of rocks which are manifestly crystalline, and the mineral ingredients of which can be determined macroscopically, it is necessary that a microscopic examination should be made. When this is done the rock will sometimes be shown to contain minute crystalline granules and crystals, or small quantities of non-differentiated matter and glass which quite escape the unassisted eye. The minute structure of the various rock-forming minerals is likewise investigated by means of the microscope, and the chemical changes which they may have undergone since the time of their formation are carefully studied. In this way much light has been thrown on the genesis of rocks and the changes which these have subsequently experienced.

Of the minerals known to science comparatively few are rock-formers; the larger number of these are practically confined to the igneous and schistose rocks, very few entering into the formation of the derivative class. The mineral constituents of the igneous rocks are grouped as *essential*, *accessory* or *adventitious*, and *secondary*. The essential minerals are the most important, as it is upon their presence that the various species of rocks depend. Accessory minerals are accidental ingredients, the presence or absence of which does not affect the specific character of a rock; if sufficiently prominent or remarkable they merely give rise to varieties. Secondary minerals are the products of chemical changes subsequent to the formation of the rock in which they occur—the essential and accessory minerals being *primary* or *original* constituents. Among the more important essential minerals of *igneous* rocks are quartz, felspar, nepheline, leucite, pyroxene, hornblende, mica, and olivine. All these also occur as accessory ingredients, and there are very many other adventitious minerals, but only the following need be named—magnetite, ilmenite (see Iron), apatite, schorl, titanite (sphene), haüyne (nosean), zircon, &c. Amongst the secondary minerals and decomposition products in igneous rocks are quartz, chalcedony, calcite, oxides of iron (see Iron), zeolites, epidote, chlorite, serpentine, green-earth, &c. The chief mineral constituents of the *Schistose* rocks are the following: Quartz, mica, felspar, talc, chlorite, hornblende, actinolite (see Amphibole), omphacite, smaragdite. Less prominent ingredients are andalusite and chiastolite, staurolite, ottrelite, kyanite, magnetite, schorl, sphene, epidote, pyrite, specular iron, &c. The *derivative* rocks having been formed out of the debris of pre-existing rock-masses, whether igneous, schistose, or sedimentary, it is obvious that they may contain many of the minerals already mentioned. Thus, there are some sandstones composed of quartz, felspar, and mica—the debris of granite or gneiss. But most of the minerals which aqueous rocks have derived from crystalline igneous and schistose rocks are more or less altered—the felspars are kaolinised, the micas are reduced to non-elastic scales or folia of a dull gray colour and much diminished lustre, the pyroxenes, amphiboles, olivine, &c. are either unrecognisable or represented by decomposition products. Quartz, as might have been anticipated, owing to its resistance to the chemical action of water and its superior hardness, is the most common mineral constituent of derivative rocks. The clay-rocks consist in large measure of the insoluble residue of the various silicates of alumina and the alkalies and alkaline earths, of which igneous and schistose rocks are so largely composed. The readily soluble and readily precipitated minerals calcite, dolomite, rock-salt, and gypsum are also important rock-formers in certain groups of derivative rocks. As binding materials (i.e. the mineral cements which hold the grains of many sedimentary rocks together) we have quartz, chalcedony, opal, &c., calcite, hæmatite, and limonite (see Iron), dolomite, siderite, &c. The rocks which are mainly composed of organic debris necessarily consist chiefly of calcareous and carbonaceous materials.

For purposes of description rocks may be grouped in the three following divisions: (I.) Igneous Rocks; (II.) Derivative Rocks; and (III.) Schistose Rocks.

I. *Igneous Rocks* (q.v.).—Of these there are two series—(*a*) *crystalline* and (*b*) *fragmental* or *clastic*. The crystalline series includes semi-crystalline and vitreous or glassy rocks, some of the more important characters of which may be noted. The vitreous rocks usually contain crystallites and microlites, and they often show perlitic and spherulitic structures. Some varieties are highly porous and froth-like (see PUMICE). Others are more or less homogeneous, closely compact, and smooth like bottle-glass; while yet others are markedly porphyritic, usually with crystals of sanidine (see FELSPAR). Such vitreous rocks are most usually acidic (i.e. highly siliceous), but basic glasses are also known. The semi-crystalline rocks are composed of crystalline minerals and glassy matter in very variable proportions. The crystalline ingredients often show minute inclusions of other minerals (*endomorphs*) or of glass, &c., which have been caught up while the crystal was growing in its molten magma. Frequently also the crystals contain minute cavities which may be empty or filled with some liquid or gas. The wholly crystalline rocks contain of course no glass or non-differentiated matter. It is in this class of rocks—many of which are of plutonic origin—that liquid cavities are of most common occurrence in the constituent minerals. In the minerals of semi-crystalline and crystalline rocks which have been erupted at or near the surface liquid cavities are less common. In vitreous, semi-crystalline, and crystalline rocks alike the mineral ingredients are not seldom disposed in lines or bands. This is called *fluxion* or *fluidal* structure—the ingredients having arranged themselves in this manner while the igneous rock was fluid and in motion. Although not unknown in some holocrystalline rocks, it is a structure which is more characteristic of the vitreous and semi-crystalline rocks which have been poured out at the earth's surface as lavas. The appearance of the original mineral constituents of many igneous rocks shows that their crystallisation cannot have taken place contemporaneously. In most cases it can be shown that they belong to two stages in the consolidation of the rock of which they form a part. Thus, in many crystalline and semi-crystalline rocks we readily distinguish a crystalline or semi-crystalline ground-mass, scattered through which occur larger crystals, many of which may be broken and corroded. These latter are believed to have crystallised while the molten rock was still at a considerable depth below the surface. Afterwards, when the fluid mass was poured out at or near the surface, and cooled rapidly, the smaller minerals and glassy matter of the ground-mass were formed. Although these two classes of minerals can be seen most clearly in rocks of a trachytoid and porphyritic aspect, yet even in granitoid rocks evidence of two stages or periods of consolidation can often be detected. The general character of fragmental igneous rocks is discussed under AGGLOMERATE, TUFF, and IGNEOUS ROCKS. Most of the rocks mentioned in the following tables have separate articles assigned to them.

(*a*) *Vitreous and Crystalline Series:*

1. ORTHOCLASE ROCKS: obsidian, pitchstone (structural varieties of vitreous rocks, as perlite, spherulite rock, pumice), phonolite, trachyte, liparite, orthoclase-porphyry, quartz-porphyry, syenite, granite.
2. PLAGIOCLASE ROCKS: andesite and porphyrite, diorite, basalt, gabbro.
3. FELSPATHOID ROCKS: nepheline-basalt, leucite-basalt.
4. OLIVINE ROCKS or PERIDOTITES: picrite, lherzolite, dunite, &c.
5. ALTERED IGNEOUS ROCKS: various serpentine rocks.

(*b*) *Fragmental or Clastic Series:*

Volcanic agglomerate, volcanic breccia, tuff; volcanic sand, ashes, dust, blocks, lapilli, and bombs.

II. *Derivative Rocks.*—As water has played a very prominent part in the formation of this great division of rocks, these are frequently termed *aqueous* or *sedimentary*. Such being the origin of by far the greater number, we find that they generally occur in layers or beds, hence the name by which they are also widely known—*stratified* rocks. Some of the members of this division, however, are not of aqueous origin, while others do not occur in beds. But they are all alike in so far as the materials of which they consist have been derived by epigene agents from the degradation of pre-existing rocks, minerals, and organic bodies.

1. GRAVEL AND SAND ROCKS: rock-debris and breccia; rain-wash and brick-earth; soil and subsoil; shingle and gravel, conglomerate; sand, sandstone, and grit; greywacke.
2. CLAY ROCKS: kaolin, pipeclay, fireclay, brick-clay, fuller's earth, boulder-clay or till, loam, mudstone, argillaceous shale.
3. CALCAREOUS ROCKS: limestone and its many varieties (such as calc-sinter, chalk, oolite, marl, coral-rock, &c.), dolomite or magnesian limestone.
4. IRONSTONE ROCKS: limonite, hæmatite, spathic iron ore (sphæro-siderite, blackband ironstone), magnetic iron ore.
5. SILICEOUS ROCKS: siliceous sinter, flint (chert, hornstone, lydian stone, jasper, &c.), tripoli and radiolarian ooze.
6. PHOSPHATIC ROCKS: bone-breccias, guano, coprolites.
7. CARBONACEOUS ROCKS: peat, lignite, coal and its varieties, anthracite, oil-shale, petroleum, asphalt.
8. GYPSUM AND HALITE GROUP: anhydrite, gypsum, and rock-salt.

III. *Schistose Rocks.*—The more representative rocks of this division are more or less crystalline and schistose or foliated (see FOLIATION). Some, however, show faint traces either of crystalline or foliated structure; while others, although distinctly crystalline, are not schistose. Again, some of the rocks are fragmental, with more or less of superinduced crystalline structure. Many schistose rocks are clearly of metamorphic origin. They are altered igneous and derivative rocks. The origin of others is still obscure. See ARCHÆAN SYSTEM, GEOLOGY.

Quartz-rock, quartz-schist hälleflinta, schistose conglomerate, clay-slate and its varieties, phyllite, mica-schist, talc-schist, chlorite-schist, amphibole-schist (actinolite-schist, hornblende-schist), gneiss, granulite, eclogite, garnet rock, marble.

See Rutley, *The Study of Rocks* (1879); Hatch, *Petrology* (1891); Cole, *Aids in Practical Geology* (1891); Lasaulx, *Einführung in die Gesteinslehre* (1886); Kalkowsky, *Elemente der Lithologie* (1886); Jannettaz, *Les Roches* (1884). More advanced works are Teall, *British Petrography* (1888); Fouqué and Lévy, *Mineralogie Micrographique* (1879); Rosenbusch, *Mikroskopische Physiographie d. Mineralien u. Gesteine* (1885); Zirkel, *Mikroskopische Beschaffenheit d. Mineralien u. Gesteine* (1873).

Petroleum (rock-oil, from Lat. *petra*, 'rock,' and *oleum*, 'oil'), an inflammable liquid, essentially composed of carbon and hydrogen, which exudes from the earth in various parts of the world.

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(1) *General History.*—It is impossible to state when petroleum was first discovered. In some form it seems to have been applied to the uses of mankind in the earliest periods known to history. The ruins of Nineveh and Babylon indicate that the asphaltic mortar used for their walls and buildings was made from a partially evaporated petroleum, obtained, doubtless, from the springs of Is, on the Euphrates. This is probably the 'slime' of the Old Testament Scriptures (Gen. xi. 3). Herodotus (i. 119; iv. 195), 500 B.C., writes of the springs in the island of Zante, 'I have myself seen pitch drawn out of a lake and from water in Zacynthus,' &c. Strabo (xvi. 2) refers to the bitumen found in the valley of Judea, and sold to the Egyptians for embalming.

Diodorus describes the same product obtained from a lake in Sicily and sold for the same uses. Pliny, Plutarch, Aristotle, and Josephus mention the deposit in Albania on the Adriatic Sea. The holy fires of Baku on the Caspian Sea, worshipped for ages by the people dwelling near, and the goal of pilgrimages even from India (see Vigne's *Travels in Cashmir and Little Thibet*), have been sustained by apparently inexhaustible petroleum stores. The North American Indians collected what was known as Seneca Oil from petroleum springs, and the indications are that long before them the Mound Builders, who worked the copper-mines of Lake Superior, the lead-mines of Kentucky, and the mica-mines of North Carolina, not only gathered the oil coming from natural springs that appeared on streams, but even dug numerous wells in Pennsylvania, Ohio, and Canada, and dipped up the oil that flowed into them. Trees now growing in the earth thrown out in digging the wells, or in the wells themselves, show that the work was done from 500 to 1000 years ago.

(2) *Growth of the American Industry.*—But the growth of the American industry, which has given the world what can be fairly termed the people's light, has been within the last half of the 19th century. From 1850 to 1858 many experiments were made with petroleum, both in the line of collecting the crude article and of refining it when secured, but with indifferent success. Among the promoters of these efforts was the Pennsylvania Rock-oil Company, incorporated in 1854 under the laws of the state of New York. The superintendent of this company, E. L. Drake, in 1858 started to sink a well in one of the old pits supposed to be of prehistoric origin, near Titusville on Oil Creek, Venango county, Pennsylvania. Water and quicksand choking this open well, he decided to drive an iron pipe from the surface of the ground down to the solid rock. On August 28, 1859, after going to a depth of 34 feet, he found that oil rose nearly to the top of his pipe at the surface of the ground. He had 'struck oil!' In the general excitement that followed this successful venture wells were sunk in great numbers along Oil Creek, French Creek, and the Alleghany River. Adventurers and investors flocked thither from all parts of the country. What was soon known as the 'oil region' was transformed from an almost unbroken forest into camps and towns in which fortunes were made in a day, and often as quickly squandered. Many wells yielded nothing, others lasted but a short time, while some gave enormous quantities of oil. But the producing fields were, and are still, constantly changing; new ones being discovered, old ones failing. For example, Pithole City, near Titusville, Pennsylvania, in 1865 next to Philadelphia the largest post-office in Pennsylvania, has now entirely disappeared, and the site of the city become a farm. Crude petroleum is at present secured in many parts of the state of Pennsylvania. Special mention might be made of M'Kean, Warren, Elk, Forrest, Erie, Crawford, Venango, Clarion, Butler, Washington, and Greene counties. It is also produced in some parts of other states—New York, Ohio, West Virginia, Indiana, Colorado, Wyoming, Kentucky, California, and Texas. Traces of petroleum are found also in many other of the United States.

The accompanying table gives the production of crude oil, the quantities delivered from the regions, the stocks, and the prices realised at the wells for each year, 1861 to 1890 inclusive. The unit of measurement of crude oil is a barrel of 42 gallons. The prices given are for the oil in bulk. The statistics on production, shipments, and stocks are taken from the *Derrick Handbook* (1884), later figures from the published reports of the National Transit Company, a corporation controlling a majority of the pipe lines by which the crude oil is collected and transported. The prices given are averages of the published daily market reports.

Year.	Production.	Shipments.	Stock, close of Year.	Price at Wells.
1861	2,113,600	1,650,183	Unknown	$0.52
1862	3,056,606	3,101,571	"	1.00
1863	2,611,359	3,242,951	"	3.11
1864	2,116,182	1,842,061	"	7.85
1865	3,497,712	2,100,132	"	6.65
1866	3,597,527	3,010,921	"	3.76
1867	3,346,306	2,893,210	584,000	2.40
1868	3,715,741	3,482,510	264,806	3.57
1869	4,186,475	4,255,843	340,154	5.64
1870	5,308,046	5,593,168	537,751	3.86
1871	5,278,072	5,667,891	568,858	4.42
1872	6,505,774	5,899,942	1,174,000 Est.	3.96
1873	9,849,508	9,499,775	1,625,157	1.78
1874	11,102,114	8,821,500	3,705,639	1.18
1875	8,948,749	8,924,938	2,751,758	1.24
1876	9,142,940	9,583,949	1,926,735	2.51
1877	13,052,758	12,469,644	2,857,098	2.38
1878	15,011,425	13,750,030	4,807,590	1.16
1879	20,085,716	16,226,586	8,094,496	.88
1880	24,788,950	15,839,020	16,606,344	.94
1881	29,674,458	19,340,021	25,333,411	.85
1882	35,789,190	22,094,209	34,335,147	.78
1883	34,885,966	21,967,636	35,715,565	1.05
1884	23,596,945	24,053,902	36,872,892	.83
1885	21,600,651	24,029,424	33,836,939	.88
1886	25,854,822	26,332,445	33,395,885	.71
1887	21,818,037	26,627,191	28,310,282	.66
1888	17,461,809	27,157,108	18,634,889	.87
1889	22,715,592	30,496,396	10,923,442	.94
1890	30,293,545	31,601,847	9,472,432	.86

There are no reliable statistics showing the number of producing wells in existence. It is estimated by those best informed on the subject that in what is known as the Pennsylvania fields there were in 1891 between 30,000 and 40,000. At first the wells were of no great depth, extending down to what was termed the first sand. Afterwards wells were sunk to the second and third sands. The average depth is from 1600 to 1800 feet, the shallowest wells being about 500 feet, the deepest about 3000 feet. Many wells, particularly when first completed, are flowing wells; that is, the oil is forced up through the tube composing the well, and reaches the surface of the ground without pumping. This of course indicates that the oil in the reservoir below the surface of the ground is held under pressure; but as an outlet is given for the oil the pressure subsides, and it becomes necessary to lift the oil by pumps. There are to-day a few flowing wells in America, but practically all the wells are pumped. Crude petroleum as it comes from the ground varies in general appearance from a bright lemon colour to a greenish black, all the intervening shades being found, and in gravity (weight or density) from 38 of Beaumé's scale to 50, all the intermediate gravities being secured. The same well will, at different stages of its life, give oil of different colours and gravities, the colour growing darker and the gravity heavier as the well grows older. There are also some natural oils as heavy as 20 Beaumé. In 1862 Colonel E. A. Roberts secured a patent for the use of torpedoes in connection with oil-wells, exploding them in the wells to increase the supply of oil. It was found that in many cases dry wells could be made to resume their yield, and declining wells to continue production for a considerable period by being shocked with torpedoes.

One of the most interesting features of the growth of the petroleum industry is found in the devices for transportation. The oil was at first carted in barrels over rough roads to the point of consumption or of loading into railroad cars. The wooden barrel gave place to light iron tanks on wheels, and the ordinary freight car for oil in barrels to wooden tank-cars, and these in turn to iron tank-cars, some of which are of 8000 gallons capacity. But the greatest advance was made when pipe lines for the transportation of petroleum were introduced. Samuel Van Syckle, of Titusville, Pennsylvania, put down the first successful line, extending from Pithole to Miller's Farm, a distance of four miles. The oil region is now a network of pipes. They carry oil from the wells to central points for storage or for delivery to the trunk lines to be pumped to the refineries. Powerful pumps move the oil rapidly in vast quantities for great distances. There are twelve to fifteen trunk lines of 6- and 8-inch pipe, carrying the oil from the point of production to the refineries handling it. The most important lines are known as the National Transit Line, South-west Lines, Macksburg Line, Tidewater Line, Western and Atlantic Line. By these crude oil is delivered at New York, Philadelphia, Baltimore, Cleveland, Buffalo, and Chicago. The total length of these main lines and their several branches and feeders is fully 25,000 miles. The American trade in petroleum is largely controlled by the Standard Oil Company.

(3) *Distillation and Products secured by Distillation.*—The main product of petroleum is refined oil for illuminating purposes. To secure this the crude petroleum is subjected to heat in stills of different sizes and shapes. In most cases the still used is a horizontal cylinder, made of iron or steel plates ¼ to ⅜ inch thick, resting upon, and partly surrounded by, brickwork, as in the case of ordinary cylindrical boilers. A large outlet or vapour-escape pipe carries the vapours over into a long condensing pipe or worm immersed in a vessel containing water constantly supplied to cool and condense the vapours passing through the condenser coil. The first products of distillation are the light gaseous fluids which can be condensed only at very low temperatures, and then kept in liquid form only under pressure. Generally this is not attempted. Then follow in order the various naphtha and refined oil products, until the residuum left in the still represents from 6 to 10 per cent. of the original charge. The yields of the various products varies according to the grade of crude charged in the still, and also somewhat according to the amounts of the different products which the manufacturer finds it most desirable to make. From the different Pennsylvania oils the range of products is as follows: Naphthas, 8 to 20 per cent.; refined oils, 78 to 70 per cent.; residuum, 9 to 5 per cent.; loss, about 5 per cent. From the naphtha many special products are made—gasolenes for lighting, stove-naphtha for cooking, gas-naphtha for gas-making. The refined oil distillates, as they come from the still, are impregnated with tarry matter and inflammable gases, imparting a greenish colour and an offensive odour. To remove the gases the distillate is heated in a still worked entirely by steam. To remove the colour and improve the odour the distillate is then transferred to a large vertical cylinder with a conical bottom, called an agitator, where, by means of an air-blast, the oil is thoroughly agitated with sulphuric acid, resulting in precipitation of much of the objectionable impurities with the refuse acid. The shape of the agitator admits of this refuse being drawn off to go to the acid-restoring factories or to fertiliser works. The distillate is then washed with soda or some other alkali, to neutralise any trace of acid, and with water.

From the residuum left in the still several grades of heavy oils and paraffin-wax are obtained by further distillation in other stills. The oils are used for lubricating purposes, the wax is used for candles. The limits of this article will not admit of even passing mention of the many other by-products secured in the way of lubricating oils, greases, wax, &c. It is safe to say that two hundred different kinds of products are secured from crude petroleum.

While the sale of petroleum products in America is very large, the exports largely exceed the home consumption. The figures below, which show the petroleum exported from the United States in the fiscal years ending June 30, are taken from reports of the Statistical Bureau of the United States Treasury Department at Washington. It will be noted that the total exports for the twenty-seven years 1864–90 have amounted to $1,043,474,435. A larger percentage of the mineral-oil product of the country is exported than of any other product, except cotton.

Year.	Gallons.	Dollars.	Year.	Gallons.	Dollars.
1864	23,210,369	10,782,689	1878	338,841,308	46,574,974
1865	25,496,849	16,563,413	1879	378,310,010	40,305,249
1866	50,987,341	24,830,887	1880	423,964,699	36,218,625
1867	70,255,581	24,407,642	1881	397,660,262	40,315,609
1868	79,456,888	21,810,676	1882	559,954,590	51,232,706
1869	100,636,684	31,127,433	1883	505,931,622	44,913,079
1870	113,735,294	32,668,960	1884	513,660,092	47,103,248
1871	149,892,691	36,894,810	1885	574,628,180	50,257,947
1872	145,171,583	34,058,390	1886	577,781,752	50,199,844
1873	187,815,187	42,050,756	1887	592,803,267	46,824,933
1874	247,806,483	41,245,815	1888	578,351,638	47,042,409
1875	221,955,308	30,078,568	1889	616,195,459	49,913,677
1876	243,660,152	32,915,786	1890	664,491,498	51,403,089
1877	309,198,914	61,789,438			

(4) *Petroleum in other Countries than the United States.*—There are oil-fields other than those in the United States producing petroleum in commercial quantities—those of Baku, Burma, Canada, Galicia, Peru, Japan, and, last to be developed, of Langkat, or Lankhat, in Sumatra.

The Baku (q.v.) field yields immense quantities of crude of heavy gravity, which on being distilled gives only a small percentage (25 to 32) of burning oil of satisfactory quality. However, as the crude is very cheap, and the balance of the product from distillation can be sold for fuel, the refiners of the Russian crude have been able to compete with other refiners for a share of the world's trade in petroleum. The petroleum of Canada, like that of several fields in the United States, particularly in the state of Ohio, is of low gravity, 26 to 42 Beaumé, and has a peculiar acrid and nauseous smell, on account of the sulphur it contains. It is difficult to refine, but its production has been fostered, and it supplies a large demand throughout the British provinces. The Japan field has been known for many centuries, but the cheapness of the American refined products renders it impracticable for products from the Japan crude to compete. Production has been completely checked.

(5) *Origin of Petroleum.*—This topic is treated here somewhat out of its natural order, not because it is lacking in interest, but because so little seems to be known about the chemical geology of petroleum. There have been three leading theories advanced, under some one of which all of the results from different lines of investigation can be classed: (1) Petroleum is a distillate produced by natural causes; (2) petroleum is indigenous to the rocks in which it is found; (3) petroleum is a product of chemical action. A full summary of the results of the investigations under each one of these theories is given by Professor S. F. Peckham in his report as special agent of the United States census for 1880. He inclines to the belief that Pennsylvania petroleum is of vegetable origin and the result of distillation.

See B. Silliman, jun., *Report on Rock-oil or Petroleum* (1855); J. S. Newberry, *Rock-oils of Ohio* (1859); T. S. Hunt, *History of Petroleum or Rock-oil* (1861; Report Smithsonian Institution); A. Norman Tate, *Petroleum and its Products* (1863), and *Examination of Petroleum, &c.* (1869); Draper and Pease, 'History of Petroleum,' *Scientific American* (vol. xii. 1865); A. Gesner, *Coal, Petroleum, and other Oils* (1865); S. S. Hayes, *Petroleum* (1866; 39th Congress, Ex. Doc. 51); T. Sterry Hunt, *Geology of Petroleum* (1866; Geological Survey of Canada); Cone and Jones, *Petrolia, a Brief History of the Pennsylvania Region* (1870); C. F. Chandler, *Report on the Quality of Kerosene Oils* (1870); *Report from the Select Committee of the House of Lords on the Petroleum Bill* (1872); A. N. Leet, *Petroleum Distillation* (1884); B. W. Crew, *Petroleum*; S. F. Peckham's *Report for the Tenth United States Census* (1885), and J. D. Weeks's for the Eleventh (1891). See also the articles FUEL, GAS AND GASES, GAS-ENGINE, NAPHTHA.

Petroleuse, a name given to the women of the French Commune of 1871, because they helped to burn the Tuileries, Hôtel-de-Ville, and other public buildings by pouring petroleum on them.

Petromy'zon. See LAMPREY.

Petronel, an ancient and clumsy description of pistol.

Petronius, surnamed 'ARBITER,' from his supposed identity with the Caius Petronius whom Tacitus calls 'arbiter elegantiæ' at the court of Nero, is generally believed to be the author of the satirical romance or collection of satires of which the 15th and 16th books have, though in a fragmentary state, come down to us. The work seems to have been a novelty in Latin literature, consisting of prose and verse, and depicting the licentious life in Southern Italy of the upper or moneyed class. Its artistic merit is great, in strength of portrayal and colour anticipating Zola, with a vein of humour as original as it is refined. Bücheler, its latest and best editor (Berlin, 1882), and Cesareo, its able Italian translator and critic (Florence, 1887), both support the long-prevalent view that its author was no other than the Petronius above referred to—a pro-consul of Bithynia and afterwards consul, a past master in all the arts of the voluptuary, the aider and abettor of Nero and the *jeunesse dorée* of the 1st century in every form of sensual indulgence. The favour he enjoyed at court aroused the jealousy of another confidant of the emperor's, Tigellinus, who had influence enough with their common master to procure his disgrace and banishment. He had proceeded as far as Cumæ, when Nero's casual presence in Campania precipitated his determination to destroy himself. True to the cynical side of his philosophy he set about his suicide in the most leisurely fashion, so as to glide out of existence 'without indecent haste.' He opened his veins at intervals and then rebandaged them, discoursing the while not on immortality or the hollowness of life, but on the gayest of topics, and listening to songs and *vers de société* when not transacting business or taking a siesta. Shortly before expiring he drew up, signed, sealed, and sent to Nero a summary of the tyrant's amours and excesses, much of which is supposed to have been embodied in his satires. The work, fragmentary as it is, has drawn around it quite a library of criticism and controversy, of which Cesareo gives an excellent *résumé*, whilst promising a yet fuller treatise on the subject. In style it represents the high-water mark of silver-age Latinity, while as a picture of the 1st century on its seamiest side it shows better than any other how Christianity had become a necessity, if only to save the morality of the world.

Petropavlovsk, a town of Asiatic Russia, in the province of Akmolinsk, on the river Ishim, 175 miles WNW. of Omsk. Pop. 11,406. It is an important military station, with a fort founded in 1752, and has a large transit trade.—Petropavlovsk is also the name of a small port on the east coast of Kamchatka (q.v.) with an admirable harbour.

Petrovsk, a town of Russia, 65 miles NW. of Saratov, on a tributary of the Don. Pop. 15,316.

Petrozavodsk, a town of Russia, on the western shore of Lake Onega, 300 miles NE. of St Petersburg, has a cannon-foundry and small-arms factory, built in 1774 on the site of an iron-work started by Peter the Great in 1703. Pop. 11,027.

Petrus Alphonsus. See FABLE.

Pettenkofer, MAX VON, chemist, was born near Neuburg on the Danube, 3d December 1818, studied at Munich, Würzburg, and Giessen, and in 1847 became professor of Chemistry at Munich. He has made many valuable contributions to science on subjects as various as gold-refining, gas-making, ventilation, clothing, the influence of soils on health, epidemics, and hygiene generally. His *Handbuch der Hygieine* (1882 *et seq.*) is his best-known work. He resigned in 1894.

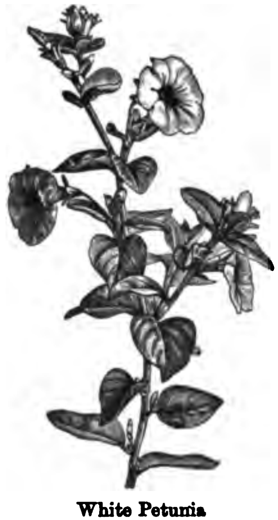
Pettie, JOHN, painter, was born at Edinburgh, 17th March 1839, was brought up at East Linton, studied art at Edinburgh, and died at Hastings, 21st February 1893. 'The Prison Pet' was exhibited at Edinburgh in 1859, and 'The Armourers,' at the Royal Academy in 1860. But the first work which showed his characteristic qualities of strong imaginative grasp of his subject, effective composition, and vigorous treatment was the 'Drum-head Court-martial' (1864). Among the hundreds of later pictures, including portraits, may here only be named 'An Arrest for Witchcraft' (1866), 'Scene in the Temple Gardens' (1871), 'Juliet and Friar Laurence' (1874), 'The Death Warrant' (1879), 'The Vigil' (1884), and 'The Chieftain's Candlesticks' (1886). Pettie was elected A.R.A. in 1866, and R.A. in 1873.

Petty, SIR WILLIAM, a man of singular versatility, best known as a political economist, was born at Romsey in Hampshire on 26th May 1623, and educated partly at Caen, partly at the universities of the Netherlands, and at Paris. His versatility and talent are evidenced by the positions he successively held, and the subjects he interested himself in: he taught anatomy and chemistry at Oxford (1648), and was made professor of Anatomy there (1651); was professor of Music at Gresham College, London; was physician to the army in Ireland (1652), executed a fresh survey of the Irish lands forfeited in 1641, started ironworks, lead-mines, sea-fisheries, and other industries on estates he bought in south-west Ireland; was secretary to Henry Cromwell when he was lord-lieutenant of that island; was made surveyor-general of Ireland by Charles II., who knighted him; invented a copying-machine (1647) and a double-bottomed sea-boat (1663); and in early life took much interest in education. In political economy he claims a place as one of the most important precursors of Adam Smith, on the strength of his *Treatise on Taxes and Contributions* (1662) and his *Political Arithmetic* (1691), the latter a discussion of the value of comparative statistics. He died in London on 16th December 1687.

Petty Bag Office, one of the branches of the Court of Chancery, was abolished in 1874, and its duties were transferred.

Petty Officers in the Navy hold a similar rank and position to the non-commissioned officers in the army. They are the backbone of the service, as the efficiency, smartness, and morale of a ship's-company depend in no small measure upon the zeal and discretion of the petty officers. They are now a most highly trained and valuable body of men, and all the warrant officers are drawn from their ranks. They are divided into four classes—viz. chief petty officers, 1st- and 2d-class petty officers, and leading seamen—and into two branches, the seamen and the so-called non-combatant, which latter includes the artificers, writers, &c. A chief petty officer can only be disrated with the sanction of the commander-in-chief, and in the case of a chief engine-room artificer his disrating must be specially reported to the Admiralty, and he can only be restored to his rank by Admiralty order. All other petty officers can be appointed or disrated by the captain of the ship, except in the case of gunnery or torpedo instructors, who are rated as such for their special qualifications in the gunnery and torpedo schools. The pay of the chief of police (master-at-arms) ranges from 4s. to 6s. a day; that of chief engine-room artificer from 6s. 9d. to 7s. 6d. a day, with an extra penny for each good-conduct badge; a chief gunner or torpedo instructor receives 4s. 2d. a day, with an additional penny for each badge, of which he can have three. A 1st-class petty officer, if a gunnery or torpedo instructor, obtains 3s. 8d. a day, with an extra penny for each badge; if not an instructor, but a trained gunner and torpedo man, 3s. a day; a 2d-class petty officer, if a trained gunner and torpedo man, 2s. 8d. a day, with pay for badges; while a leading seaman receives 2s. 4d. if a trained man, with pay also for badges. A leading stoker receives 2s. 5d. a day, and if a trained mechanic, 2s. 8d.; a carpenter's mate, 4s. 6d.; and a 1st-class writer, 5s. See WARRANT-OFFICERS.

Petunia, a genus of plants of the natural order Solanaceæ, natives of the warmer parts of America. They are herbaceous plants, very nearly allied to Tobacco, and with a certain similarity to it in the general appearance of the foliage, which has also a slight viscidity, and emits when handled a disagreeable smell; but the flowers are very beautiful, and varieties improved by cultivation are amongst the favourite ornaments of British greenhouses and flower-borders. The petunias, although perennial, are very often treated as annuals, sown on a hotbed in spring, and planted out in summer, in which way they succeed very well even in Scotland. They are tall plants, with branching weak stems, and may readily be made to cover a trellis. Though, when treated as greenhouse plants, they become half-shrubby, they live only two or three years. The name is from the Brazilian *Petun*. The first petunia was introduced into Britain in 1831. There are now many garden varieties with double flowers, individually more durable than the single-flowered kinds.



White Petunia
(*Petunia nyctagyniflora*).

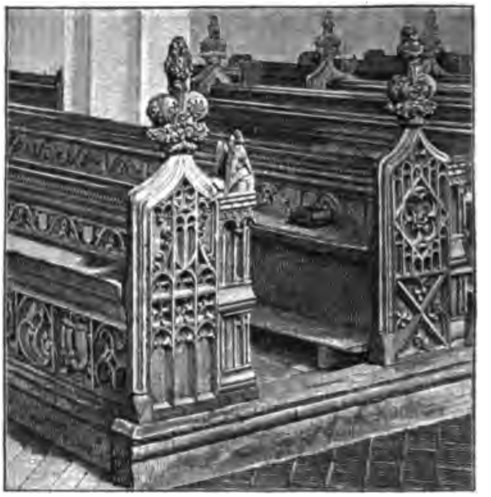
Petuntze. See FELSPAR, POTTERY.

Petworth, a market-town of Sussex, on an eminence near the West Rother River, 14 miles NNE. of Chichester. Petworth House, the seat of Lord Leconfield, is an 18th-century mansion, with a fine park and many portraits and other relics of the Percies and Wyndhams. Pop. of parish, 2942. See F. H. Arnold's *Petworth* (1864).

Peutinger, CONRAD (1465-1547), a scholarly citizen of Augsburg, and keeper of the archives. He published a series of Roman inscriptions; and at his death the so-called *Tabula Peutingeriana* was in his possession, in course of being prepared for publication. This remarkable Itinerary (q.v.) is really a Roman map of the military roads of the 3d century A.D., though his copy was probably a 13th-century one. The document was sold by his family, bought by Prince Eugene in 1714, and is now in the Imperial Library at Vienna. It was edited and published by Scheyb (1753), Mannert (1824), and Desjardins (1869).

Pevensey, a village of Sussex, stands on the English Channel, 12 miles by rail W. by S. of Hastings. The Romans built here a castle, whose walls enclose a Norman keep. The church is Early English. William the Conqueror landed on the shore of Pevensey Bay. Pop. of parish, 365. See Lower's *Chronicles of Pevensey* (3d ed. 1880).

Pews (anciently *pues;* Old Fr. *puys;* Dutch *puyes;* Lat. *podium*, 'anything on which to lean'—*s'appuyer*), enclosed seats in churches. Church-seats were in use in England some time before the Reformation, as is proved by numerous examples still extant, the carving on some of which is as early as the Decorated Period—i.e. before 1400 A.D.; and records as old as 1450 speak of such seats by the name of *pues*. They were originally benches, usually facing east, with partitions of wainscoting about three feet high, and ends of the width of the seat, panelled or carved; these ends often rising above the wainscoting, and ending in fleurs-de-lis or 'poppy-heads,' as shown in the illustration.



Pews, Fressingfield Church, Suffolk.

The benches here are in Fressingfield Church, Harleston, Suffolk, and date from the later half of the 15th century. The back of the one in the engraving is quite a 'poor man's Bible,' being carved with the emblems of the Passion, from the cock crowing to the seamless coat. In later times pews grew into large and high enclosures, containing two or more seats, lined with baize, and fitted with doors, desks, and cushions; but these will soon have all been swept away in England under the influence of the restoration movement and of the Free and Open Church Association founded in 1865 for the abolition of appropriated seats. Pews were early assigned to particular owners, but at first only to the patrons of churches. A canon made at Exeter, in 1287, rebukes quarrelling for a seat in church, and decrees that none shall claim a seat as his own except noblemen and the patrons. Gradually, however, the system of appropriation was extended to other inhabitants of the parish, to the injury of the poor, and the multiplication of disputes.

The law of pews in England is briefly this. All church-seats are at the disposal of the bishop, and may be assigned by him, by faculty, to persons owning property in the parish. Long occupation may give an owner of property a prescriptive title to a pew. Subject to rights acquired by faculty or prescription, the churchwardens are required to find seats for the parishioners, according to their degree; they may assign a pew to a parishioner, but the right thus conferred may at any time be recalled. In new churches pews may be assigned and pew-rents levied under several acts of parliament. See Dale's *Clergyman's Handbook.* It appears that by common law every parishoner has a right to a seat in the church, and the churchwardens are bound to place each one as best they can. The practice of *letting* pews, except under the church-building acts or special local acts of parliament, and, much more, of *selling* them, has been declared illegal.

In Scotland pews in the parish churches are assigned by the Heritors (q.v.) to the parishioners, who have accordingly the preferable claim on them; in towns the practice is to let them annually. As is well known, pews in dissenting churches are rented as a means of revenue to sustain general charges. In some parts of the United States pews in churches are a matter of annual competition, and bring large sums. Latterly, in England, there has been some discussion as to the injuriously exclusive character of the 'pew system,' and in many churches the open seats or chairs are unappropriated and free to all. In a good many Ritualistic churches the sexes are divided, as in some country churches has been the case with the peasantry since pre-Reformation days. In the Roman Catholic churches on the Continent pews are seldom to be seen.

Pewsey, a small market-town of Wiltshire, in a fertile vale, 18 miles E. of Devizes and 7 SSW. of Marlborough. Pop. of parish, 1895.

Pewter, a common and very useful alloy of the metals tin and lead. See ALLOY.

Pézenas, a town of France (dept. Hérault), on the left bank of the river Hérault, 32 miles by rail SW. of Montpellier. The vicinity produces excellent wine, and woollen and linen goods are manufactured. Pézenas is one of the principal brandy-markets of Europe. Here Molière wrote *Les Précieuses Ridicules.* Pop. 6538.

Pfäfers, hot springs in the canton of St Gall, Switzerland, in the deep and gloomy gorge of the Tamina torrent, which joins the Rhine at Ragatz, 2½ miles to the north. They were discovered towards the middle of the 11th century, and have been used ever since. Patients used formerly to be let down by ropes, but they can now approach by a good road. The water (97° F.) is conducted in pipes to Ragatz, though there are bath-houses (1704) in the ravine. Near the village of Pfäfers (pop. 1628), which stands above and outside the ravine, is a Benedictine abbey, founded in the 8th century, but converted into a lunatic asylum after its dissolution in 1838.

Pfalz, the German name for the Palatinate (q.v.).

Pfalzburg. See PHALSBOURG.

Pfeiffer, IDA (*née* REYER), a celebrated female globe-trotter, was born at Vienna, October 15, 1797. In 1820 she married an advocate named Pfeiffer, from whom she was obliged to obtain a separation. When she had settled her two sons in life, she proceeded to gratify, at the age of forty-five, her long-cherished inclination for a life of travel and adventure. Her first expedition was to the Holy Land in 1842. She published an account of her eastern rambles in the following year, which, like all her other works, went through many editions, and was translated into French and English. In 1845 she visited northern Europe—Sweden, Norway, Lapland, and Iceland—and recorded her impressions in another book, *Skandinavien und Island* (2 vols. 1846). Resolving in 1846 on a voyage round the world, she started from Hamburg in a Danish brig for Brazil. She then sailed round Cape Horn to Chili, thence across the Pacific to Otaheite, China, and Calcutta, traversed India, Persia, western Asia, southern Russia, and Greece, and re-entered Vienna in 1848. Two years later she published a narrative of her travels and adventures, entitled *Eine Frauenfahrt um die Welt* (3 vols. 1850). *Meine Zweite Weltreise* (1856) describes a second journey round the world from England by the Cape to Java, Borneo, California, Peru, and the United States (1851–54). In 1856 she set out on what was to be her last expedition—namely, to Madagascar. After enduring terrible hardships, she got away, and came home to Vienna—to die, October 28, 1858.

Pfleiderer, OTTO, a great philosophic theologian of Protestant Germany, was born at Stetten, near Cannstadt in Würtemberg, September 1, 1839; studied under Baur, at Tübingen, from 1857 till 1861, and next paid a visit of study to England and Scotland; became pastor at Heilbronn in 1868, and superintendent at Jena in 1870, an office which in the same year he exchanged for the chair of Theology there. In 1875 he was called to be professor of Systematic Theology at Berlin. In New Testament criticism Pfleiderer belongs to the younger critical school which has grown out of the impulse given by Baur. But he is not the less an independent thinker, acute, suggestive, and profoundly learned, and he has made his name as well known in England and America as in Germany by a series of works which no serious student of philosophy or theology can afford to overlook. Of these the chief are *Die Religion, ihr Wesen und ihre Geschichte* (2 vols. 1869; 2d ed. 1878); *Der Paulinismus* (1873; 2d ed. 1890; Eng. trans. 2 vols. 1877); *Religions-philosophie auf geschichtlicher Grundlage* (2 vols. 1878; 2d ed. 1883–84; Eng. trans. 4 vols. 1886–88); *Zur religiösen Verständigung* (1879); *Grundriss der Christlichen Glaubens und Sittenlehre* (1880; 4th ed. 1888); *The Influence of the Apostle Paul on Christianity*, the Hibbert Lectures for 1885; *Das Unchristentum* (1887); *The Development of Theology since Kant* (Lond. 1890); and *The Philosophy and Development of Religion*, the Gifford Lectures for 1894.

His brother, EDMUND PFLEIDERER, born at Stettin 12th October 1842, studied at Tübingen, and after a short experience as a pastor was made professor of Philosophy at Kiel in 1873, whence he was called to Tübingen in 1878. His writings include studies on Leibnitz (1870), on Empiricism and Scepticism in Hume's Philosophy (1874), modern Pessimism (1875), Kantian criticism and English philosophy (1881), Arnold Geulinx (1884), Lotze (2d ed. 1884), Heraclitus of Ephesus (1886), &c.

Pforzheim, the chief manufacturing town of Baden, stands at the northern border of the Black Forest, 20 miles SE. of Carlsruhe by rail. It contains the remains of an ancient castle, from 1300 to 1565 the residence of the Margraves of Baden-Durlach, and was the birthplace of Reuchlin. The town is famous for the manufacture of gold and silver ornaments, in which 8000 people are employed, and has further chemical and iron works, machine-shops, tanneries, paper and other factories. There is a trade in timber, cattle, ornaments, &c. The town was burned by the French in 1689. Pop. (1871) 19,801; (1890) 29,508. See works by Rühl (4th ed. 1888) and Näher (1884).

Phædrus (or PHÆDER, according to some scholars), author of a translation of Æsop's fables in Latin verse, was, by his own account, a Macedonian, who from his childhood was imbued with Greek culture. While still young he came to Italy, and in Rome or some other city attended school where he studied Ennius, whom he quotes in the epilogue to his third book. From the title of the entire work, *Phædri Augusti Liberti Fabulæ*, it appears that from a slave he became the freedman of Augustus, either the first of that name or his successor Tiberius. Under the reign of this latter he published the first two books of his fables, but his biting though veiled allusions to the tyranny of the emperor (in the fable of the frogs asking a king) and to his minister Sejanus (in that of the jay dressed in peacock's plumage) caused him to be hated at court, then accused, and finally condemned—to what punishment is unknown. On the death of Sejanus he resumed publication, and dedicated his third book to one Eutychus, freedman of the Emperor Claudius, courting his protection from enemies and accusers. In the last years of his life, to which the fourth and fifth books belong, he seems to have regained liberty of pen as well as of person. He died probably at an advanced age. Phædrus was more than he claims to be—a reproducer of Æsop; he invented fables of his own, and gave an Æsopic turn to contemporary events. That the five books traditionally ascribed to him are his cannot without large deductions be maintained—not a few of them may be of the same authorship as the *Fabulæ Novæ* commonly added as an appendix to the five books, and found in an anthology attributed to Nicola Perotti, a scholar of the 15th century. The merits of Phædrus are his clear succinct narrative, his pure Latinity, and his skill in versification. The editions of Bentley, Dressel, Orelli, and finally of Müller have been ably gleaned by his latest and most helpful editor Ramorino (Turin, 1884).

Phaëthon ('the shining'), in the writings of Homer and Hesiod, a frequent title of Helios the sun-god, and subsequently employed as his name.—Phaëthon, in Greek mythology, is also the name of a son of Helios, famous for his unfortunate attempt to drive his father's chariot. Scarcely had the presumptuous youth seized the reins, when the horses, perceiving his weakness, ran off, and approaching too near the Earth, almost set it on fire. Whereupon the Earth cried to Jupiter for help, and Jupiter struck down Phaëthon with a thunderbolt into the Eridanus or Po. His sisters, the Heliades, who had harnessed the horses of the Sun, were changed into poplars, and their tears into amber.

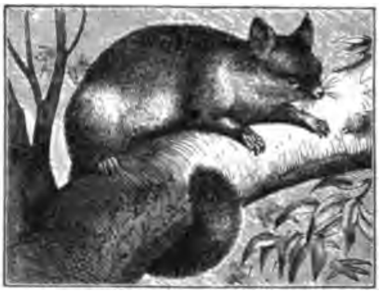
Phagedæna. See ULCERS.

Phag'ocytes, the white or colourless blood-corpuscles, which are also called leucocytes. They are active amœboid cells, and engulf both nutritive and harmful particles. Since the researches of Metschnikoff the manifold physiological importance of these elements has been increasingly appreciated. Thus, it is generally recognised that the destruction of invading bacteria is due to the health and activity of the phagocytes. See BLOOD.

Phalacrocorax. See CORMORANT.

Phalæna, the Linnæan genus including Moths (q.v.).

Phalanger (*Phalangista*), a genus of small arboreal marsupials, of which many species are found in Australia and the islands to the north of it. All the species have long, prehensile tails, and many grasp their food and convey it to the mouth with the forepaws. They feed usually on the young shoots and leaves of the trees in which they live, but in captivity they do not refuse animal food. The Vulpine Phalanger (*P. vulpina*) is very common in Australia, and is used by the natives for food. The Dormouse Phalanger (*P. nana*), which is only six inches in length, resembles the common dormouse in habits and appearance. See also (under Flying Animals) FLYING PHALANGER.



Vulpine Phalanger (*Phalangista vulpina*).

Phalanstère. See FOURIER.

Phalanx, the ancient Greek formation for heavy infantry, was a series of parallel columns standing close one behind the other, the whole owing to its depth and solidity capable of penetrating any line of troops. The oldest phalanx was the Lacedæmonian or Spartan, in which the soldiers stood four, six, or, more generally, eight deep. The Macedonian phalanx, the latest form, was sixteen men deep. The arms of the men were swords, shields, and long pikes or spears. The heavy-armed phalanx was ordinarily flanked by *peltastes* or light infantry, similarly formed, who usually fought with javelins and slings.

Pha'laris, tyrant of Agrigentum, in Sicily, who flourished about the middle of the 6th century B.C., was born on a small island near Cnidus, in Asia Minor, and whilst building a temple in the citadel of Agrigentum made himself master of the city. He greatly embellished it, and extended his power over large districts in Sicily. But after holding power for sixteen years he was overthrown, for his cruelties, by noble families of the island, and roasted alive in his own invention, the brazen bull. The tradition points probably to the religious sacrifice of human victims to Baal or Moloch (q.v.). Later ages represent Phalaris as a humane and enlightened ruler. But the 148 letters bearing his name were proved by Bentley (q.v.) in 1697 and 1699 to be spurious, and to have been composed several centuries after Phalaris died. See Bentley's *Dissertation*, edited by W. Wagner (Lond. 1883).

Phalarope (*Phalaropus*), a genus of wading-birds forming a sub-family of the Snipes. They are distinguished by their lobed toes, resembling those of the coot. By means of these they swim well, while they can also run swiftly on shore. There are only three species, all inhabiting northern regions, and migrating southward in winter. The Red-necked Phalarope (*P. hyperboreus*), a small bird resembling a Sandpiper in appearance, breeds in the Orkney and Shetland Islands, and the Gray Phalarope (*P. fulicarius*) occasionally visits Britain in the course of its migration farther south.

Phallus, the Greek term for the symbol of generation which figures in the rites and ceremonies of most primitive peoples, and appears as a survival amongst civilised peoples. At the time when Mythology (q.v.) was universally considered to contain the teaching of ancient sages couched in the form of allegory, and everything in mythology was considered to be 'symbolical' of some profound and hidden truth, phallic worship was naturally conceived to conceal some esoteric teaching as to the mystery of the transmission of life. But this view of mythology is dissipated by an examination of the manner of life and mode of thought of those savage peoples in whom the scientific observer recognises primitive man. The savage leads not a speculative but a practical life, and his rites and ceremonies are practical. He lives in the midst of dangers, which as a practical man he wishes to avert; he has a variety of needs, which as a practical man he wishes to satisfy. Amongst the most important of his needs—whether he be in the pastoral or the agricultural stage—is the need of fruitful flocks, of fertile fields. Amongst the means which he employed to secure fertility were some which we should discriminate as magical, though probably to him they originally seemed to be not more supernatural or less rational than ploughing. Thus, it has been proved to demonstration by Mannhardt that one of the beliefs most widely spread amongst primitive men is the belief in a spirit of vegetation. The tree is regarded first as having life like a man, then as being the abode of a spirit, and finally the spirit ceases to be permanently attached to the tree. The savage has special means for promoting the vigour, for preventing the decay, for averting the displeasure of these spirits on whom the fertility of his crops depends. These various means are usually of the nature of what has been termed 'sympathetic magic.' Even civilised man, if he is abroad and is ignorant of the language of the country, acts what he wishes to have done. In a somewhat similar way the savage performs or mimics the things which he wishes the spirit of vegetation, say, to bring about. When he wishes a spirit to make his flocks multiply, his 'sympathetic magic' inevitably takes the form of a ritual which to us seems obscene, but is to him as harmless and necessary as the act of generation itself. Finally, let it be noticed that, if by 'worship' is meant 'adoration,' then phallic worship is unknown to primitive man; phallic rites and phallic objects are but the means by which, according to his notions, he incites or constrains the spirits to bring about the results he wishes; they are not the symbols of any esoteric mysteries.

Phallus, a genus of fungi. See FUNGI.

Phalsbourg, or PFALZBURG, a town of Lorraine, stands on the north-west shoulder of the Vosges, 25 miles NW. of Strasburg. It was fortified by Vauban in 1680; invested, but not taken, by the Allies in 1814–15; and bombarded and taken by the Germans in 1870, after which they razed the fortifications. It was the birthplace of Erckmann, and is widely known through *Le Blocus* and others of the Erckmann-Chatrian novels. Pop. 3680.

Phanariots. See FANARIOTS.

Phanerogamia (Gr. *phaneros*, 'manifest,' *gamos*, 'marriage') are those plants which bear flowers and produce seeds. But, for the differences and the resemblances between the flowering and seeding of Phanerogams and the reproduction of Cryptogams, see CRYPTOGAMIA, FLOWER, GYMNOSPERMS, SEED. The group includes the following sets of plants: A. Gymnosperms (q.v.), with naked ovules—e.g. conifers; B. Angiosperms (q.v.), with ovules enclosed in ovaries: (1) Monocotyledons (q.v.), with one cotyledon—e.g. lilies, grasses, orchids; (2) Dicotyledons (q.v.), with two cotyledons—e.g. buttercups, roses.

Pharaoh, the English spelling of the name given by the Hebrews to the monarch ruling in Egypt at the time, sometimes as if it were a proper name, though really an official title (from the Egyptian *Peraa* or *Phouro*). The greatest difficulties have been encountered in attempting to determine the particular monarchs who pass under this name in the Scriptures. See EGYPT.

Pharisees (*Perûshim*, 'separated'), a so-called 'Jewish sect,' more correctly a certain Jewish school, which probably dates as a distinct body or party from the time of the Syrian troubles, and whose chief tendency it was to resist all Greek or other foreign influences that threatened to undermine the sacred religion of their fathers. They most emphatically took their stand upon the Law, together with those inferences drawn from its written letter which had, partly from time immemorial, been current as a sacred tradition among the people. They originated as the Chasidim (q.v.), and became known as Pharisees in the time of John Hyrcanus (see MACCABEES). Principally distinguished by their most scrupulous observance of certain ordinances relating to things clean and unclean, they further adopted among themselves various degrees of purity, the highest of which, however, was scarcely ever reached by any member of their community. For every degree a special course of instruction, a solemn initiation, and a novitiate was necessary; all of which, together with a certain distinction in dress, seems to have been imitated from them by the Essenes (q.v.). The name of Pharisees or Perûshim was probably at first bestowed upon them in derision by the Sadducees or Zadokites, the priestly aristocracy and their party, who differed from them politically, and to some extent also in religious matters. The Pharisees had no articles of creed different from the whole body of Jews. The Bible, as interpreted by the traditional Law, was their only code. Obedience to this Law, strictest observance of all religious and moral duties, submission to the Divine will, full confidence in the wisdom and justice of Providence, firm belief in future reward and punishment, chastity, meekness, and forbearance—these were the doctrines inculcated in their schools. They were, in fact, nothing more nor less than the educated part of the people, who saw in the rigid adherence to the ancient religion, such as it had developed itself in the course of centuries, the only means of saving and preserving the commonwealth, notwithstanding all its internal and external troubles. Hence they wished the public affairs, the state and all its political doings, to be directed and measured by the standard of this same Divine Law; without any regard for the priestly and aristocratic families, the Sadducees (q.v.), and the heroes and sagacious statesmen, who had brought the Syrian wars to a successful issue, and had, by prudent negotiations with other courts, restored the nation to its former greatness. The latter held that religion and state were two totally different things; that God had given man the power of taking his matters into his own hands; and that it was foolish to wait for a supernatural interference, where energy and will were all that was required.

Naturally enough, the political difference between the two parties by degrees grew into a religious one. And the more the Sadducees lost their influence (the people siding with the Pharisees), the more the religious gulf must have widened between them; although the divergence between them, as far as our authorities (Josephus, the New Testament, and the Talmud) go, does not seem to have been of so grave a nature as is often assumed. Thus, the Pharisees assumed the dogma of immortality; while the Sadducees held that there was nothing in the Scripture to warrant it, and, above all, that there was no need of any future reward. While the Pharisees held all the traditional ordinances in equal reverence with the Mosaic institutions, the Sadducees rejected, or rather varied some of these according to the traditions of their own families: these ordinances chiefly relating to priestly and sacrificial observances, certain laws of purity, and some parts of the civil law. It may perhaps even be assumed (as by Geiger) that the Pharisees were the representatives of a newer Halacha, inspired by an oppositional and religious and national zeal which carried them far beyond the original boundaries. Certain other legal differences between the two parties, such as the application of the laws of inheritance to daughters, or of the responsibility of the master for his servants, are nothing more than political party-views in a religious mask, which were meant to meet certain special isolated cases only. In general the Pharisees handled justice in a much milder manner than their antagonists, who took their stand upon the rigid letter, and would hear of no mercy where a violation of the code was clearly made out. Out of the midst of the Pharisees rose the great doctors and masters of the Law (Heb. *shoferim;* Gr. *nomodidaskaloi*, 'teachers of the law,' usually rendered 'scribes'), and to them were entrusted by the later rulers the most important offices. The greatest misconception has prevailed even among scholars respecting this patriotic, pious, learned, and national party of progress. That there were among them those who were a disgrace to their party none knew better than the Pharisees themselves; and, in bitterer words than were ever used by Christ and the apostles, the Talmud castigates certain fanatical members of their own community as the 'plague of Pharisaism.' Pharisaism—from which gradually branched off the wild democratical party of 'Zealots' (*Kannaim*) in the revolution of Bar Cochba (q.v.)—has, from the final destruction of the commonwealth to this day, remained the principal representative of Judaism as a creed.

See Jews, Talmud; Schürer's *History of the Jewish People in the Time of Jesus Christ* (Eng. trans. 5 vols. 1886-90).

Pharmacopœia. This term has been applied to various works, consisting for the most part of (1) a list of the articles of the Materia Medica, whether simple or compound, with their characters, their modes of preparation, and the tests for the determination of their purity; and (2) a collection of approved receipts or prescriptions, together with the processes for preparing articles in the Materia Medica. Almost every civilised country of importance has its national pharmacopœia; those of the United States (6th ed. 1883), Germany (3d ed. 1890), and France deserving special mention. The earliest pharmacopœias were prepared by the Arabs from the 9th to the 12th century, and subsequently by the medical school of Salerno. The first pharmacopœia published under authority appears to have been that of Nuremberg in the year 1542. Valerius Cordus, afterwards professor at Wittenberg but then a student, showed a collection of medical receipts, which he had selected from the works of the most eminent writers, to the physicians of Nuremberg. The latter were so struck with its value that they urged him to print it for the benefit of the apothecaries, and obtained for his work the sanction of the city council. Before this time the books chiefly in use amongst apothecaries were the treatises: *On Simples* by Avicenna and Serapion; the *Liber Servitoris* of Balchasim ben Aberazerim; and the *Antidotarium* of Nicolaus de Salerno, arranged alphabetically. This work was commonly called *Nicolaus Magnus*, to distinguish it from an abridgment known as *Nicolaus Parvus.*

Confining our remarks to the British Pharmacopœias, we may notice that the first edition of the London Pharmacopœia (or, more correctly speaking, of the Pharmacopœia of the London College of Physicians) appeared in 1618, and was chiefly founded on the works of Mezue and Nicolaus de Salerno. Successive editions appeared in 1627, 1635, 1650, 1697, 1721, 1746, 1787, 1809, 1824, 1836, and 1851, and form an important contribution to the history of the progress of pharmacy and therapeutics during the last two centuries and a half. The nature and the number of the ingredients that entered into the composition of many of the pharmaceutical preparations of the 17th and 18th centuries would astonish most of the practitioners and patients of the present day. In the earlier editions we find enumerated earthworms, snails, wood-lice, frogs, toads, puppy dogs, foxes ('a fat fox of middle age, if you can get such a one'), the skull of a man who had been hanged, the blood of the cat, the urine and excrements of various animals, &c.; and electuaries were ordered, containing 50, 62, and in one instance—Mathiolus, his Great Antidote against Poison and Pestilence—124 different ingredients.

The Edinburgh Pharmacopœia is more modern than the London, the first edition having appeared in 1699; while the Dublin Pharmacopœia does not date further back than 1807. The latest editions of these works appeared in the years 1841 and 1850 respectively.

Until the Medical Act passed in 1858, the right of publishing the pharmacopœias for England, Scotland, and Ireland was vested in the Colleges of Physicians of London, Edinburgh, and Dublin respectively; and as these three pharmacopœias contained many important preparations, similar in name but totally different in strength (as, for example, dilute hydrocyanic acid, solution of hydrochlorate of morphia, &c.), dangerous complications arose from a London prescription being made up in Edinburgh or Dublin, or *vice versâ.* By that act it is ordained that 'the General [Medical] Council shall cause to be published, under their direction, a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed; and containing such other matter and things relating thereto as the General Council shall think fit, to be called *British Pharmacopœia ;*' and by a subsequent act it is enacted that 'the British Pharmacopœia shall for all purposes be deemed to be substituted throughout Great Britain and Ireland for the several above-mentioned pharmacopœias.' The *British Pharmacopœia*, which appeared in the beginning of the year 1864, gave rise to such a general feeling of disappointment throughout the profession that the General Council brought out a new and amended edition in 1867. A second reprint with additions appeared in 1874. Another edition was published in 1885, and a supplement to it in 1890. There are also Homœopathic and Veterinary Pharmacopœias, and Pharmacopœias for the London and other hospitals, but these are not printed by authority, nor authorised in any way by government.

The Pharmacopœia of the United States is drawn up by a national convention consisting of delegates from the various medical societies, medical corporations, and universities throughout the United States. It was first published in 1820, and a second edition appeared in 1828; but it is now revised every ten years, a new revision appearing in 1893.

Pharmacy, a department of the medical art which consists in the collecting, preparing, preserving, and dispensing of medicines. In Great Britain the practice of pharmacy is regulated by a series of *Pharmacy Acts*, of which the more important are those of 1852, 1868, 1869, and 1882. See ADULTERATION, CHEMISTS AND DRUGGISTS, MEDICINE, PHARMACOPŒIA, PRESCRIPTION.

Pharos. See ALEXANDRIA, and LIGHTHOUSE.

Pharsa'lus, now FERSALA, a town of Thessaly, to the south of Larissa, on a branch of the Salambria, and accordingly in the part of Thessaly restored to Greece in 1881. The district, Pharsalia, is historically notable mainly for Cæsar's great victory over Pompey, August 9, 48 B.C. See LUCANUS.

Pharynx (Gr.) is the name of that part of the alimentary canal which lies behind the nose, mouth, and larynx. Its nature and functions are described in the article DIGESTION, where an illustration will also be found. In cases of Diphtheria (q.v.) the pharynx is usually the chief seat of the disease. It is liable to ordinary inflammation or *pharyngitis*—an affection characterised by pain, especially in swallowing, without redness in the fauces or change of voice. Sometimes it proceeds to suppuration, and abscesses are formed. See QUINSY, THROAT.

Phascogalé, a genus of marsupial quadrupeds allied to the Dasyures (q.v.), and containing, according to the most reliable estimate, thirteen species, all of which are arboreal and insectivorous; they are spread through the Papuan islands and Australia. The best-known form is perhaps the 'Tapoa Tafa' (*P. penicillata*), of the size and appearance of a rat, which commits depredations in the larders of Australian colonists, and is of the fiercest disposition when meddled with. This marsupial has a curious resemblance to the rodent genus Hapalotis, also found in Australia. It may be a case of 'mimicry' between some of the species.

Phascolomys. See WOMBATS.

Phases (Gr. *phasis*, 'appearance'), the different luminous appearances presented by the moon and several of the planets, sometimes the whole, a part, or none of the luminous surface being seen from the earth. See MOON, PLANETS.

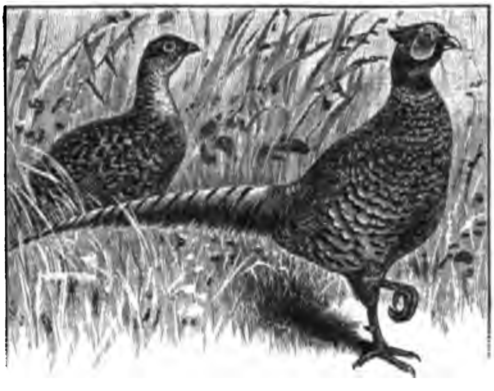
Phasianidæ. See PHEASANT.

Phasis, a river in Colchis, now called Rion or Faz. It rises in the Caucasus, and flows west into the Euxine near the ancient city of Phasis.

Phas'midæ (Gr. *phasma*, 'a spectre'), a family of insects, including walking-stick insects (Bacillus and Bacteria), spectre-insects (Phasma), and leaf-insects (Phyllium). With the exception of Bacillus, which occurs in south Europe, they occur in the tropics—in South America, Borneo, East Indies, &c. As their names suggest, they have a striking resemblance to the twigs and leaves of the plants on which they feed and live. See LEAF-INSECT, MIMICRY.

Pheasant (*Phasianus*), a genus of gallinaceous birds of the family Phasianidæ; having a rather short strong bill, a little curved; the cheeks and skin surrounding the eyes destitute of feathers, and warty; the wings short; the tail long, its feathers so placed as to slope down, roof-like, on either side, the middle feathers longest; the tarsus of the male furnished with a spur. The males of all the species are birds of splendid plumage; the females have shorter tails and dull or sombre colours. There are numerous species, natives of the warm and temperate parts of Asia. The Common Pheasant (*P. colchicus*) is said to have been brought from the banks of the Phasis, in Colchis, to the south of Europe at a very remote period, its introduction being ascribed in classic legend to the Argonauts. From the Phasis it derived its Greek name *Phasianos*, the origin of its name in English and other modern languages. It was soon naturalised in Europe, and is now diffused over almost all the temperate parts of it. The date of its introduction into Britain is not known, but was certainly earlier than 1199, when King John granted William Brewer a license 'to hunt the hare, fox, cat, and wolf, throughout all Devonshire, and to have free warren throughout all his own lands for hares, *pheasants*, and partridges' (Dugdale's *Baronage*, vol. i. p. 701). Strangely, however, the pheasant seems never to be mentioned as a royal dish till 1689. It has long been plentiful in plantations and game-preserves, and has been introduced into almost every part of the country suitable to its habits. The abundance of pheasants in Britain, however, is to be ascribed chiefly to careful game-preservation, without which the race would in all probability soon be extirpated. No kind of game falls so easy a prey to the poacher, for in its present method of rearing it is semi-domesticated, though we can hardly include it amongst our domestic fowls.

A minute description of the common pheasant is unnecessary. The feathers on the upper part of the head are brownish green, with edgings of yellow; the neck has variations of green and blue, with reddish orange below; the breast and sides are brownish yellow, each feather tipped with purplish blue; the back and belly are variegated, the rump deep red with green and grayish reflections; the tail is dull greenish yellow, with yellowish gray, and bars of black, and a band of dull red on each side. The whole length of a male pheasant is about 3 feet, of which the tail measures about 18 inches. The entire length of the female is a little more than 2 feet, principally in that the tail is much shorter than in the male. The general colour of the female is pale grayish brown and yellow, varied with darker brown, the sides of the neck tinged with red and green. The ordinary weight of a pheasant is about two pounds and a half; but when pheasants are abundantly supplied with food, and kept undisturbed, they are sometimes four pounds or four pounds and a half in weight. The pheasant, unlike the partridge, is polygamous.



Common Pheasant (*Phasianus colchicus*), male and female.

The nest of the pheasant is on the ground, and is a rude heap of leaves and grasses, in which eleven or twelve olive-brown eggs are laid. But in the half-domesticated state in which it exists in many English preserves the pheasant does not pay that attention to its eggs and young which it does when more wild, and not unfrequently continues to lay eggs for a considerable time, like the domestic fowl; the eggs being removed by the gamekeeper, and hatched by hens, along with eggs from nests found among clover and hay in the season of mowing. In fact, where pheasants are reared in large numbers nearly all the birds are hatched by either common hens or incubators, which are being largely employed for the purpose. In the former method coops are employed, in front of which are runs formed by wire netting, and in this way a large number can be attended to at one time. Very young pheasants must be carefully supplied with ants' eggs, maggots, gentles, &c., and the whole difficulty of rearing them is in their earliest stage. The difficulty of rearing birds bred in confinement has led to the introduction of various forms of artificial food, several of which are excellent. Custard is largely employed, and when given fresh is eaten with avidity, and brings on the young birds rapidly. Canary-seed is good also at first. Pheasants feed very indiscriminately on berries, seeds, roots, young shoots of plants, worms, insects, &c. Beans, peas, corn, and buckwheat are frequently thrown for them in open places in woods; and they scrape up bulbous and tuberous roots in winter. They roost in trees at no great height from the ground, and poachers sometimes capture them by burning sulphur below them. During the moulting season they do not ascend trees to roost, but spend the night on the ground, when they fall a ready prey to foxes. They are fond of woods with a thick undergrowth, in which, when disturbed, they naturally seek shelter, running whilst it is possible, rather than taking flight. The male pheasant takes flight much more readily than the female, which, apparently trusting to her brown colour to escape observation, often remains still until the sportsman is almost upon her. The males and females do not associate together except during the breeding season, but small numbers of one sex are often found in company. The 'short crow' of the males begins to be heard in March. In England and Scotland pheasant-shooting legally begins on the 1st of October, and ends on the 3d of February. The pheasants turned out from the gamekeeper's breeding-yard into a preserve are in general supplied with abundance of food during winter, and come to the accustomed call as readily as any kind of poultry, so that the sportsmanship of a *Battue* (q.v.), in which they are killed by scores or hundreds, is of the lowest kind. Maize is one of the best foods, but barley, peas, wheat, and oats, with the usual green food, are all employed. Some pheasant rearers use chopped meat, boiled potatoes, decayed apples, raisins, and similar dainties. It is scarcely necessary to mention that the flesh of the pheasant is in very high esteem for the table.

The female pheasant, as is the case with most other birds, in old age, or when from any cause incapable of the functions of reproduction, sometimes assumes the plumage of the male. The pheasant exhibits a remarkable readiness to hybridise with other gallinaceous birds. A hybrid between it and the common fowl is not unfrequent, and is called a *Pero*. Hybrids between the pheasant and black grouse have also occurred; and hybrids are supposed to have been produced between the pheasant and guinea-fowl, and the pheasant and turkey. None of these hybrids, however, have ever been known to be fertile, except with one of the original species. On the contrary, the offspring of the common pheasant and the Chinese or Ring-necked Pheasant (*P. torquatus*) is perfectly fertile, a circumstance which is urged in argument by those who regard them as mere varieties of one species. The ring-necked pheasant is now almost as plentiful in Britain as the common pheasant; it is a native of the forests of India and China, and is said not to breed with the common pheasant in a truly wild state, but in Britain they readily intermix. It is distinguished by a white ring almost surrounding the neck, and is of smaller size than the common pheasant, somewhat different in markings, and has a shorter tail. It is the common pheasant of the Celestial Empire. There is also the Ringless Chinese Pheasant (*P. decollatus*), and others scarcely known here. The Bohemian Pheasant is another variety of a creamy colour, and it is much more homely in appearance. White pheasants are of not very unfrequent occurrence, and often appear spontaneously from the common variety. Pied pheasants may be bred from crossing the white and common varieties. Of other species of pheasant may be mentioned Diard's Pheasant (*P. versicolor*), a native of Japan, in which the prevailing colour is brilliant green; Soemmering's Pheasant (*P. soemmeringii*), also from Japan, one of the most beautiful pheasants known, but terribly pugnacious; and Reeves's Pheasant (*P. reevesii*), a native of the north of China, in which white is the prevailing colour, and the tail is of extraordinary length, so that a bird not larger than the common pheasant measures eight feet in entire length. Of somewhat different type, and more nearly approaching to the common fowl, are the Golden Pheasant (*P. pictus*, or *Thaumalia picta*) and the Silver Pheasant (*P.* or *Euplocamus nycthemerus*), both natives of China, and hardy birds, the introduction of which into British preserves has been attempted with decided success. Both have long been kept in a state of domestication by the Chinese. The golden pheasant is one of the most splendid of the tribe. It has a fine crest, and a ruff of orange and black, capable of being erected at pleasure. The tail is very long. The crest and ruff are held in great estimation by anglers for making artificial flies. Lady Amherst's Pheasant (*P.* or *Thaumalia amherstiæ*) is a native of China, resembling the golden pheasant, and with an extremely long tail. The silver pheasant is one of the largest and most powerful of the tribe, and very combative, driving the common pheasant from preserves into which it is introduced. The prevailing colour of the upper parts and tail of the male is white, finely pencilled with black, the breast and belly purplish black. The Eared Pheasant (*Crossoptilon mantchuricum*) has a sombre brown body, a vaulted beak, red face, and white throat and ears, the feathers on which stand up above the head. The Argus Pheasant (*Argus giganteus*), found in Malacca and Siam, is separately discussed (see ARGUS). The latter series of pheasants are chiefly kept in aviaries as ornamental fowls, for which purpose they are well adapted. A recent introduction, the Prince of Wales Pheasant (*P. principalis*), was discovered on the Afghan frontier of India, and is distinguished from all other pheasants in that the greater part of its wings are white, though it is somewhat different in its markings and the arrangement of its colours.

See D. G. Elliot's *Phasianidæ* (2 vols. 1870–72); Tegetmeier's *Pheasants* (1873); and R. J. L. Price's *Practical Pheasant-rearing* (1888).

Phelps, ELIZABETH STUART, an American authoress, was born 31st August 1844, at Andover, Massachusetts, the daughter of Professor Austin Phelps and of the authoress of *Sunny Side*. Besides lecturing and engaging in work for the advancement of women and for social reforms, she has written a number of stories, including *The Gates Ajar* (1868), which passed through twenty editions in the year of its publication; *Beyond the Gates* (1883); *The Gates Between* (1887); *Hedged In* and *The Silent Partner* (1870); *The Story of Avis* (1877); *Doctor Zay* (1884), in which the question of professional life for women is considered; and in 1890, in conjunction with her husband, the Rev. Herbert D. Ward, *Come Forth*, a travesty of the story of Lazarus, and *The Master of the Magicians*.

Phelps, Samuel, the last of the old school of actors, was born 13th February 1804 in Devonport. When seventeen years old he came to London, and was engaged on the *Globe* and *Sun* newspapers as reader; among his companions being Douglas Jerrold, then, like himself, a stage-struck youth. After some experience as an amateur, Phelps joined the York circuit in the autumn of 1826, and continued in the provinces for eleven years. On 28th August 1837 he made his début in London as Shylock at the Haymarket, under the management of Benjamin Webster, making a very great success. He was afterwards engaged by Macready, but his genius did not get full scope until the beginning of his famous Sadler's Wells management, one of the most extraordinary achievements in the history of the drama. At an outlying unfashionable and unpopular theatre he for eighteen years produced a constant succession of 'legitimate' plays, attracting around him an excellent company, and educating a rough and unpolished audience to appreciation of the masterpieces of English dramatic literature. He began this apparently unpromising experiment on 27th May 1844, continued as manager till March 1862, and made his last appearance before his Islington friends on 6th November 1862. During his management he produced no fewer than thirty-one Shakespearian plays, as well as works of the other great Elizabethans, and of the dramatists of the 18th century from Congreve to Colman. After leaving Sadler's Wells Phelps did not attach himself to any particular theatre, appearing at Drury Lane, the Queen's, and the Gaiety theatres, and playing regularly in the provinces. On 1st March 1878, when acting Wolsey at the Aquarium (Imperial) Theatre, he broke down, and never played again. He died on 6th November 1878. Although primarily a tragedian, Phelps was an excellent all-round actor, and some of his comedy parts are among his most notable—as, for instance, Malvolio, Bottom, and Shallow. In tragedy he was famous in Wolsey, Lear, Macbeth, Brutus, Luke (*City Madam*), and Sir Giles Overreach; while among his other chief successes were Richelieu, Sir Pertinax Macsycophant, Bertuccio, Old Dornton, and Job Thornberry.

See *Memoirs*, by J. and E. Coleman (1886); and *Life and Life-work*, by W. May Phelps and John Forbes Robertson (1886).

Phenacetin, a drug prepared from carbolic acid, valuable in fevers, and, like antipyrin, of service in stilling pain and securing rest in cases of severe headaches, insomnia, and nervousness.

Phenacodus. See Mammals.

Phenol, a name for Carbolic Acid (q.v.). See also Aromatic Series; and for the Phenol Dyes, Dyeing, Vol. IV. p. 141.

Pheræ, a powerful city of Thessaly, near Mount Pelion; according to legend, the ancient royal seat of Admetus and Alcestis, and afterwards of political consequence under 'tyrants' of its own, who long made their influence felt in the affairs of Greece, and repeatedly attempted to make themselves masters of Thessaly. One of these tyrants, Alexander (slain 357 B.C.), is particularly celebrated for his cruelties.

Pherecydes, an ancient Greek philosopher, born in the island of Syros, in the 6th century B.C., a contemporary of Thales. He taught the doctrine of the existence of the human soul after death; but it is uncertain if he held the doctrine of the transmigration of souls, afterwards promulgated by his disciple, Pythagoras. Of his work, a mythological system of philosophy, only fragments are extant, collected and edited by Sturz (2d ed. Leip. 1824).—Another Pherecydes, a native of Leros, who lived in the 5th century B.C., compiled mythical histories of Athens and other states, but only a few fragments remain, published in C. Müller, *Frag. Hist. Græc.* (vol. i.).

Phi Beta Kappa, by far the oldest of the American college Greek letter societies, takes its name from the initial letters of its motto, said to be *Φιλοσοφία Βίου Κυβερνήτης*—'Philosophy is the guide of life.' The society, 'founded on literary principles,' and intended to embrace the 'wise and virtuous of every degree and of whatever country,' was an outcome of the desire for national union, and sprang into being in the somewhat chaotic period when the old colonies had became states, but had not yet adopted a federal constitution. It was founded in 1776 (the same year as the Illuminati, q.v.), in the old 'Raleigh Tavern' at Williamsburgh, Virginia, by forty-four undergraduates of William and Mary College, of whom John Marshall was one. Branches were established at Yale in 1780 and at Harvard in 1781; and to-day there are nearly a score in the principal colleges and universities of the Union. The Phi Beta Kappa is now simply 'an agreeable bond of meeting among graduates;' since 1831 its innocent mysteries have been open secrets. At Harvard there is an annual Phi Beta Kappa dinner, oration, and poem; the earliest and one of the most striking of Edward Everett's great orations was delivered before the society, with Lafayette for a guest, in 1824; and among the poets may be mentioned R. T. Paine ('The Ruling Passion,' which brought him $1200 on its publication in 1797) and Oliver Wendell Holmes (1829).—In colleges where the first third of a graduating class are admitted to Phi Beta Kappa there is a burlesque of the society, the Kappa Beta Phi, for the consolation of the third at the other end of the class, generally in the order of demerit, the winner of the Wooden Spoon ranking first. See an interesting paper by Dr E. E. Hale, in the *Atlantic Monthly* (July 1879).

Phidias (Gr. *Pheidias*), the greatest sculptor of ancient Greece, was born the son of Charmides, at Athens about 500 B.C. His instructor in sculpture was Ageladas of Argos. To Phidias came an opportunity such as falls to the lot of few artists: Pericles, having risen to the head of affairs in the Athenian state, resolved to adorn the city with temples and other public buildings fitting for the vanquisher of Persia, and he not only gave to Phidias a commission to execute the more splendid statues that were to be erected, but made him general superintendent of all the public works planned for the city. Plutarch tells us that Phidias had under him architects, statuaries, workers in copper and bronze, stonecutters, gold and ivory beaters, &c. He constructed the Propylæa and the Parthenon, the sculptured ornaments of which were executed under his direct superintendence, while the statue of the goddess Athena, of ivory and gold, was the work of Phidias himself. Fragments of the metopes, frieze, and pediments of the Parthenon were carried to England by Lord Elgin (see Elgin Marbles). Phidias executed a colossal statue of Zeus for the Olympieum at Olympia (q.v.), also of ivory and gold; this was reckoned his masterpiece. Accused of having appropriated to himself some portion of the gold destined for the robe of Athena, and of impiety in having introduced his own likeness and that of Pericles on the shield of the goddess, he was thrown into prison, and died there about 432 B.C., but whether of sickness or poison is uncertain. Other works by his hand were a statue of Aphrodite at Elis, of gold and ivory, a colossal bronze figure of Athena Promachos on the Acropolis at Athens, a gilt colossal Athena at Platæa, a monument of the victory of Marathon at Delphi, and numerous others. Their prevailing characteristic appears to have been an ideal sublimity, and even the imperfect relics that we possess are the most noble specimens of sculpture in the world. In 1888 there was dug out at Tanagra a red vase bearing what was believed to be the signature of Phidias. See SCULPTURE.

See A. S. Murray, *Greek Sculpture* (1880); C. Waldstein, *Essays on the Art of Phidias* (Camb. 1885); and Collignon, *Phidias* (Paris, 1886).

Phigalia, an ancient town of Arcadia, situated in its extreme south-west corner. From its temple of Apollo, at Bassæ, 5 to 6 miles distant, a sculptured frieze representing the contests between the Centaurs and Lapithæ, and the Amazons and Greeks, was brought to the British Museum in 1812. The temple was first described by Chandler in 1765. Next to the Theseum at Athens it is the most perfect architectural ruin in all Greece, being built of fine gray limestone and white marble. It was designed by Ictinus, one of the architects of the Parthenon at Athens, and measured originally 125½ feet long and 48 broad, and had 15 columns on each side and 6 at each end, in all 38, of which 34 still stand. See Cockerell, *Temples of Ægina and Bassæ* (1860).

Philabeg. See HIGHLAND COSTUME.

Philadelphia, the chief city of Pennsylvania and the third city of the United States in population, is situated on the Delaware River, about 100 miles (*viâ* Delaware Bay and River) from the Atlantic Ocean, 90 miles by rail SW. of New York City and 136 miles NE. of Washington. Co-extensive with the county of Philadelphia, the city lies along the Delaware from the mouth of the Schuylkill River at League Island, northward, for about 15 miles, and has an average breadth of some 8 miles. Its total area embraces nearly 130 sq. m., about one-eighth of which is comprised within the limits of the thickly built up portions of the city, while the rural sections consist of suburban communities which, though within the city limits, are locally known by the names they bore prior to their annexation to the city. Philadelphia is notably 'a city of homes.' Its inhabitants are largely composed of the well-to-do middle class, and it has within its limits more comfortable single residences than any other city in the world.

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The dominant architecture of the older sections of the city is of the severely plain, substantial style which characterised its Quaker founders, and which until the second half of the 19th century held undisputed sway, its outstanding features being uniformity of design and a general employment of red brick as building material. A marked departure has, however, lately taken place in the style of both the public and the private buildings of Philadelphia, among the former of which the city hall (1871 *et seq.*), built of white marble upon a granite base, and covering an area of 486 by 470 feet, affords a striking instance. The height of the tower and dome is 510 ft. 3½ in., or 547 ft. 3½ in. with the colossal figure of Penn (37 ft.) surmounting it, the structure being thus almost the highest in the world. Over 500 rooms (mostly offices for city officials) are comprised in this edifice, on which more than $19,000,000 had by January 1, 1896, been expended. The entire cost when completely furnished for occupancy will doubtless exceed $20,000,000. Other buildings worthy of note are the terminal railway stations, the Masonic Temple, of granite, erected at a cost of over $1,500,000; a United States government building of granite—containing the Post-office, United States court-rooms, and other offices of the general government—which cost about $8,000,000; a custom-house of marble, modelled after the Parthenon at Athens; a naval asylum; the United States Mint; the Academy of Fine Arts; the Academy of Natural Sciences, a massive Gothic structure with an extensive scientific library and a museum of a million or more specimens; the Academy of Music; and the buildings of the University of Pennsylvania.

Nearly every street of importance is traversed by tramways, mostly with cars propelled by electricity. There are numerous well-shaded commons in the older portion of the city, some of which were laid out by William Penn at the foundation of his 'great towne' in 1682–83; while the Fairmount Park, some 3000 acres in extent, and bisected through its entire length of 10 miles or more by the Schuylkill River and its affluent the Wissahickon, stands without a rival among the pleasure-grounds of the great cities of the New World. In this park in 1876 was held the Centennial Exhibition; and in its environs are the Zoological Garden, the Fairmount Waterworks, which supply to the city 100,000,000 gallons of water daily, the beautiful Horticultural Hall and Memorial Hall—remains of the Centennial Exhibition—the Laurel Hill Cemetery, &c. Among the statues in Philadelphia there are bronze equestrian figures of Generals Meade, McClellan, and Reynolds; and there is a monument at Germantown to the Union soldiers, and another in the grounds of Girard College to those of its former pupils who fell in the civil war.

The churches include the old Swedes Church (1700), Christ Church (Episcopal, 1727–54), where Washington's pew is preserved, and a Roman Catholic cathedral. There are some 75 Baptist churches in the city, 90 Episcopal, 40 Lutheran, 100 Methodist, 100 Presbyterian, 15 Quaker, 60 Roman Catholic, and a number of others. Philadelphia has almost from its foundation been noted for its benevolent institutions, but these have been greatly increased within recent years: prominent among such institutions are the Pennsylvania Hospital (1751), with suburban departments for the insane; Episcopal, Presbyterian, and Methodist hospitals, and the St Joseph's and St Agnes' hospitals; the hospitals in connection with the university and the several medical schools, &c.

The educational facilities of Philadelphia are very great. At the public schools, which are maintained at an annual cost of over $3,500,000, there are 3000 teachers and 148,000 pupils, some 4000 of the latter belonging to the high and normal schools. In the Roman Catholic schools 30,000 children are enrolled. Besides the Girard (q.v.) College, the city contains the Drexel Industrial Institute (endowed with $2,000,000) and the Cahill Roman Catholic High School; and in Philadelphia or its immediate environs are the Williamson Free School of Mechanical Trades (endowed with some $2,200,000), state institutions for the blind and deaf and dumb, the Franklin Institute (1824, for the mechanic arts), Spring Garden Institute (for drawing, painting, and mechanical handiwork), the Episcopal Academy (1785), several Catholic colleges and convents, and Episcopal, Lutheran, and Roman Catholic theological seminaries. Crowning all these is the University of Pennsylvania, which began as an academy chartered by the sons of William Penn, became a college in 1755, and a university in 1779. At present (1896) it has over 2600 students and 251 professors and instructors, and embraces faculties of arts, science, architecture, natural history, and finance and economy (871 students), of medicine (873), dentistry (323), veterinary medicine (61), law (313), and physical education. The Jefferson Medical College (1825), with about 625 students, is one of the most famous medical schools of the United States; and others here are the Hahnemann

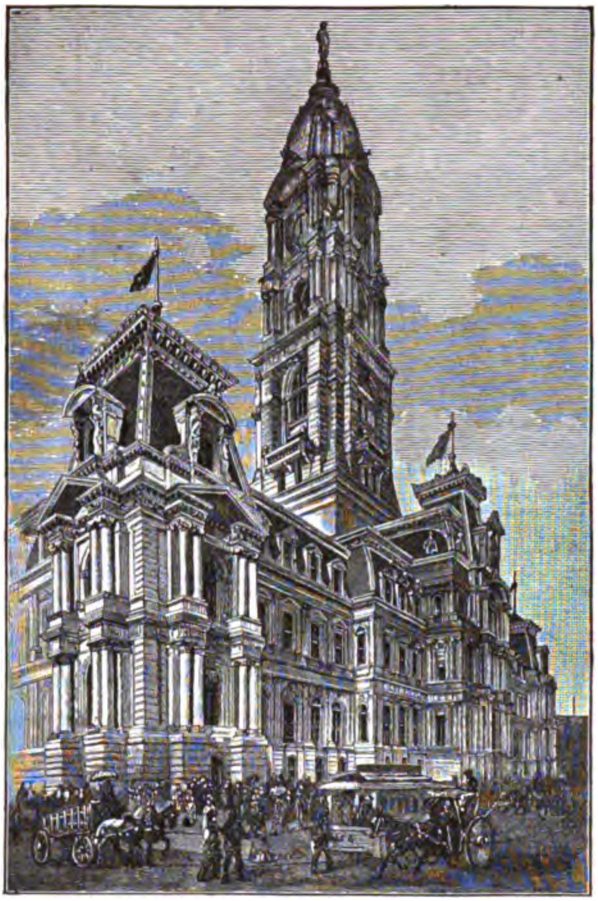
Medical College (1869), the Medico-Chirurgical College (1880), the Woman's Medical College (1850), and the Philadelphia Polyclinic and College for Graduates in Medicine.

Manufactures, Commerce, &c.—Though in its early history noted for its extensive shipping interests, as compared with those of its sister cities, it is rather as a manufacturing than as a commercial city that Philadelphia holds a present prominence. Here are immense establishments covering acres of ground, from which millions of dollars worth of products are issued annually for the home and foreign markets, besides smaller concerns innumerable. The aggregate capital employed in manufacturing is estimated at $300,000,000, the number of hands employed at 250,000, and the value of the annual product at $600,000,000. Among the prominent industries of this class are the building of locomotives, of which $10,000,000 worth are constructed annually, employing some 5000 men; the manufacture of carpets, at which about 30,000 hands are employed, producing annually goods valued at about $50,000,000; woollen and worsted goods, employing 35,000 hands, and valued at $45,000,000; upholstery goods, valued at $25,000,000; cotton goods, $15,000,000, &c. General iron and steel products are computed to employ 40,000 hands, whose product reaches $75,000,000 in value—the single article of saws, principally made by one firm, giving employment to 5000 workmen, and amounting in value to $2,500,000. There are several extensive sugar-refineries, the out-put of which reaches 20,000 barrels of refined sugar daily, and gives direct employment to 2500 hands; oil-refineries, whose receipts of crude petroleum by railways and pipe-lines from the oil-fields of western Pennsylvania reach 6,000,000 barrels per annum; nearly 100 breweries; and several great chemical works.

The foreign commerce of the city, while varying from year to year, shows on the whole a very considerable gain both as to its specific value and as to the proportion which it bears to the entire commerce of the United States. The value of the exports for the fiscal year 1869–70 was $16,927,610; for 1879–80, $49,649,693; for 1889–90, $37,410,683, being respectively 3·55, 5·94, and 4·36 per cent. of the entire value of the exports of the country for those years. The imports for the fiscal year 1869–70 were valued at $14,483,211; for 1879–80, $35,944,500; for 1889–90, $53,936,317, being respectively 3·32, 5·38, and 6·83 per cent. of the entire imports of the country.

The city government is almost entirely administered by the mayor through various departments—of public works and of public safety, each administered by a director who is appointed by him; of receiver of taxes, of city treasurer, of city controller, and of law, whose heads are elected for three years; a department of education governed by a board of 35 members (one from each city ward), who are appointed by the judges of the courts, and who serve without compensation; a department of charities and correction, whose officials are appointed by the mayor, and who serve without compensation; and a sinking fund commission. The legislative branch of the city government consists of a chamber of select council of thirty-seven members (one from each ward), who are elected for three years, and a chamber of common council of 130 members who are elected for two years, all of whom serve without pay. The judiciary of the city and county consists of twelve judges of the Courts of Common Pleas and four judges of the Orphans' Court, all of whom are elected for ten years. There are besides twenty-eight magistrates elected for five years.

Founded in 1682 (see PENN), Philadelphia the year after was made the capital of Pennsylvania, and soon became a place of importance. It was the central point in the war of independence, and the city still preserves the Carpenters' Hall (1770), where the first congress met (4th September 1774), and the old State House (1735), with its Liberty Bell, where the Declaration of Independence (see INDEPENDENCE DAY) was adopted in 1776, and which has since been famous as Independence Hall. At Philadelphia, moreover, the federal union was signed in 1778; and here, too, the constitution was framed, in 1787. An interest of another kind attaches to the fact that the Protestant Episcopal Church of North America was organised here in 1786. From 1790 to 1800 Philadelphia was the federal capital; and the first mint was established here in 1792. Later events have been the holding of the Centennial Exhibition, in 1876, and the commemoration of Penn's visit, in 1882. Pop. (1700) 4500; (1800) 70,287; (1860) 568,034; (1880) 847,170; (1890) 1,046,964.



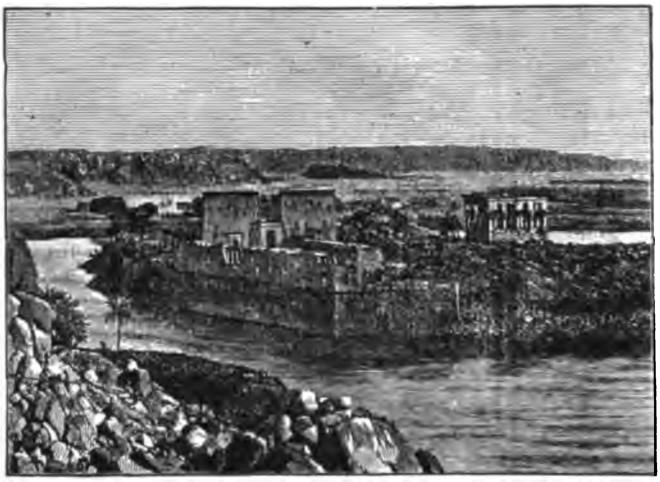
New City Hall, Philadelphia.

See Scharf and Thompson's *History of Philadelphia* (3 vols. 1884); *Philadelphia and its Environs* (Lippincott, 1890); and works by W. P. Hazard (1879), T. Westcott (1877), F. Cook (1882), and S. C. Woolsey (1888).

Philadelphia, in Asia Minor. See ALA-SHEHR.

Philadelphians, a mystic sect emphasising 'brotherly love' (Gr. *philadelphia*), founded in London in 1652 under the influence of Boehme by Dr John Pordage (1608–98) and Mrs Leade and others. It had for a time a branch in Holland, but disappeared early in the 18th century.

Philæ (Gr. *Philai*, Egyptian *Pālek*), an island in the Nile, near Assouan and south of Syene, in Nubia. It is a small granite rock, fringed with rich verdure, about 1200 feet long and 450 broad, almost covered with ancient buildings of great architectural beauty and interest, though not of very ancient date. That to the east, a hypæthral or roofless hall, commonly called 'Pharaoh's bed,' belongs to the Greek and Roman period, and consists of fourteen great columns with capitals of various patterns, connected at the lower part by solid walls; the length is 63 feet, the width 48. The great temple of Isis, to whom the island was sacred, was mainly built by Ptolemy Epiphanes, and continued by his successors, especially by Ptolemy III., Euergetes. The processions of pilgrims approached the island from the south, were received by the priests at a flight of steps at the south-west corner, and then passed into a court with a colonnade to right and left, erected by Tiberius and later Roman emperors. To the north stood the great propylon or gateway, 60 feet high and over 120 wide. This is the oldest part of the temple, and bears the name of Nectanebes II. (about 361 B.C.). Beyond was another court with several chambers and a small chapel. Another smaller pylon gave entrance to the temple proper, at the northern extremity of the irregular complex of buildings. The temple proper contains representations of the story of Osiris, his birth, bringing up, death, and embalmment by Isis. It was converted into a Christian church in 577.



Island of Philæ, seen from the south-west corner.

Philaret (1782–1867), became in 1817 Bishop of Reval, in 1819 Archbishop of Tver, and in 1821 Archbishop of Moscow. He was the greatest preacher and the most influential Russian churchman of his time.

Philately. See STAMPS.

Philemon, EPISTLE TO, is the shortest of the four extant letters that bear to have been written by the apostle Paul during his captivity (see PAUL). It is a brief private letter (of twenty-five verses) addressed to Philemon, a man of wealth and liberality, who had been a convert of the apostle, and is now addressed by him as his 'fellow-worker.' It was at Philemon's house, and perhaps under his presidency, that the Christians of Colossæ held their meetings. In the *Apostolical Constitutions* he is represented as bishop of Colossæ, and subsequent tradition has it that he suffered martyrdom there under Nero. Philemon had possessed a slave called Onesimus, who, after robbing his master, had run off and found his way to Rome (or Cæsarea), and there had come under the influence of Paul, and been converted to Christianity. At first the apostle seems to have been minded to retain Onesimus for his own service, but on further consideration he resolved to send him back to his former master, and accordingly made him the bearer of the epistle before us, in which 'Paul the aged' asks pardon for the runaway, and entreats the injured master to receive him 'not now as a servant, but above a servant, a brother beloved.' The epistle exhibits fine delicacy and tact throughout, and has been characterised by Renan as 'a little masterpiece in the art of letter-writing.' Its genuineness may be said to be well established. Some writers, indeed, in the fourth century held that it was too trifling and unedifying to have been written by Paul; but the arbitrariness of this criterion was pointed out by Jerome, Chrysostom, and others. Baur also regarded it as a literary invention intended to illustrate the ideal relation of master and slave; but this view is not strongly urged by any of his modern followers, while some of them (Hilgenfeld and Holtzmann) have entirely abandoned it. There are commentaries on the Epistle to Philemon by Meyer, Bleek, Ellicott (*Philippians, Colossians, and Philemon*, 3d ed. 1865), and Lightfoot (*Colossians and Philemon*, 7th ed. 1884).

Philemon and Baucis, according to a classic myth, finely poetised by Ovid in his *Metamorphoses*, were a married pair, remarkable for their mutual love. Jupiter and Mercury, wandering through Phrygia in human form, were refused hospitality by every one, till this aged pair took them in, washed their feet, and gave them such humble fare as they could provide. On going away, the gods took them with them to a neighbouring mountain, on looking from which they saw their village covered with a flood, but their own cottage changed into a splendid temple. Jupiter permitted them to make any request they chose, but they only asked to be servants of his temple, and that they might die at the same time. When, accordingly, they were seated at the door of the temple, being now of great age, they were changed, Philemon into an oak, and Baucis into a linden.

Philharmonic Society, established in London in 1813, welcomed Mendelssohn to England in 1829 and again in 1844. The New Philharmonic was founded in 1852. The Philharmonic Society of New York dates from 1842.

Philidor, the assumed name of a French family, originally called Danigan, which has produced several distinguished musicians, and a composer, François André (born at Dreux in 1726, died in London, 1795), who was even more famous as an authority on Chess (q.v.). See Allen's *Life of Philidor* (Phila. 1864).

Philip of Macedon, the father of Alexander the Great, was born at Pella in 382 B.C. He was the youngest son of Amyntas II. and Eurydice, and spent part of his early life as a hostage at Thebes. The assassination of his eldest brother, Alexander II. (367 B.C.), and the death of his second brother, Perdiccas III., in battle (360 B.C.), made him guardian to his nephew Amyntas, still an infant; but in a few months Philip made himself king, the rights of Amyntas being set aside. Dangers soon beset him from without and from within. But foreign and domestic enemies soon disappeared before the decision, the energy, and the wise policy of the young king. In the brief space of a year he had secured the safety of his kingdom, and had gained for himself a dreaded name. Henceforward his policy was one of aggression. The Greek towns on the coast of Macedonia were the first objects of attack. In Thrace he captured the small town of Crenides, which under its new name, Philippi, soon acquired great wealth and fame. The surrounding district was rich in gold-mines, which proved a source of great revenue to Philip, and supplied him plentifully with the means of paying his armies, and of bribing traitorous Greeks to open the gates of many cities. After a few years of comparative leisure he captured Methone (at the siege of which he lost an eye), advanced into Thessaly, and ultimately to the Strait of Thermopylæ, which, however, he did not attempt to force, as it was strongly guarded by the Athenians. He therefore directed his arms against the Thracians. After capturing all the towns of Chalcidice—the last of which was the important city of Olynthus—he made peace with the Thracians, and next year with the Athenians, who had been at war with him in defence of their allies the Olynthians. It was this siege of Olynthus by Philip which called forth the famous Olynthiac orations of Demosthenes. Philip was now requested by the Thebans to interfere in the war ('the Sacred War') which was raging between them and the Phocians. He marched into Phocis, destroyed its cities, and sent as colonists to Thrace many of the inhabitants (346 B.C.); and he was appointed, jointly with the Thebans and Thessalians, as president of the Pythian games. His next step was to secure a footing in the Peloponnese, by espousing the cause of the Argives, Messenians, and others against the Spartans. In 339 B.C. the Amphictyonic Council declared war against the Locrians of Amphissa; and, in the following year, appointed Philip commander-in-chief of their forces. The Athenians were alarmed at his approach into Greece in this capacity, and formed a league with the Thebans against him; but their united army was utterly defeated at the battle of Chæronea (338 B.C.), and all Greece was at the feet of the conqueror. He was now in a position to enter on the great dream of his later years—viz. to invade the Persian empire, and revenge the injuries of Greece. Deputies from the different states of Greece assembled in congress at Corinth, and, after resolving to make war on the Persian king, chose Philip as leader of their armies. Preparations were in progress for this great expedition when he was suddenly cut off by the hand of the assassin Pausanias, at a festival to celebrate the marriage of his daughter with Alexander of Epirus (336 B.C.). Philip was a man given to self-indulgence and sensuality; he was faithless in the observance of treaty obligations, and unscrupulous as to the means by which he gained his ends; but of his energy, acuteness, and eloquence it is impossible to speak too highly. He was at the same time a lover of learning and a liberal patron of learned men. See works cited at GREECE and DEMOSTHENES.

Philip II., better known as PHILIP-AUGUSTUS, king of France, was the son of Louis VII. and Alix of Champagne, and was born in August 1165. He was crowned joint-king in 1179, during the lifetime of his father, succeeded him in 1180, and proved one of the greatest monarchs of the Capet dynasty, while he confirmed his hold of the throne by marriage with Isabella of Hainault, the last direct descendant of the Carlovingians. His first war, made upon the Count of Flanders, gave him the county of Vermandois and the city of Amiens. He rigorously punished heretics and despoiled the Jews, and reduced the rebellious Duke of Burgundy to submission. He supported the sons of Henry II. of England in their rebellions against their father, and gained Berri by cession in 1189. On the accession of Richard to the throne Philip and he set out together on the third crusade; but they quarrelled while wintering in Sicily. After staying but three months in Syria he returned to France, having taken a solemn oath not to molest Richard's dominions; but no sooner had he returned than he made a bargain with the faithless coward John for the partition of Richard's territories in France. The fiery Richard's sudden return occasioned an exhausting war, which was closed through the mediation of Pope Innocent early in 1199. Richard died within two months after; but war with England blazed out anew, on account of the rival claims of John and his nephew Arthur of Brittany to the French heritage of King Richard, which consisted chiefly of Anjou, Maine, and Touraine. Philip embraced the cause of Arthur, but was for a while fully occupied by his quarrel with the pope. He had put away his second wife, Ingeborg of Denmark, in order to marry the beautiful Agnes of Meran, but the terror of the thunders of the Vatican forced him to replace Ingeborg upon her throne. The murder of Arthur again gave him the excuse he sought. Richard's great fortress of Château Gaillard fell early in 1204, and Philip passed in triumph over Normandy. Before the end of that year he had added to his dominions Normandy, Maine, Anjou, and Touraine, with part of Poitou, as well as the over-lordship of Brittany, hitherto a fief of Normandy. Philip took no active part in the war against the Albigenses, but devoted himself to consolidating his dominions. The great victory of Bouvines (29th August 1214) over the Flemish, the English, and the Emperor Otho established his throne securely, and the rest of his reign he was able to devote to reforms of justice and to the building and fortifying of the city of Paris. Notre Dame and the great court of peers remained lasting monuments of this great king's administration. He died at Mantes, July 14, 1223.

See works by Capefigue (3d ed. 2 vols. Paris, 1842), Mazabran (Lille, 1878), and Davidsohn (Stuttgart, 1888).

Philip IV., surnamed *Le Bel* or 'the Fair,' king of France, the son of Philip III., 'the Rash,' and Isabella of Aragon, was born at Fontainebleau in 1268, and succeeded his father in 1285. By his marriage with Queen Joanna of Navarre (q.v.) he obtained Navarre, Champagne, and Brie. He overran Flanders, but a Flemish revolt broke out at Bruges, and at Courtrai on the 'Day of Spurs' the flower of the French chivalry went down in thousands before the sturdy burghers. The great event of his reign was his struggle with Pope Boniface VIII., which grew out of his attempt to levy taxes from the clergy. By the bull *Clericis laicos* in 1296 Boniface forbade the clergy to pay taxes, and to this Philip replied by forbidding the export of money or valuables, thus cutting off a main supply of papal revenue. A temporary reconciliation in 1297 was ended by a fresh outbreak of the quarrel in 1300. Philip flung the papal legate into prison, and summoned the three Estates of France, clergy, nobles, and burghers. The last two assured him of their support even in case of excommunication and interdict. Boniface replied with the celebrated bull *Unam Sanctam*. Philip caused the bull to be publicly burned, and with the consent of the States-general confiscated the property of those prelates who had sided with the pope. Boniface now excommunicated him, and threatened to lay the kingdom under interdict, but the king sent to Rome William de Nogaret, who seized and imprisoned the pope, with the aid of the Colonnas. Though released after a few days by a popular rising, Boniface soon afterwards died. In 1305 Philip obtained the elevation of one of his own creatures to the papal chair as Clement V., and placed him at Avignon, the beginning of the seventy years' 'captivity.' He compelled the unhappy and reluctant pope to condemn the Templars in 1310, and to decree the abolition of the order two years later. They made a heroic defence, but were condemned and burned by hundreds, and their wealth appropriated by Philip. The grandmaster, Jacques de Molay, was burned 18th March 1314, and at the stake he summoned Philip to compear within a year and a day, and the pope within forty days, before the judgment-seat of God; strange to say, both pope and king died within the time, the latter at Fontainebleau, November 29, 1314. Philip during his whole reign steadily strove for the suppression of feudalism and the introduction of the Roman law; but while thus increasing the power of the crown, and also that of the third estate, he converted royalty, which was formerly protecting, kind, and popular to the mass of the people, into a hard, avaricious, and pitiless taskmaster. Under him the taxes were greatly increased, the Jews persecuted, and their property confiscated; and, when these means were insufficient to satisfy his avarice, he caused the coinage to be greatly debased.

Philip VI., of Valois, king of France, was the son of Charles of Valois, younger brother of Philip IV., and succeeded to the regency of France on the death of Charles IV. The proclamation of a king was deferred on account of the pregnancy of Charles IV.'s widow; but on her giving birth to a daughter Philip caused himself to be crowned king at Rheims (May 29, 1328). His right to the throne was denied by Edward III. of England, the grandson of Philip IV., who declared that females, though excluded by the Salic law, could transmit their rights to their children, and therefore insisted upon the superiority of his own claims. Philip, however, was not only already crowned king, but he had the support of the people. His reign commenced gloriously; for, marching into Flanders to support the count against his rebellious subjects, he wiped out the disgrace of Courtrai by vanquishing the Flemings at Cassel (August 23, 1328). He was obliged to give up Navarre (q.v.), as the Salic law of succession did not apply to it, but he retained Champagne and Brie, paying for them a considerable annual stipend. The hundred years' war with England began in 1337 both in Guienne and in Flanders, but was carried on languidly for several years, the only prominent incident being the destruction of the French fleet off Sluys (June 24, 1340). Philip was a bad and faithless man, and his grasping extortion well-nigh exhausted the wealth of the country. Yet money for his pleasures and for new wars had constantly to be provided by some new tax or fresh confiscation. In 1346 Edward III. landed in Normandy, ravaged the whole country to the environs of Paris, and totally defeated Philip at Crécy. A truce was then concluded, but the devoted kingdom had no sooner been released from war than destruction threatened in the yet more terrible form of the 'Black Death.' Philip received Dauphiné in gift in 1349, purchased Majorca from its unfortunate king, and died August 22, 1350, neither loved nor respected.

Philip II., king of Spain, the only son of the Emperor Charles V. and Isabella of Portugal, was born at Valladolid, 21st May 1527. He was brought up in Spain, and carefully educated for his destiny, but grew up distrustful and reserved; cold and austere, without being virtuous; haughty and bigoted, yet without real respect for honour or religion. In 1543 he married Mary of Portugal, who died three years later, after bearing a son, the ill-fated Don Carlos. In 1548 he went to join his father at Brussels, and made a decidedly unfavourable impression upon his future subjects. Three years later he returned to Spain, and in 1554 he made a marriage of policy with Mary Tudor, Queen of England. During his fourteen months' stay in England he laboured hard but unsuccessfully at the uncongenial task of ingratiating himself with his wife's subjects. His failure, together with the vexatious jealousy of a wife who was plain, spare, nearly forty, and likely to be childless, prompted him to leave England and return to Brussels (September 1555). In the next half-year he became by the abdication of his father the most powerful prince in Europe, having under his sway Spain, the Two Sicilies, the Milanese, the Low Countries, Franche Comté, Mexico, and Peru; with the best disciplined and officered army of the age. The treasury alone was deficient, having been drained by the enormous expenditure of his father's wars. The first danger he had to face was a league formed between Henry II. of France and the Neapolitan pope Paul IV. to deprive him of his Italian dominions. Alva soon overran the territories of the pope, while Philip's army under Philibert of Savoy defeated the French at St Quentin (August 10, 1557) and Gravelines (July 13, 1558). These reverses forced Henry II. to agree to terms of peace at Cateau Cambrésis (April 2, 1559). In January 1558 the French had captured Calais, and Mary Tudor's death followed eleven months later. Her husband, after an unsuccessful attempt to obtain the hand of Queen Elizabeth, married Isabella of France (June 24, 1559) and returned to Spain, where he lived the rest of his life.

The main object of his domestic policy was to concentrate all power in himself, and to this end he laboured to destroy everything resembling free institutions in any of his dominions. He ostentatiously put himself at the head of the Catholic party in Europe, but the interests of the church in his eyes were ever identical with his own. He found the Inquisition the best engine of his tyranny in Spain, but its effect in the Low Countries was a formidable revolt, which ended in 1579 with the northern part, the Seven United Provinces, achieving independence. In this conflict the resources of Spain were exhausted, and to replenish his treasury Philip exacted enormous contributions from his subjects, abolishing all the ancient special communal or provincial privileges of Spain, and suppressing all insurrection and discontent by force of arms or the Inquisition. His son, Don Carlos, whom he hated, died in prison in 1568, and all that can be said in the father's justification is that at least he did not directly murder him. His pride did not disdain the aid of cowardly murder in the pursuit of his policy, and the tragic death of William the Silent (1584) and the relentless persecution of Antonio Perez show how pitiless and how persistent was his hatred of an enemy. He married in 1570 as his fourth wife his niece, Anne of Austria, whose sole surviving son afterwards became Philip III.

The one great triumph of his reign was the famous naval victory of Lepanto (September 16,1571), won by his half-brother, Don John of Austria, over the Turks. In 1580, the direct male line of Portugal having become extinct, Philip laid claim to the throne, and despatched Alva to occupy the kingdom. But his attempt to conquer England recoiled upon himself in hopeless disaster, as the ships of the great Armada were swept to destruction before the northern tempests and the irresistible valour of the English seamen. His intrigues against Henry of Navarre were foiled by his antagonist's courage, aided by the death (1592) of his own general Alexander Farnese and Henry's politic change of his religion. The stubborn heroism of the Netherlanders and the exasperating ravages of the English cruisers on the Spanish Main, added to financial distress at home, embittered the last years of Philip, and he died of a lingering and peculiarly loathsome disease, in the Escorial at Madrid, on 13th September 1598, under the shadow of that failure which had followed all his greatest undertakings. Philip II. possessed great abilities, but little political wisdom, and he engaged in so many vast enterprises at once as to overtask his resources without leading to any profitable result. A fanatical and gloomy bigot in religion, sullen and jealous in temper, he persecuted all heretics through the Inquisition with relentless cruelty, and at the same time dealt a fatal blow to Spain by crushing that ancient, proud, and chivalrous spirit which had been the secret of its strength, as well as by cutting off the commerce of the country by oppressive exactions and by a bitter persecution of the industrious Moriscos. There is hardly a more unlovable figure in history than this sullen and solitary bigot whom historians with unusual unanimity have united to condemn.

See the articles ALVA, ARMADA, CHARLES V., CARLOS, MARY, HOLLAND, and SPAIN; the *Histories* of Prescott, Motley, and Froude; Mignet's *Antonio Perez et Philippe II.* (5th ed. 1881); Forneron's *Histoire de Philippe II.* (3d ed. 4 vols. 1887); Gachard's two books on Don Carlos, and the same editor's correspondence of Philip on the affairs of Belgium (5 vols. Brussels, 1848–79), with his ambassadors in England (4 vols. up to 1888), and of his daughters Isabella and Catharine (Paris, 1884).

Philip V., king of Spain, and the founder of the Bourbon dynasty in that country, was the second son of the Dauphin Louis (son of Louis XIV. and Maria Theresa of Spain) of France, and was born at Versailles, December 19, 1683. In 1700 Philip, then Duke of Anjou, was bequeathed the crown of Spain by Charles II. His grandfather, Louis XIV., as he left him to take possession of the throne, uttered the famous phrase, 'Mon fils, il n'y a plus de Pyrénées.' He entered Madrid in February 1701, and after a long and varying struggle against his rival, the Archduke Charles, was left in possession of his throne by the peace of Utrecht in 1713. Next year died the queen, Maria Louisa, daughter of Victor Amadeus, Duke of Savoy, whom Philip had married in 1702; and soon after he married Elizabeth Farnese of Parma, 'the termagant,' in Carlyle's phrase, who embroiled the peace of Europe for thirty years. By her influence the reins of government were committed by the amiable and weak-minded king to Alberoni. Philip was obliged by the Quadruple Alliance to dismiss his daring and ambitious minister at the close of 1719. He abdicated in favour of his son Don Louis in 1724, but resumed the crown on his death eight months later. The ambitious queen's dearest wish was to drive the Hapsburgs out of Italy in the interests of her sons by a former marriage, but all her efforts succeeded only in securing the Two Sicilies for Don Carlos. Spain joined the coalition against Maria Theresa, and her younger son Don Philip was at first successful in conquering the Milanese; but as soon as the Silesian war was closed by the treaty of Dresden the Austrian queen poured her troops into Italy and drove out the Spaniards. At the crisis Philip, who had been for years sunk in a state of mental stupor, died at Madrid, July 9, 1746. See ALBERONI, SUCCESSION WARS, and SPAIN; and Baudrillart's *Philippe V. et la Cour de France, 1700–15* (2 vols. 1890–91).

Philip, sachem of the Wampanoag tribe of Indians, was the second son of Massasoit, who for nearly forty years had been the first and staunchest ally of the Pilgrim settlers of Plymouth, and had obtained English names for his two sons. In 1661 Philip succeeded his brother, and formally renewed the treaties of his father, which he kept for some years. By 1671, however, goaded by the encroachments of the whites, he had formed a confederation of tribes aggregating nearly 10,000 warriors; and in 1675 what is known as King Philip's War broke out. On the Indian side it was a war of surprises and massacres—thirteen towns were destroyed, and 600 colonists slain. In December 1675 Governor Winslow and a force of 1000 men burned the great fort of the Narragansetts, slew 600 warriors, and massacred 1000 women and children. In the spring the Indians retaliated for a time, but their numbers steadily diminished; several tribes fell away from the confederation; others, hitherto neutral, declared against them. In the early summer Philip's squaw and little son were captured, and sold as slaves for the West Indies; and on 12th August 1676, at midnight, he and his remaining followers were surprised by Captain Benjamin Church. Philip was slain, and his head cut off. Afterwards his body was drawn and quartered, and the head was exposed on a gibbet at Plymouth for twenty years. Church wrote an *Entertaining History of King Philip's War* (1716; new ed. with additions by S. G. Drake, Boston, 1825); see also Washington Irving's *Sketch-book*.

Philip the Bold (*Philippe le Hardi*), the founder of the second and last ducal House of Burgundy, was the fourth son of John the Good, king of France, and his wife Bonne of Luxemburg, and was born January 15, 1342. He was present at the battle of Poitiers (1356), and displayed such heroic courage, venturing his own life to save his father's, as earned him the epithet of *le Hardi*, or 'the Bold.' He shared his father's captivity in England, and on returning to France in 1360 received in reward of his bravery the duchy of Touraine, and on the death, without heirs, of Philippe de Rouvre (1363) also that of Burgundy, being created at the same time the premier peer of France. On the accession of his brother, Charles V., to the throne of France Philip had to resign Touraine, but, as a compensation, obtained in marriage Margaret, the heiress of Flanders, in 1369. In 1372 he commanded with success against the English, and in 1380 he helped to suppress the sedition of the Flemish towns against their count, his father-in-law. But the citizens of some of the populous places, especially Ghent, were possessed with such a fever of independence that they were only brought back to their allegiance after the bloody defeat of Rosbeck (November 27, 1382), where 26,000 Flemings were left on the field. Flanders, the county of Burgundy, Artois, Rethel, and Nevers fell to him by the death of the count in 1384, and his firm and wise government quickly won the affection and esteem of his new subjects. He encouraged judiciously arts, manufactures, and commerce, and his territory—a kingdom in extent—was one of the best governed in Europe. During the minority and subsequent imbecility of his nephew, Charles VI. of France, he was obliged to take the helm of affairs, and preserve the state from insurrection and sedition within and the attacks of the English without. He died April 27, 1404.

Philip the Good (*Philippe le Bon*), Duke of Burgundy, the son of Jean 'Sans-peur' by Margaret of Bavaria, and grandson of Philip the Bold, was born at Dijon, the capital of the duchy, June 13, 1396, and, on the assassination of his father on the bridge of Montereau at the instigation of the dauphin (afterwards Charles VII.), succeeded to the duchy of Burgundy. Bent on avenging the murder of his father, he entered into an offensive and defensive alliance with Henry V. of England at Arras in 1419, at the same time recognising him as the rightful regent of France, and heir to the throne after Charles VI.'s death. This agreement, which disregarded the Salic law, was sanctioned by the king, parliament, university, and States-general of France in the treaty of Troyes (1420), but the dauphin declined to resign his rights, and took to arms; he was, however, defeated at Crevant (1423) and Verneuil (1424), and driven beyond the Loire. Some disputes with the English prompted Philip to conclude a treaty with the king of France in 1429. However, the English, by ceding to him the province of Champagne, and paying him a large sum of money, gained him back to their side. At this time, by falling heir to Brabant, Holland, Zealand, and the rest of the Low Countries, he was at the head of the most flourishing and powerful realm in western Europe; but though much more powerful than his superior, the king of France, he preferred to continue in nominal subjection. Smarting under some fresh insults of the English viceroy, and strongly urged moreover by the pope, he made a final peace (1435) with Charles, who gladly accepted it even on the hard conditions which Philip prescribed. The English, in revenge, committed great havoc among the merchant navies of Flanders, which irritated Philip to such an extent that he declared war against them, and, in conjunction with the king of France, gradually expelled them from their French possessions. The imposition of taxes, which were necessarily heavy, excited a rebellion, headed, as usual, by the citizens of Ghent, but the duke inflicted upon them a terrible defeat (July 1454), though he wept over a victory bought with the blood of 20,000 of his subjects. The later part of his reign was filled with trouble caused by the quarrels between Charles VII. and his son, the Dauphin Louis (afterwards Louis XI.), who had fled from his father's court, and sought shelter with Philip, although, after ascending the throne, far from showing gratitude, he tried in the most dishonourable manner to injure his benefactor. Philip died at Bruges, July 15, 1467, deeply lamented by his subjects. Under him Burgundy was the most wealthy, prosperous, and tranquil state in Europe; its ruler was the most feared and admired sovereign of his time, and his court far surpassed in brilliancy those of his contemporaries. Knights and nobles from all parts of Europe flocked to his jousts and tournaments. See Barante's *Histoire des Ducs de Bourgogne de la Maison de Valois.*

Philiphaugh, on Yarrow Water, 3 miles WSW. of Selkirk, the property from 1461 till 1889 of the line of the 'Outlaw Murray' of the ballad. Here, on 13th September 1645, Montrose (q.v.) was defeated by David Leslie, who butchered more than a hundred Irish prisoners. See Craig-Brown's *Selkirkshire* (1886).

Philip Neri, St. See Neri.

Philippeville, a seaport of Algeria, the harbour of Constantine, from which it lies 54 miles NNE. by rail. There is a magnificent harbour (1882) protected by two moles, one 4590 feet long, the other 1310 feet. The town is quite new, having been built since 1838 on the site of the ancient *Rusicada*. The imports and exports together reach £3,500,000 per annum. Pop. (1872) 10,267; (1891) 15,788.

Philippi, a city of Macedonia. It was named after Philip II. of Macedon (q.v.), who enlarged it because of the gold-mines in its neighbourhood. It is famous on account of the two battles fought in 42 B.C. between Antony and Octavianus on the one side and the republicans under Brutus and Cassius on the other, in the second of which the republic finally perished. The apostle Paul founded a Christian church here, to which one of his epistles is addressed.

Philippians, Epistle to the, the latest of the four letters that claim to have been written by the apostle Paul during his captivity (see Paul). The Philippian Church was looked upon with peculiar tenderness and affection by the apostle. It was the first-fruits of his mission in Europe; its members were singularly kind to him; more than once, when he was labouring in other cities, they sent him contributions, that he might not be burdensome to his new converts, and now they had despatched one of the brethren—Epaphroditus—all the way to the place of his captivity with presents for him, knowing that he was in bonds, and suspecting (as was in fact the case) that he might be in straits for his daily bread. His letter to them, of which Epaphroditus, on his return journey, was the bearer, is the 'most epistolary of all the epistles;' though containing important doctrinal matter, it is characterised primarily by its warm expression of personal feelings towards his friends at Philippi. The external evidence in favour of the genuineness of this epistle is exceptionally strong; it is alluded to by Polycarp, and enumerated among the Pauline writings both by Marcion and by the writer of the Muratorian canon. The arguments of Baur and others against its genuineness, which turn purely on questions of biblical theology, such as the compatibility of Phil. ii. 6–11 with 1 Cor. xv. 45–49, or of Phil. iii. 6–11 with certain other expressions in the undisputed writings, still find some supporters (one of the latest and ablest being Holsten); but they are not regarded as convincing even by Hilgenfeld, Schenkel, Weizsäcker, Pfleiderer, or Harnack. There are commentaries on Philippians by Meyer, Weiss, Ellicott (*Philippians, Colossians, and Philemon*, 3d ed. 1865), Lightfoot (6th ed. 1881), and C. J. Vaughan (1882).

Philippics, originally the three orations of Demosthenes against Philip of Macedon. The name was afterwards applied to Cicero's fourteen orations against the ambitious and dangerous designs of Mark Antony. It is now commonly employed to designate any severe and violent invective, whether oral or written.

Philippine Islands, a large insular group forming a northern section of the Eastern Archipelago, from which it is separated by the two profound abysses of the Sulu (Mindoro) and Celebes Seas, 2000 to 4000 fathoms deep. But these seas are enclosed by the three insular chains of Palawan, with Balabac in the north, Sulu in the centre, and Sanguir with Sias in the south, all of which lie in shallow waters, and form a geological connection between the Philippines and Borneo in the southwest and the Philippines and Celebes in the south. The archipelago, which is washed on the east side by the Pacific Ocean (3000 fathoms) and in the north-west by the China Sea (2000 fathoms), lies in 4°—21° N. lat. and 117°—127° E. long., and comprises a vast aggregate of over 2000 islands of all sizes, ranging from mere rocks and reefs to the great lands of Luzon and Mindanao, the former rather more, the latter somewhat less, than 40,000 sq. m. in extent. The other chief members of the group, collectively called Visayas, are Mindoro, 9000 sq. m.; Palawan (Paragua), 5500; Samar, 5000; Panay, 4500; Negros, 4300; Leyte, 3000; Cebu and Bohol, both 1500; Masbate, 1200; total area, 116,000; population variously estimated at from 7,500,000 to 9,500,000.

The archipelago is disposed nearly due north and south, and is essentially mountainous and volcanic, lying in the direct line of the vast igneous chain which sweeps round from Sumatra and Java through the Lesser Sunda groups and the Moluccas northwards to Formosa and Japan. In the Philippines the first link in this system going southwards is the volcanic islet of Babuyan on the north coast of Luzon; but beyond the remarkable volcano of Taal (1320 feet), near Manilla Bay, the chain ramifies into an eastern and a western branch, which traverse the whole of the archipelago, and which are continued seawards by the insular chains of Sulu and Sanguir. The eastern branch develops the lofty cones of Mayon (9000 feet) and Bulusan at the south-eastern extremity of Luzon, while the western branch gives rise to those of Malaspina and Bacon in Negros and Camiguin near the north coast of Mindanao; in this island the two chains converge at the head of the Gulf of Davao, where they culminate in Apo (10,400 feet), highest point in the Philippines. These various ranges, which cover nearly the whole surface of the archipelago, leaving room for scarcely any plains except about the lower courses of the rivers, consist mainly of very old eruptive rocks, in many places covered by later tertiary, quaternary, and modern scoriæ and lavas. The underground forces are still active, and reveal themselves by tremendous eruptions, such as those of Mayon in 1766 and of Daraga in 1814, and especially by earthquakes, which are almost continuous, keeping the seismographs of the observatory at Manilla in a constant state of vibration. Manilla itself was nearly destroyed by the earthquake of 1863, which was followed by the disastrous convulsions of 1872 and 1880 at Surigao and in many parts of Mindanao. The navigation of the inland waters is endangered not only by these disturbances, but also by the conflicting currents caused by opposing tidal waves, and by the cyclones, here called typhoons, which range as far south as about 10° N. lat. (see Map at ASIA).

Owing to the parallel disposition of the mountain-ranges, space is afforded for the development of several large rivers, such as the Cagayan (Rio Grande), which drains about one-fourth of Luzon, flowing for 220 miles northwards between the Sierra Madre and the North Cordillera east and west; the Agno and Pampangan on the west side of the same island; and in Mindanao the Agusan (Butuan), navigable by large vessels for over 60 miles, and the Rio Grande di Mindanao, which flows from Lake Magindanao in the centre of the island first south-west then north-east to Illana Bay in the Celebes Sea. This river is joined by the emissaries of several other lakes, and a characteristic feature of the landscape in most of the islands is the large number of lacustrine basins, which send their overflow through short coast-streams to all the surrounding waters. The most important and best known of these emissaries in Luzon are the Pansipit, which drains Lake Bourbon, and the Pasig, which flows from the Laguna de Bay to Manilla. Several of the basins appear to be flooded craters, while others are of marine origin, bays and inlets cut off from the sea by the eruptive matter ejected from the neighbouring volcanoes in former geological epochs.

Thanks to the general elevation of the land, and the prevailing sea-breezes, the climate, although moist and hot, is less insalubrious than that of most tropical lands. The fevers are generally of a somewhat mild, intermittent type, and the most dreaded maladies are consumption, dysentery, and anæmia; leprosy exists in Luzon, but its ravages are confined to small areas. As elsewhere in the Eastern Archipelago, there are two seasons, a wet and a dry, which are determined by the trade-winds, but which, owing to the peculiar configuration of the land, may be said to go on simultaneously. Thus, for all the southern and western slopes, the south-west monsoon is the wet, the north-east the dry season, the recurrence of these periods being reversed on the opposite slopes of the same ranges. At Manilla, which is exposed to the south-west winds, the rains last from June to November, dry weather for the rest of the year; but this succession is elsewhere constantly modified, especially by the trend and altitude of the mountain-chains. On the other hand, the temperature varies little throughout the year, ranging from about 77° F. in December (the coldest month) to 86° F. in May (the hottest month), while the greatest extremes recorded at the Manilla Observatory are not more than 25 degrees (66°—91°). But the rainfall varies enormously, from ⅛ inch in March to 20 inches in August, with a yearly average of 68 to 70 inches.

The indigenous flora, which is nowhere surpassed in variety and exuberance, indicates a long connection of the Philippines with Indo-Malaysia, and more transitory relations with Austro-Malaysia, through Celebes. Thus all the local genera are represented in the Great Sunda Islands and Malay Peninsula, but only very few in the Australasian world; absolutely independent forms are extremely rare, and generally represented only by a single type. Vast spaces are still covered with magnificent primeval forests containing a great number of dyewoods, fine, hard-grained, medicinal and other useful plants, such as ebony, sapan, tamarind, guinguina, the incorruptible magkono (a myrtacean), banyan, cocoa-nut, pandanus, nipa, and many other palms, bamboo, tree-ferns. Specially numerous are the fibrous plants, such as the gigantic bejuco, the buri, cabonegro, and abaca (Manilla hemp). On the plantations are grown several varieties of rice, maize, sugar-cane, cotton, coffee, and tobacco, the last mentioned second only to that of Cuba. Above 6000 feet the forest and alpine floras are almost exclusively Malaysian, and nearly identical with those of Borneo and Sumatra.

The native fauna is remarkable for the total absence of many large mammals, such as the tiger, elephant, rhinoceros, bear, tapir, orang-outang, which nevertheless occur in the Sunda Islands. Hence the only dangerous animals are the crocodile, snakes, and some other reptiles. The largest wild mammal is the buffalo, and next to it the gibbon, besides which there are several other species of apes and lemurs, three or four varieties of antelope, and a small deer resembling the Javanese *muntjac*. The carnivora are chiefly represented by several species of civet, the insectivora by the porcupine, and bats and squirrels abound in all the woodlands. Birds are very numerous, and the gallinacean family especially presents some remarkable forms, such as the laburgo (*Gallus bankiva*) and the bulicsigay, noted for its size, courage, and beautiful plumage. An endless variety of forms is also offered by the insect world, while the fresh and marine waters abound in fishes, turtles, molluscs (including both the pearl and mother-of-pearl oyster), sponges (euplectella and other exquisite varieties).

Of minerals the most widely diffused are coal and iron; copper also occurs, as well as gold, lead, sulphur, cinnabar, quicksilver, alum, besides jasper, marble, and fine building stones. Thermal waters, chiefly sulphurous and ferruginous, occur in many places, especially in Luzon. But the mineral resources of the archipelago are little developed, and mining operations are carried on in the most primitive manner.

The original inhabitants of the Philippines were undoubtedly the Negritos (*Aetas*, *Atas*, *Itas*), who at one time occupied the whole of the archipelago, but are now reduced to a few isolated groups numbering altogether less than 20,000, scattered over the remoter parts of Luzon, Negros, Mindanao, and several other islands. Half-caste Negrito communities are extremely numerous, this indigenous element having almost everywhere amalgamated with the intruding Indonesian and Malay peoples, who at present constitute the great bulk of the population. The Indonesians (see MALAYS) are mostly 'Infieles' (i.e. pagans), whereas nearly all the Malays are either 'Indios' (i.e. Roman Catholics) or 'Moros' (i.e. Mohammedans). Like the allied races of Sumatra, Borneo, and Polynesia, the Indonesians are distinguished by their tall stature, muscular frames, light-brown complexion, and regular features. Their chief tribes are the Apayaos, Tinguianes, Calanas, Guinaanes, Gaddanes, Igorrotes, Ifugaos, and Ilongotes of Luzon, about 60,000 altogether; the Cimarrones, Samars, and others of the Visayas, about 20,000; the Subanos, Manobos, Mandayas, Bilans, Guiangas, and Bagobos of Mindanao, where they are most numerous, 300,000, giving a total of about 380,000 for all the Indonesian tribes. The Moros (Orang-Islam, or Mohammedan Malays) are now reduced to from 250,000 to 300,000, chiefly confined to Palawan and Mindanao (Illanos, Lutancas, Sanguiles). All the rest of the Malays are Indios, or at least nominal Catholics, and comprise two main divisions, the northern Tagals of Luzon, about 3,000,000, and the central Visayas (Bisayas) of the Visayas Islands and parts of Palawan and Mindanao, about 2,500,000. The Tagal and Visayan languages are the most highly developed of all the Malayo-Polynesian forms of speech, and are gradually absorbing all the other numerous dialects of that family current throughout the archipelago.

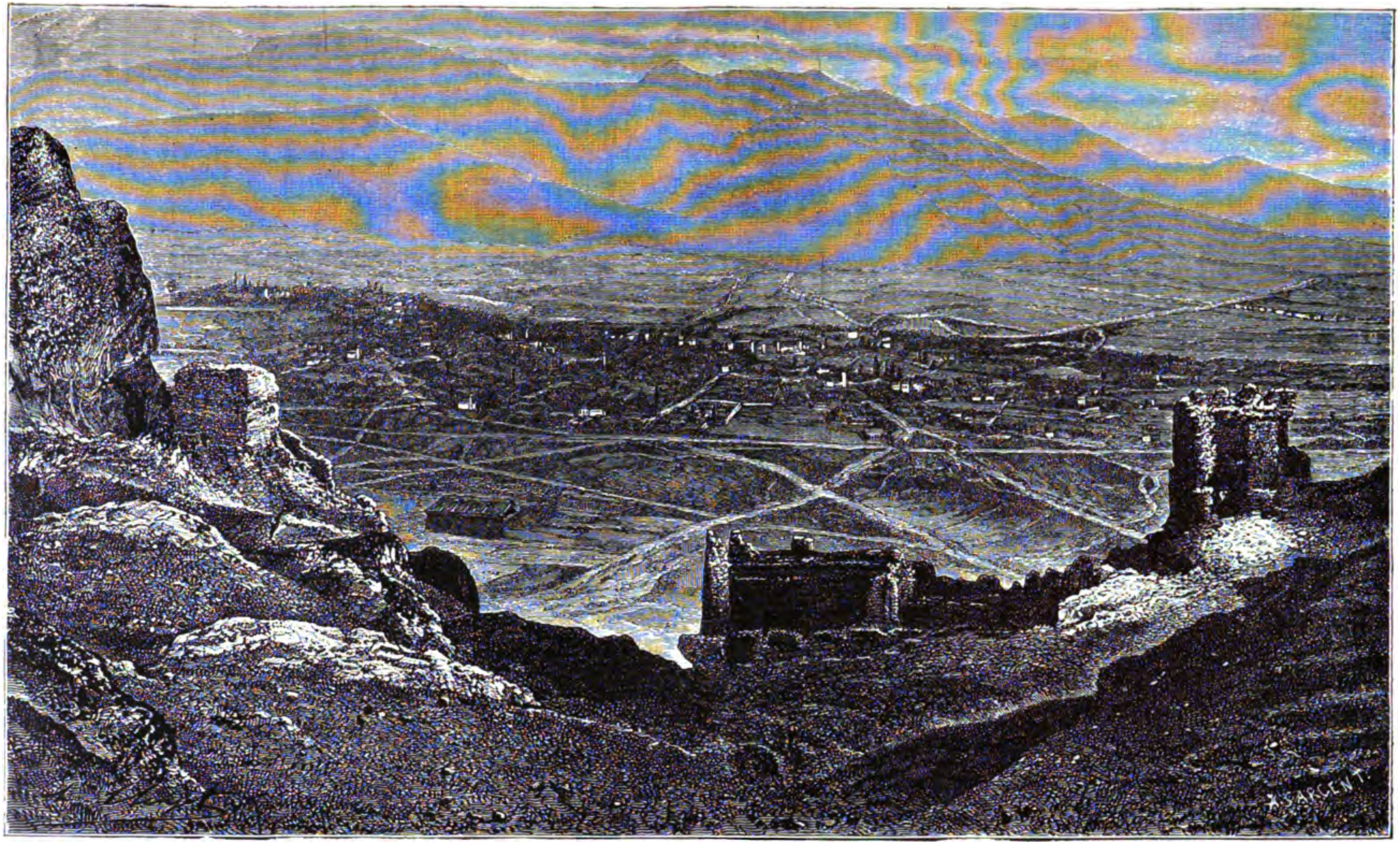
Discovered in 1521 by Magellan, who was killed on the islet of Mactan on April 27 of that year, the Philippines were officially annexed to Spain in 1569, and have since remained an integral part of the Spanish dominion. Manilla, the capital, was founded in 1571, and most of the archipelago was rapidly reduced, the numerous petty Malay chiefs (*dato*) generally accepting the title of gubernadorcillos, as administrators of their several territories. But the Mohammedans of Sulu and Mindanao long retained their independence, the sultan of Sulu having been deposed so recently as 1876, while many parts of Mindanao are still practically autonomous. The crown is represented by a governor-general and a captain-general, under whom are the four governors of Luzon, the Visayas, Mindanao with Sulu, and Calamianes with Palawan (Paragua) and Balabac. The governments are again subdivided into fifty-four provinces, ruled by alcaldes and commandants, under whom are the gubernadorcillos and local magistrates. Besides Manilla (pop. 270,000) there are several other considerable towns, such as Laoag (37,000), San Miguel (35,000), Banang (33,000), Cabaera (30,000), and Ilo-ilo (24,000). The chief exports are sugar (£2,400,000 in 1889), hemp (£1,600,000), and tobacco, including 120 million cigars (£500,000). Shipping, 435 vessels of 345,000 tons cleared; railways, 16 miles at Manilla; telegraphs, 720 miles and submarine cable to Hong-kong; army, 4800, with 3500 gendarmerie; navy, 2 corvettes, 6 avisos, 16 gunboats, manned by 2000 sailors and marines.

See Morga, *Sucesos de las Islas Filipinas* (Mexico, 1609; Eng. trans. Hakluyt Society series, 1868); Zuñiga, *Historia de Filipinas* (Sampaloc, 1803; Eng. trans. Lond. 1814); G. Mallat, *Les Philippines* (Paris, 1846); Buzeta, *Diccionario Geografico, &c., de las I. Filipinas* (Madrid, 1850); Sir J. Bowring, *A Visit to the Philippines* (1851); F. Jagor, *Die Philippinen und ihre Bewohner*, in *Zeitschrift für Ethnol.* (1870), and *Reisen* (Berlin, 1875); A. B. Meyer, *Die Einwohnerzahl der Ph.*, *Ueber die Negritos*, and *Album of Philippine Types* (Dresden, 1878-85); Semper, *Reisen* (Wiesbaden, 1879-91); Blumentritt, in 'Petermann's Mitteilungen,' 1882, &c.; S. Kneeland, in *Bull. American Geo. Soc.* (1883); Plant, *Journ. of Manchester Geo. Soc.* (vol. ii. 1886); Rolfe, *Journ. Linnean Soc.* (vol. xxi. 1887); Montero y Vidal, *El Archipiel. Filip.* (1886), and *Historia General de Filipinas* (1887); and John Foreman, *The Philippine Islands and Dependencies* (1892).

Philippo'polis, capital of Eastern Roumelia (or Southern Bulgaria), on the navigable Maritza, 110 miles by rail W. by N. of Adrianople. It manufactures silk, cotton, tobacco, leather, &c., and prepares and exports otto of roses (to the value of £55,000). Pop. (1893) 36,033, of whom nearly half are Turks, Greeks, and others than Bulgarians. An outpost of the Macedonian kingdom, it was ruined by the Goths, captured by the Turks (1363), destroyed by an earthquake (1818), burned (1846), and occupied by the Russians (1878).

Philippsburg, a town of Baden on the Rhine's right bank, 16 miles N. of Carlsruhe. Fortified till 1800, it was often besieged. Pop. 4922.

Philips, AMBROSE, minor poet, was descended from a Leicestershire family, and born about 1671. He was educated at St John's College, Cambridge, and contributed to the university memorial verses on the death of Queen Mary. Coming up to London he became intimate with Addison and Steele, did hack work for Tonson, and first gained a reputation by the 'Winter-piece' in the *Tatler* (No. 12) and the six Pastorals which opened the sixth volume of Tonson's *Miscellany* (1709), of which the first four volumes had been edited by Dryden. Strangely enough the same volume closed with the Pastorals of the young Pope, whose jealousy was aroused by Tickell's praising Philips and passing over himself, in his paper in the *Guardian* on Pastoral Poetry from Theocritus downwards. Pope took a characteristic revenge by a paper in the *Guardian* (No. 40), in which the worst of the verses of Philips were ironically exalted above the best of his own. His design he disguised with such dexterity that, though Addison discovered it, as Dr Johnson tells us, Steele was deceived, and was afraid of displeasing Pope by publishing his paper. Philips is said to have hung up a rod in Button's Coffee-house with which he threatened to chastise Pope on the first occasion. Pope nourished his anger against him, and all the more after his own quarrel with Addison to whose circle Philips belonged, and did not forget him in the *Dunciad*. Philips supported the government in the columns of the *Free-thinker*, and was rewarded by being made secretary to Archbishop Boulter in Ireland. Later he sat for Armagh, acted as secretary to the Lord Chancellor and judge of the Prerogative Court, and after his patron Boulter's death returned to London, and died in 1749. Of his plays, *The Distress'd Mother* (1712)—an adaptation from Racine's *Andromache*—was warmly praised in the *Spectator*; *The Briton* and *Humphry, Duke of Gloucester* lived only long enough to be damned. His *Pastorals* are vigorous and easy yet graceful verse, but lack the charm that belongs to Gay, whose *Shepherd's Week* was really written at Pope's



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instigation to take Philips off. Some of his odes, addressed to children, and written with infantine simplicity of diction, earned him from Henry Carey the lasting nickname of 'Namby-Pamby.'

See Johnson's *Lives*, and Pope's Correspondence in Elwin and Courthope's edition.

Philips, or PHILLIPS, EDWARD, the elder of the two nephews brought up and educated by Milton, the sons of his sister Anne, whose husband E. Phillips held a government office in Chancery, and died in 1631, leaving two sons to Milton's care. Edward Philips was born in 1630, and became a student of Magdalen College, Oxford, but left in 1651 without taking a degree. In 1663 he was tutor to the son of John Evelyn at Say Court in Essex. He is mentioned in Evelyn's Diary as 'not at all infected by Milton's principles,' yet certainly he entertained a great respect and admiration for his uncle, and not only extolled Milton in his *Theatrum Poetarum* as 'the exactest of heroic poets,' 'who hath revived the majesty and true decorum of Heroic Poesy and Tragedy,' but has left us a valuable though short and fragmentary *Life* of the poet. This was originally prefixed (1694) to a translation of Milton's *Letters of State*, but is now most accessible in Godwin's *Lives of E. and J. Philips* (1815, pp. 350-383), and is, as Johnson says, 'the only authentic account of Milton's domestic manners.' Of his numerous works may be mentioned a complete edition (the first) of the *Poems of Drummond* of Hawthornden (1656); *New World of English Words* (1658), a kind of dictionary, which went through several editions; the *Continuation* of Baker's *Chronicle of the Kings of England* (1665); *Theatrum Poetarum, or a Complete Collection of the Poets* (1675); the *Tractatulus de Carmine Dramatico Poetarum* in the 18th edition of Buchler's *Thesaurus* (1679); and *Tractatulus de Lingua Latina* (1682). Milton, says Aubrey, made his nephews songsters, and sing from the time they were with him, and verses by both are found in *Ayres and Dialogues for One, Two, and Three Voices*, by Henry Lawes (1653). Edward is supposed to have died shortly after the publication (1694) of the *Letters of State*.

Philips, JOHN, Milton's younger nephew and more peculiar charge, born in 1631, was, like his brother Edward, educated by his uncle, and frequently acted as his amanuensis. It may be supposed that Milton had formed a high opinion of his literary capability, since he entrusted to John rather than Edward the writing of the *Responsio ad Apologiam pro Rege et Populo Anglicano* (1652), himself correcting it with the utmost care. But if John was Edward's superior in ability, he was greatly his inferior in character, and persistently displayed an unnatural animosity to his uncle and benefactor. His next work was *A Satyr against Hypocrites* (1655), a bitter anti-Puritan poem and attack on Cromwell, written with considerable talent, but in a strain of coarse buffoonery. Somewhat in the style of Chaucer, he describes a Sunday in Cromwell's time, a christening, and a Wednesday fast with the extravagant supper at night. This production was frequently reprinted, and must have caused Milton no small disappointment and annoyance. In 1660 John amused himself and the world with his *Montelion* or the *Prophetical Almanac*, a low, scurrilous work, which was, however, extremely successful; he was also a most industrious translator, and in little more than a year (1677) published three large folio translations, *Almahide*, from the French of Madame de Scudéry, on which was founded Dryden's great tragedy, *The Conquest of Granada; Pharamond*, a lengthy French romance; and the *Six Voyages* of J. Baptista Tavernier. He died soon after 1706.

Philips, JOHN, described on the monument in Westminster Abbey erected by Sir Simon Harcourt to his memory as a second Milton. He was the author of three very popular poems, *The Splendid Shilling*, an imitation of Milton; *Cider*, an imitation of Virgil; and *Blenheim*, a Tory celebration of Marlborough's great victory. He was born in 1676, but, curiously enough, was registered at Winchester as five years, and at Christ Church, Oxford, as six years younger than he really was. He died in 1708, and was buried in the cathedral at Hereford.

Philips, KATHERINE, 'the matchless Orinda,' was born the daughter of a respectable Presbyterian London merchant, on New-year's Day 1631. A precocious child, she early became strongly royalist in feeling, and in her seventeenth year she married a worthy Welsh gentleman, James Philips of Cardigan Priory. Her earliest poem was an address to Henry Vaughan the Silurist, on the appearance of his *Olor Iscanus* (1651). About the same time she seems to have assumed her melodious *nom-de-plume* of Orinda, having formed among her neighbours of either sex a Society of Friendship, the members of which must needs be re-baptised—the ladies as Lucasia, Rosania, Regina, Valeria, Polycrite; the gentlemen as Palæmon, Silvander, Antenor (her own husband), and Poliarchus (Sir Charles Cotterel, her greatest friend, her forty-eight *Letters* to whom were published in 1705). Orinda is our earliest sentimental writer, and she has tears at will even for the marriages of the lady-members, which she resents as outrages on the sufficiency of friendship. Yet she was a worthy woman and good wife, despite her overstrained sentimentality, and deserved the honour of a dedication from Jeremy Taylor (*Discourse on the Nature, Offices, and Measures of Friendship*, 1659). She went to Dublin in 1662, and here Roger, Earl of Orrery, and the rest gave her a flattering reception. On a visit to London she caught smallpox, and died at thirty-three, June 22, 1664. At Dublin she translated Corneille's *Pompée*, and in her last year the greater part of his *Horace*. Her poems were surreptitiously printed at London in 1663, but an authoritative edition was issued in 1667. The matchless Orinda's poetry has long since faded into forgetfulness, despite the chorus of contemporary praise from Cowley and every poet of note. Keats found her poems in 1817 while writing *Endymion*, and in a letter to Reynolds speaks of them as showing 'a most delicate fancy of the Fletcher kind.' Mr Gosse conjectures the scarce volume of *Female Poems* (1679) 'written by Ephelia' to have been the work of Orinda's only daughter, Joan (born about 1654), who married Mr Wogan of Pembrokeshire in 1679.

See the admirable essay by Mr Edmund Gosse in *Eighteenth Century Studies* (2d ed. 1885).

Philipstown, a market-town of King's County, Ireland, 8 miles E. of Tullamore and 49 miles W. by S. of Dublin, takes its name from Queen Mary's consort, Philip of Spain. Pop. 829.

Philistines (Heb. *Pelishtim*; Gr. *allophuloi*, 'strangers'), a people mentioned in the Bible as being in frequent contact with the Jews, and who lived on the coast of the Mediterranean, to the south-west of Judæa, from Ekron towards the Egyptian frontier, bordering principally on the tribes of Dan, Simeon, and Judah. Our information about the origin of the Philistines is extremely obscure. The genealogical table in Genesis (x. 14) counts them among the Egyptian colonies (the 'Casluhim, out of whom came the Philistines'); according to Amos, ix. 7, Jeremiah, xlvii. 4, and Deuteronomy, ii. 23, they came from Caphtor—formerly, from mere resemblance of the word, identified with Cappadocia. Others have, groundlessly, derived them from the Pelasgians. Of late the tendency is to believe that the Philistines, who were undoubtedly immigrants, came from Crete, the collocation of Cherethites (Cretans) and Pelethites (2 Sam. viii. and xv.) favouring this view. But they seem to have become thoroughly Semitised in speech, their language being undistinguishable from pure Hebrew; and their gods Baalzebub and Dagon (q.v.) are apparently Semitic.

It is doubtful if Abimelech, king of Gerar (Gen. xxi., xxvi.), was king of this people or merely of the country afterwards Philistine; more probably the expulsion of the Danites (Judges, v., xviii.), presumably before the new invaders, marks their first appearance as aggressive enemies. They were subject to five princes, who ruled over the provinces of Gaza, Ashdod, Askalon, Gath, and Ekron. They were so powerful at the time of Eli that they carried away the ark itself. Under Samuel their rule was terminated by the battle of Mizpah. Saul was constantly engaged in warding off their new encroachments, and at Gilboa he and his sons fell in a disastrous battle against them. David succeeded in routing them repeatedly; and under Solomon their whole country seems to have been all but incorporated in the Jewish empire. The internal troubles of Judæa emboldened the Philistines once more to open resistance; but Hezekiah subdued their country with the aid of the Egyptians. The Assyrians afterwards took Ashdod; and in the time of the Maccabees the Philistines were Syrian subjects; by the time of Herod the name of the country had long been lost in that of Palestine. A civilised; agricultural, commercial, and warlike nation, they traded largely, and their wares seem to have been much sought after.

See the various histories of the Israelites cited at JEWS; Schrader's *Keilinschriften* (2d ed. 1883); Wright's *Comp. Gram. of the Semitic Languages* (1890).—German students call those who have ceased to be students, as well as non-students, tradesmen, &c., *Philister* or Philistines; hence the further sense of 'uncultured,' 'narrow-minded,' in which application the term has come to be used in Britain, especially through Mr Matthew Arnold's influence.

Phillimore, SIR ROBERT JOSEPH, born 5th November 1810, studied at Oxford, and, after serving in the Board of Control, had a brilliant career at the bar. He sat in parliament as a Whig from 1853 to 1857; and held in succession the offices of Advocate-general (1862, when he was knighted), Judge Advocate-general (1871), judge of the Arches Court (1867–75) and of the High Court of Admiralty (1867–83). Made a baronet in 1881, he died 4th February 1885. His most important works are his *Commentaries upon International Law* (4 vols. 1854–61; 3d ed. 1879), and his *Ecclesiastical Law of the Church of England* (2 vols. 1873; supp. 1876).

Phillip, JOHN, R.A., was born, an old soldier's son, at Aberdeen on 19th April 1817. He was apprenticed to a painter and glazier, but in 1836 was sent by Lord Panmure to London, where he was ere long admitted to the schools of the Royal Academy. In 1839 he began to exhibit in the Academy Exhibition. Most of his early subjects were of Scotch character, such as a 'Scotch Fair' and 'Baptism in Scotland.' In 1851 he went to Spain in search of health. On his return he became noted as a painter of the habits and customs of the Spanish people, and was known as 'Spanish Phillip.' In 1853 he exhibited 'Life among the Gypsies at Seville.' His pictures for 1854–55, 'A Letter Writer of Seville' and 'El Paseo,' were purchased by the Queen. In 1857 he became A.R.A., in 1859 R.A. 'The Marriage of the Princess Royal' (1860) was a success, as was also the 'House of Commons,' containing upwards of thirty portraits of the leading members of both sides of the House. But his main triumphs were in Spanish subjects, such as 'La Gloria' (1864) and 'El Cigarillo' (1864). He twice again visited Spain, and the year before his death in London (27th February 1867) made a short stay in Italy. The characteristics of his style are rich, powerful colour, broad light and shade, and directness of force.

Phillips, WENDELL, abolitionist, was born 29th November 1811, at Boston, Massachusetts, the son of the first mayor of the city (1822). He graduated at Harvard with Motley in 1831, studied law there, and was called to the bar in 1834. But before clients came he had been drawn away from his profession to the real work of his life. A timely and important speech in Faneuil Hall in 1837 made him at once the principal orator of the anti-slavery party; and henceforth, until the president's proclamation of 1st January 1863, he was Garrison's loyal and valued ally, his lectures and addresses doing more for their cause than can well be estimated. He also championed the cause of temperance, and that of women, and advocated the rights of the Indians. In 1870 he was nominated for governor by the Prohibitionists and the labour party. He died 2d February 1884. His speeches and letters were collected in 1863 (new ed. 1884); and there is a Life by G. L. Austin (Boston, 1888).

Phillipsburg, a city of New Jersey, on the Delaware River (crossed by two railroad bridges), opposite Easton, at the western terminus of the Morris Canal, and 73 miles W. of New York by rail. It contains a rolling-mill and several foundries, boiler- and locomotive-works, &c. Pop. (1890) 8644.

Philoctetes, a famous archer, the friend and armour-bearer of Hercules, who bequeathed him his bow and poisoned arrows. As one of the suitors of Helen, he led seven ships against Troy; but being bitten in the foot by a snake (or, according to one story, wounded by his own arrows), he fell ill. As his wound gave forth an unendurable stench, the Greeks left him on the island of Lemnos, where for ten years he spent a miserable life. But an oracle declared that Troy could not be taken without the arrows of Hercules, so Ulysses and Neoptolemus were despatched to bring Philoctetes to the Greek camp; where, healed by Æsculapius or his sons, the restored hero slew Paris, and helped powerfully in the taking of Troy. After the war he settled in Italy. The play of Sophocles is the only one of several written on the subject that has been preserved.

Philo Judæus, the Philosopher, was born at Alexandria, most probably about 20–10 B.C. Belonging to a wealthy family—his brother, according to Josephus, was the alabarch or arabarch Alexander—he received the most liberal education; and such was his zeal for learning that at a very early age he had passed through the ordinary course of Greek studies. Although every one of the different free sciences and arts included in the *Encyclika*, he says, attracted him like so many beautiful slaves, he yet aimed higher, to embrace the mistress of them all—Philosophy. Metaphysical investigation was the only thing which, he tells us, could give him anything like satisfaction or pleasure. He was intimately acquainted with Plato, the Greek tragedians, and Homer, and he speaks with the warmest praises of the Stoics and the Pythagoreans. With these and especially with Plato his affinities are closest—an old proverb runs: ἢ Πλάτων φιλωνίζει ἢ Φίλων πλατωνίζει. Yet with all his Greek culture he remained a Jew, holding Jewish philosophy as the highest wisdom.

the divine revelation given to Moses as the source of all true knowledge in religion. He had completely mastered the literature of his nation, but, strange to say, was by no means a profound Hebrew scholar. When over fifty years of age he went to Rome as the advocate of his Alexandrian brethren, who had refused to worship Caligula in obedience to the imperial edict. His *De Legatione ad Caium* gives a vivid account of this embassy. Of his life we know little except what is recorded above, and that he once went to Jerusalem. His second mission to Rome, to the Emperor Claudius, on which occasion Eusebius reports that he made the acquaintance of the apostle Peter, is doubtful.

The religious and philosophical system of Philo, however, is most minutely known, and deserves the most careful study on account of the vast influence which it has exercised both on the Jewish and Christian world. To understand his system aright it will be necessary to recall to memory the strange mental atmosphere of his day. The Alexandrines had endeavoured to make Judaism palatable to the refined Greeks, by proving it to be identical with the grandest conceptions of their philosophers and poets, and had quite allegorised away its distinctive characteristics. Philo was the first man who, although himself to a great extent imbued with allegorising tendencies, made a bold and successful stand against a like evaporisation of the revealed religion of his fathers; which, indeed, in many cases had led people to throw off its yoke also outwardly. Himself a most zealous champion of Judaism, his bitterness knows no bounds in rebuke of those co-religionists who tried to defend their secret or overt apostasy by scoffing at the Law itself, who were 'impatient of their religious institutions, ever on the lookout for matter of censure and complaint against the laws of religion, who, in excuse of their ungodliness, thoughtlessly argue all manner of objections.' He cannot understand how Jews, 'destined by divine authority to be the priests and prophets for all mankind,' could be found so utterly blind to the fact that that which is the position only of a few disciples of a truly genuine philosophy—viz. the knowledge of the Highest—had by law and custom become the inheritance of every individual of their own people; whose real calling, in fact, it was to invoke the blessing of God on mankind, and who, when they offered up sacrifices 'for the people,' offered them up in reality for all men.

To Philo the divinity of the Jewish law is the basis and test of all true philosophy. Although, like his contemporaries, he holds that the greater part of the Pentateuch, both in its historical and legal portions, may be explained allegorically—nay, goes so far even as to call only the Ten Commandments, the fundamental rules of the Jewish theocracy, direct and immediate revelations, while the other parts of the Book are owing to Moses—he yet holds the latter to be the interpreter specially selected by God, to whose dicta in so far also divine veneration and strict obedience are due; and again, while admitting that many explanations of a metaphysical nature may be given to single passages, yet demands in general that their literal meaning shall not be tampered with. This literal meaning, according to him, is the essential part, the other explanations are mere speculation—exactly as the Midrash and some Church Fathers hold. At the same time it is true that, without denying the literal meaning, again and again he puts forward the allegorical meaning as the one really divine, and indeed sometimes he treats the literal meaning as absurd. Only the allegorical method in his hands differed in so far from that of his contemporaries that to him these interpretations—for which he did not disdain sometimes even to use the numbers symbolically, or to derive Hebrew words from Greek roots, and the like—were not a mere play of fancy, in which he could exercise his powers of imagination, but, to a certain extent, a reality, an inner necessity. He clung to philosophy, as combined with the Law. If the former could be shown, somehow or other, to be hinted at in the latter, then only he could be that which all his soul yearned to be—viz. the disciple of both: a Greek, with all the refinement of Greek culture, and a Jew—a faithful, pious, religious Jew. Nay, he even urged the necessity of allegory from the twofold reason of the anthropomorphisms current in Scripture and from certain apparent superfluities, repetitions, and the like, which, in a record that emanated from the Deity, must needs have a special meaning of their own which required investigation and a peculiar interpretation. Yet this fanciful method never for one moment interfered with his real object of pointing out how Judaism most plainly and unmistakably was based upon the highest ethical principles.

His writings develop his ideas and his system in the two directions indicated. In that division of his writings principally which treats of the Creation (κοσμοποιΐα) he allows allegory to take the reins out of his hands; in that on the Laws (νόμοι), on the other hand, he remains remarkably sober and clear, extolling the Mosaic legislation throughout at the expense of every other known to him. In a very few instances only is he induced to find fault, or to alter slightly, by way of allegory, the existing ordinances.

His idea of God is intended to be in the highest degree philosophical, though its religious significance is never lost sight of. God alone is the real Good, the Perfect, the final cause of all things, which ceaselessly flow outwards from Himself. God is only to be imagined as the primeval light, which cannot be seen by itself, but which may be known from its rays that fill the whole world. Being infinite and uncreated, He is not to be compared with any created thing. He has, therefore, no name, and reveals Himself only in designations expressive of this 'inexpressibility,' such as 'the Place' (the Talmudical *Makom*), because He comprises all space, and there is nothing anywhere besides Him. He is better than Virtue and Knowledge, better than the Beautiful and the Good (καλοκἀγαθία), simpler than the One, more blissful than Bliss. Thus He has properly speaking no quality, or only negative ones. He is the existing Unity or Existence itself (ὁ ὤν), comprised in the unpronounceable Tetragrammaton. As Creator, God manifests Himself to man, and in this phase of active revelation of God, which is as natural to Him as burning is to the heat, and cold to the snow, may be distinguished two distinct sides or essential properties, the Power and the Grace, to which correspond the two Scripture names of Elohim and Adonai. The *Power* also gives the laws and punishes the offender; while the *Grace* is the beneficent, forgiving, merciful quality. Yet, since there is not to be assumed an immediate influence of God upon the world, their respective natures being so different that a point of contact cannot be found, an intermediate class of beings had to be created to stand between both, through whom He could act in and upon creation—viz. the spiritual world of ideas, which are not only 'Ideals,' or types, in the Platonic sense, but real, active powers (δυνάμεις), surrounding God like a number of attendant Beings. They are His messengers, who work His will, and by the Greeks are called good *dæmons*, by Moses *angels*. There are very many different degrees of perfection among them. Some are immediate 'serving angels;' others are the souls of the pious, of the prophets, and the people of Israel, who rise higher up to the Deity; others, again, are the heads and chief representatives of the different nations, such as Israel does not need, since they conceive and acknowledge the Everlasting Head of all Beings Himself. Collectively the Powers are used as equivalent to the nature or essence of God—his ideas or thoughts dominating and informing the universe; yet they are far from being substitutes for God. Zeller maintains that in Philo's doctrine of the Powers two representations cross each other—the religious notion of personal, and the philosophical of impersonal, mediators. Edersheim also asserts that here Philo's philosophy and theology are hopelessly at issue, the δυνάμεις being undoubtedly represented as *hypostases*, while yet they have no true personal subsistence. Dr Drummond refuses to admit that Philo imputed personality to the Powers, or that he identified them with the angels. Schürer maintains that we cannot deny definitely the personification of the λόγοι or δυνάμεις, since Philo conceived of them both as independent hypostases and as immanent determinations of the Divine existence.

The *Logos*, or Divine Reason, comprises all these intermediate spiritual powers in His own essence. It is the universal idea, the one supreme and all-embracing thought which unifies everything into a real cosmos—a property of God, and the representative of God in His relation to the created world. As such the Logos is the highest of the angels, the Beginning, the Name, the Word, the Primeval Angel, the first-born son of God, the second God (δεύτερος θεός, in opposition to ὁ θεός). As the expressed Thought of God it has a twofold aspect regarded as the *uttered* and the *inward* Logos, although this is not formally expressed by Philo. It becomes objective in the harmonies of the created world, and stands distinct from the same Thought when hidden in the silent depths of God, and known only to His omniscience. The Logos formed the world out of chaotic matter, regarded as a mass occupying space, and now considered as the μὴ ὄν of Plato, again as the οὐσία of the Stoics. Man is a microcosm, a little world in himself, a creation of the archetypal Logos, through whom he participates in the Deity, or, as Scripture has it, 'he is created in the image of God.' He stands between the higher and lower beings—in the middle of creation. . The ethical principles of Stoicism Philo identified with the Mosaic ethics, in which the ideal is most exalted moral perfectibility or sanctity, and man's duties consist in veneration of God, and love and righteousness towards fellow-men. Philo holds firmly the belief in immortality. Eternity is the motionless duration of unalterable being; time but the moving succession of ever-shifting phenomena. Man is immortal by his heavenly nature; but as there are degrees in his divine nature, so there are degrees in his immortality, which only then deserves this name when it has been acquired by an eminence of virtue. There is a vast difference between the mere living after death, which is common to all mankind, and the future existence of the perfect ones. Future recompense and punishment are not taken by him in the ordinary sense of the word. Virtue and sin both have all their rewards within themselves; but the soul, which is 'pre-existing,' having finished its course in the sublunar world, carries this consciousness with it in a more intense and exalted manner. Paradise is Oneness with God; there is no hell with bodily punishments for souls without a body, and no Devil in the Philonic system. Dr Drummond has succeeded in proving against Dähne and others that matter, though eternal, is purely passive, and not itself necessarily evil in Philo's teaching. The source of the imperfection is not in the material as opposed to the spiritual, but in the phenomenal as opposed to the eternal. The human πνεῦμα is itself an emanation from Deity, subject meantime to the bondage of sense, and the loftiest principle of ethics is the utmost possible renunciation of sensuousness. The direct vision of God is possible only for those souls which have been lifted out of themselves and illumined by renunciation and severe purity. And transcending this ecstasy is the complete deliverance from the body beyond the gates of death, when the soul that has freed itself in life from the bondage of sense returns again to its original condition as pure spirit.

Philo's Messianic notions are vague in the extreme, and he partly even interprets certain scriptural passages alluding to some future Redeemer as referring to the soul. Yet he indicates his belief in a distant time when some hero will arise out of the midst of the nation who will gather all the dispersed together; and these, purified by long punishments, will henceforth form a happy, sinless, most prosperous community, to which all the other nations will be eager to belong. Still the Messianic hope is very obscure, and Dähne's identification of the Logos with the Messiah is indefensible.

We have only been able to indicate, in the slightest of outlines, the principal features of Philo's theology and philosophy, without endeavouring to follow any one of the manifold systematic schemes into which his scattered half-obscure dicta have been pressed. His method of exegesis and the main elements of his religious philosophy passed into the Christian church, and exercised a powerful influence over its thinkers. Nor can Philo ever lose his importance in the history of thought as the earliest eclectic religious philosopher, the first to construct a real philosophy of religion, in which were harmonised the rational and the irrational—the results of speculative thought with the suppositions of a supernatural revelation.

Philo's writings are numerous, and their arrangement presents no small difficulty to the student. Many of his writings in the list given by Eusebius (*H.E.* ii. 18) are lost, but the bulk even of these have been preserved in the Fathers and early Christian writers, like Eusebius, who quote Philo to an enormous extent. Many detached portions have also been preserved in the *Florilegia* and similar compilations of the earlier Christian Parallelists. The first and very imperfect edition of the Greek text was that published by Turnebus (Paris, 1552), containing only thirty-nine treatises. The best is still that of Thomas Mangey (2 vols. folio, Lond. 1742), but a satisfactory collected edition is still a desideratum, neither that promised by Grossmann so long ago as 1829, nor that for which Tischendorf collected materials, ever having appeared. The *Libellus de Opificio Mundi* was edited by Leop. Cohn in 1889 as a specimen of a projected edition. Some writings of Philo preserved only in Armenian have been published in Latin translations by Jo. Bapt. Aucher (Venice, 1822, 1826); and Greek portions of greater or less extent have been given by Mai, Grossmann, Tischendorf, Cardinal Pitra, and Professor J. Rendel Harris (Cambridge Press, 1886). The more recently collected materials are contained in the hand edition of C. E. Richter (8 vols. Leip. 1828–30) and the Tauchnitz stereotype edition (8 vols. Leip. 1851–53). See the brief account of each book in Schürer's *Hist. of the Jewish People* (div. 2, vol. iii. 1886) in Clark's translation. An important contribution to Philo bibliography is that by L. Massebieau (Paris, 1889). There is an Eng. trans. by C. D. Yonge in Bohn's 'Eccles. Library' (4 vols. 1854–55).

More than three-fourths of what has come down to us from Philo consists of three chief works on the Pentateuch: (1) Ζητήματα καὶ λύσεις (*Quæstiones et Solutiones*) —in Armenian—a short explanation of Genesis and Exodus in question and answer; (2) Νόμων ἱερῶν ἀλληγορίαι, a large allegorical commentary on Genesis, in which the history is interpreted as a system of psychology and ethics, itself filling almost the whole of Mangey's first volume, and consisting of a series of sixteen special treatises; (3) a group of compositions intended as an *Exposition of the Mosaic legislation for non-Jews*, and falling naturally into three divisions—an Account of the Creation (*κοσμοποιΐα*, *De Opificio Mundi*), the Biographies of Virtuous Men, and the Legislation proper. Besides these have been preserved, either entire or in fragments, the following works: Περὶ βίου Μωϋσέως (*Vita Mosis*), Περὶ τοῦ πάντα σπουδαῖον εἶναι ἐλεύθερον (*Quod omnis probus liber*), Εἰς Φλάκκον (*Adversus Flaccum*) and Περὶ ἀρετῶν καὶ πρεσβείας πρὸς Γάϊον (*De legatione ad Caium*), Περὶ προνοίας (*De Providentia*), Ἀλέξανδρος ἢ περὶ τοῦ λόγον ἔχειν τὰ ἄλογα ζῶα (only in Armenian), Ὑποθετικά (known only from Eusebius), and Περὶ Ἰουδαίων.

Other works now generally regarded as spurious are *De Incorruptibilitate mundi*, *De Mundo*, and *Interpretatio Hebraicorum nominum*. The *De Vita contemplativa* was attacked with much learning by P. E. Lucius (*Die Therapeuten und ihre Stellung in der Geschichte der Askese*, Strasburg, 1879), but is ably defended by Edersheim in his article 'Philo' in Smith's *Dict. of Christ. Biography*.

See Gfrörer, *Philo und die Alexandrinische Theosophie* (2 vols. Stuttgart, 1831); Dähne, *Geschichtliche Darstellung der Jüdisch-Alexandrinischen Religions-Philosophie* (2 vols. Halle, 1834), also his article in Ersch and Grüber; Keferstein, *Philo's Lehre von den göttlichen Mittelwesen* (Leip. 1846); Siegfried, *Philo von Alexandria als Ausleger des Alten Testaments an sich selbst und nach seinem geschichtlichen Einfluss betrachtet* (Jena, 1875); Zeller, in part iii. div. 2 of *Die Philosophie der Griechen* (3d ed. 1881); Edersheim's *Life and Times of Jesus the Messiah* (2 vols. 1883); and Principal Drummond's admirable *Philo-Judæus, or the Jewish-Alexandrian Philosophy in its Development and Completion* (2 vols. 1888).

Philo of Byblus. See PHŒNICIA.

Philology. The meaning of this term has varied curiously. As we find it first employed by Plato, it meant the love of discussion, limited practically to the moral and social questions in which Plato delighted; and the method of such discussion was the Socratic one. At Alexandria the 'philologer' was busied with all the knowledge of his day brought together for the first time in the great library of the Ptolemies. Thus, Eratosthenes, who applied this term to himself, was specially famous as a writer on astronomy. But the great scholars of Alexandria applied themselves with especial eagerness to the study of the older Greek literature. Men like Zenodotus and Aristarchus compared the numerous MSS. of Homer, selected the best texts, made lists of difficult words, called *glossæ*—the earliest dictionaries—and were the founders of the science of criticism by establishing canons on which they rejected what they deemed spurious in the copies before them. Two centuries later at Rome Cicero, who uses the word not unfrequently in his letters, applies it to study in general. But ever after the Alexandrian time 'philology' was essentially the intelligent critical study of the traditional learning of the past. It widened again at the revival of learning to include the study of grammar, rhetoric, poetry, archæology —in a word, all the 'humane' studies. And this wider sense clung to the word. Johnson in the last century defines a philologer as 'one whose chief study is language, a grammarian, a critick.' Yet Watts, whom he quotes as one of his authorities for the use of the word, says that 'studies called philological are history, language, grammar, rhetoric, poesy, and criticism.' In fact philology was the study which interpreted the best writings; and these writings were Greek and Latin; and in these languages were to be found the most noteworthy speculations on all matters of human interest. So philology had its special and its wider sense. Since the middle of the 19th century the use has been changing in a different direction. Through the discovery of Sanskrit the scientific comparison of Greek and Latin with other languages became possible. That study was called 'comparative philology.' But this term is cumbrous, and in England, and to some extent in France, it is customary to speak in this sense of 'philology' alone. So, whereas formerly philology meant pre-eminently the knowledge, grammatical, critical, exegetical, which enabled men to explain the most important literature of the world, it now is becoming limited to the study of language apart from the literature embodied in it—to the science which deals with the origin, development, and general character of the different families of speech throughout the world and of human speech as a whole: to which, therefore, the most highly cultivated languages may be not more important than languages which have hardly any literature or none at all: because such languages develop naturally, whereas literary languages are subject to artificial restraint. In Germany, it may be noted, this special study of language is called not 'Philologie' but 'Linguistik.'

It must not be supposed that this scientific study of language as an end in itself has superseded the older philology of a Bentley or a Porson. Rather, it has helped it by throwing light on the forms and meaning of words and phrases isolated or obscure in one language, but frequent and clear in another. But indeed the work of the critical scholar of the present day has been widened to a degree which could not have been realised three generations ago. First, the art of interpretation has been developed; the old storehouses of MSS. have been more fully searched; the principles of palæography are more widely known, so that we have many more scholars capable of dealing at first hand with MSS., of deciding upon their age, origin, and relative value. The sister-art of epigraphy, which deals with inscriptions, has ever-increasing material to work upon. Secondly, the science of archæology has been almost re-created. Explorations in all parts of the Hellenic world—Attica, Delphi, Peloponnese, Cyprus, and Asia Minor—especially the recent search in the Acropolis at Athens, have profoundly affected our ideas of Greek art, both plastic and constructive. The long-continued excavations at Pompeii have shown us the domestic life of the 1st century in the most minute detail. There can be no doubt that we have yet much to learn, and that the zeal of modern students will be equal to the task. Again, historical inscriptions and coins have corrected and supplemented the statements of ancient writers, and have often given us unexpected and perfectly trustworthy information as to periods unrepresented in any literature. These and other auxiliary sciences have given new life and meaning to the scholar's work. They make it at once more satisfying and more difficult: there is so much more to be known. Formerly a really great scholar could master the whole domain of knowledge; now every man must depend for something on the labours of others.

The study of philology, especially the study of grammar, after it was transplanted from Alexandria, flourished at Rome in the imperial time. It lingered on at Constantinople till the line of great grammarians ended in Priscian; while lexicography culminated later in the work of Photius and of Suidas. But it was in Italy that the study of antiquity became again a living thing: Italians in the 14th and 15th centuries discovered in Italy, Germany, and France works of the greatest Roman writers, such as Cicero and Lucretius, which had remained for generations buried in convents; it was to Italy that learned Greeks, especially after the sack of Constantinople, came to teach the Greek language at Florence and at Venice, and brought with them the MSS. of Thucydides and of Plato, to be translated by Valla and by Ficinus; and it was in Italy that the results of their labours were first published to the world at large by the great houses of the Manucci and the Giunta. But with the exception of Faerno Italy had no great scholar. Yet by its connection with France it produced scholars in northern Europe. Budé was secretary to Louis XII., whose main interests were in Italy; Lambin visited Rome and Venice before he became the editor of Horace, of Lucretius, and of Cicero; while Muret, though born near Limoges, lived and worked at Rome from 1559 to his death in 1585, and at Rome he lodged for two years the young Joseph Scaliger, destined to become the foremost of European scholars. Italian by descent, but born in France, where he edited his *Manilius* and wrote his *De Emendatione Temporum*, the first great work in historical criticism, he was led by his conversion to Protestantism eventually to retire from France to Leyden, where he ended his days, the dictator of the world of letters. Isaac Casaubon, a leader in exegesis, as Scaliger was in criticism, though born at Geneva, was the son of a French Huguenot refugee, and in France he lived during the greater part of his life, till like Scaliger he found a securer home elsewhere—in Protestant England. Justus Lipsius, the third great scholar of the day, was a Belgian, professor successively at Jena, at Leyden, and at Louvain; he also had travelled in Italy.

Of the members of the older German school the most famous was Erasmus, by birth a Hollander, but the centre of a band of able scholars at Basel, where he spent the last sixteen years of his life, well known in England, and for a short time a professor at Cambridge, a man of vast learning, but not a master in criticism, 'the man of letters, the first who had appeared in Europe since the fall of the Roman empire' (Mark Pattison). He lived some three years in Italy, but gained, as he thought, nothing from it. Able scholars were Camerarius, professor at Leipzig, and Gruter of Antwerp, the first great collector of Greek and Latin inscriptions.

For different reasons France and Germany ceased to be the nurse of scholarship in the 17th century. The reign of Louis XIV. fostered modern rather than ancient literature; and Germany was the scene of furious war. But Scaliger's influence lived on in Holland. At Leyden, where he died, lived Daniel Heinsius and his son Nicolas, Gronow, conspicuous for his skill in appreciating MSS., and Clüwer, the first great writer on geography. At the same time Graefe was editing Cicero at Utrecht. Somewhat later in England lived the first of English scholars, Richard Bentley, in frequent correspondence with Dutch scholars, but owing nothing to them, a man whose astounding critical power could not always save him from errors due to his self-confidence. The only other Englishman whose fame, like Bentley's, has steadily grown with time was Richard Porson, professor of Greek at Cambridge at the end of the 18th century. Distinguished names in the school of Holland in the 18th century are Hemsterhuis and his pupils Ruhnken and Valckenaer. In Germany we find Ernesti at Leipzig, the editor of Cicero; his scholar, Heyne, the founder of the school of Göttingen; Reiske of Leipzig, skilled not only in Greek and Latin, but also in Arabic, whose edition of the Greek orators is still in use; Winckelmann, the first great writer on ancient art; Wolf, professor at Halle, best known as the great Homeric critic, but whose general power and method almost entitle him to a place by the side of Scaliger and Bentley. Scholars of a later date, whose lives extended far into the 19th century, are Immanuel Bekker, professor at Berlin, editor of Plato, Thucydides, the orators, and Aristophanes; Godfrey Hermann, a scholar of unusual breadth, whose fame rests securely upon his work on Æschylus; Welcker, professor at Bonn, the first who combined the study of Greek art, literature, and mythology; K. O. Müller, whose services to the study of ancient history were cut short by his premature death; F. Ritschl, professor at Bonn, the restorer of the text of Plautus, as Lachmann at Berlin was the restorer of Lucretius. We have only of late suffered the loss of H. A. J. Munro of Cambridge, the inheritor of Lachmann's labour on Lucretius; of Madvig the Dane, a Latin scholar of eminent acuteness; and of Cobet, in whom the critical power of Holland seemed to be renewed again. (An excellent sketch of the history of classical philology, by Dr L. von Urlichs of Würzburg, will be found in the first volume of Iwan Müller's *Handbuch der Klassischen Altertumswissenschaft*.)

Speculations on the connection of Greek and Latin—e.g. that Latin was derived from some Greek dialect, and that both, as well as all the other languages of the earth, must be derived from Hebrew—are not wanting in the writings of the older scholars. It was reserved for an Englishman, Sir William Jones, in 1786, to point out that Sanskrit, Zend, Greek, Latin, Gothic, and Celtic belong to the same family; and for Franz Bopp, born at Mainz in 1791, to become the founder of the special science of comparative philology. In his 'conjugation-system,' published at Frankfort in 1816, he worked out the details of the principle already established by tracing out the history of the verb inflections of the Greek, Latin, Old Persian, and Teutonic as compared with Sanskrit. His monumental work, the *Comparative Grammar*, appeared at different times between 1833 and 1852. In this he lays down the phonetic laws of the several languages, and traces their grammatical forms back to their common origin in a lost 'Indo-Germanic' speech. It is impossible here to describe the development of this work in the hands of the singularly able men who laboured at it in the same generation, such as Jakob Grimm, the founder of the scientific study of the Teutonic languages; Pott, the most learned and voluminous of writers; Benfey, the acute philologist and accomplished Sanskritist. The most successful application of the science to Greek was made somewhat later by Georg Curtius, and to Latin by Corssen, and in France by Michel Breal. The common principle of all these writers was that the never-ceasing change in every language is regulated by law; that in each language there is a regular sequence of sound, one passing into the other, not by chance or by the will of any speaker or speakers, but in a definite ascertainable course: and that only by the knowledge of these sequences, commonly but not very wisely termed 'laws,' can the science of language exist. One of the best known of these is the sound-change commonly called 'Grimm's Law,' which states the fact that whenever we find a *k*, *t*, or *p* in Sanskrit, Greek, Latin, and (inferentially) in the common parent-language, we shall find in English and most other Teutonic languages an *h*, *th*, *f*—e.g. *καρδ-ια* (Lat. 'cord-') will appear as 'heart,' 'tres' as 'three,' 'pes' as 'foot;' that *g*, *d*, *b* will appear as *k*, *t*, *p* ('genus' = 'kin,' 'duo' = 'two'); and aspirates (*gh*, *dh*, *bh*) will appear as *g*, *d*, *b* (e.g. Ind.-Ger. 'ghans' = 'goose,' 'bhāgos' = 'beech'). Further, that a subsequent 'shifting' of the same kind, but much less complete, took place many centuries later in Germany itself, and produced there the changes which distinguished the dialects of South Germany ('High') from those of the north ('Low German,' or, as it is called in Germany itself, 'Platt-Deutsch') and from our own English—e.g. 'drei' from 'three,' 'zwei' from 'two,' &c. Such astounding uniformity of change over so large an area was well calculated to confirm the belief in the 'reign of law' in language. But that belief was certainly strengthened when in 1875 Karl Verner wrote a paper (published in Kuhn's *Zeitschrift*, vol. xxiii.) in which he showed that some apparent exceptions to Grimm's Law were really due to the operation of another and wider law (commonly called by his name) dating from variation of accent preserved by the old Teutonic from the parent-speech; in consequence of which at the present day a west Cumberland dalesman says 'fa*dd*er' and 'mu*dd*er,' but 'bro*th*er,' because in the parent-language (as attested by Sanskrit and Greek) the stress was laid on the last syllable in 'patér,' 'matér,' but on the first syllable in 'bhráter;' and every Englishman says 'lan*d*,' but 'ear*th*' (in the oldest Teutonic 'hlūdá' and 'értha,' with the final vowel still surviving), because the suffix (Ind.-Ger. -*to*) which was common to both was accented in the first word, but not in the last; so also 'min*d*,' but 'grow*th*' (suffix -*ti*), 'floo*d*,' but 'dea*th*' (suffix -*tu*). Here the regularity seems little less than miraculous; and it was discoveries such as this which led about this time to the rise of what is sometimes called the 'new school' of philology, men who in reality only press to their furthest limit the principles of their predecessors. For example, Curtius and Schleicher held that the operation of unvarying law in certain cases did not exclude the possibility of 'sporadic changes' —i.e. of changes found in some words only, not in every word in which the sound so affected occurred: thus, 'lacrima' in Latin shows an *l* instead of the *d* of the original word, as proved by Greek *δακρυ* and our 'tear;' but they did not therefore think it necessary that every *d* should pass into *l* in Latin.

The 'new school'—Leskien, Brugmann, Osthoff, Paul (to mention a few only of the most conspicuous members)—hold that sound-change so far as it is due to physical causes is absolutely uniform in any one language or dialect at the same time; and that the new form produced by such change in every case drives out the old one. Briefly put, phonetic law is invariable; there is no such thing as sporadic change—change attacking a few words, and sparing others; throughout the whole speech-area all words in which a particular sound occurs are alike affected. This doctrine has commanded very general assent; it is tempting to the scientific mind; and its strength lies in the number of apparent exceptions which have been satisfactorily explained. Yet the *a priori* arguments against it are strong, and it is certain that it is incapable of absolute proof: you cannot prove a negative. But the good done by its supporters in every branch of philology has been immense. They protested, and rightly, against the habit, seen in the later writings of Curtius and other lesser men in other languages, of allowing obvious exceptions to ascertained phonetic law on the ground of identity of function. Be the principle of the new men right or wrong, its observance in practice is excellent. But this protest is only one of the services of the new school. They (especially Paul) have called attention to the inner side of language; the older writers had spent themselves on the outer side. For language is both a physical and a psychical product. The sounds which make language are due to the physical apparatus of speech. As such their nature can be exactly ascertained, and they are subject to changes which can be known and registered like the sequences of any physical science (see PHONETICS), and may be called the outer side of language. The inner development is due to the mind of man; and this, like all the other works of man, belongs to historical and not to physical science. Here the ruling principle is imitation. Every child learns every word it utters through imitation, and imitation of words heard from others or previously uttered by ourselves is the parent of the language of every grown-up man. That we are wholly unconscious of the process does not make the fact any less certain. One form of imitation especially active in speech is what grammarians call 'form-association.' Different forms of speech—e.g. preterite tenses of many verbs, or a particular case of many nouns—are alike each in their grammatical function, and tend to be thought of, and to be used, together. But these forms are nevertheless often very unlike; though their use may be the same they may have different origins—e.g. 'I swam,' 'I stood,' in English owe their distinctive form to a vowel-variation, but 'I heard' to the adding of a suffix. Now, the mind is constantly acting under the influence of analogy to reduce such variations, to do away with unnecessary differences, to reduce old forms to one level, or to make new forms on the analogy of old ones. Thus (see under article GRAMMAR), we now say 'we ran,' not 'we run' as our forefathers did, because the reason for the different vocalism of singular and plural is no longer discernible, and the unmeaning difference is 'levelled.' Again, we say 'I climbed,' not 'I clomb' any more, because the preterite in -*ed* is the simplest and commonest form of the tense, capable of being applied without difficulty when a new verb becomes necessary—e.g. 'we boycotted him.' This principle of 'analogy' (as for brevity it is often called) acts widely in every language; it conditions every new word we make, and it must have acted much more upon vernaculars which had no literature (a good example may be seen in the reconstruction of the old Latin verb in modern Italian), and still more upon wholly unwritten languages.

There are then two chief factors which act on language: one, the *vis inertiæ*, which is the prime cause of phonetic change, and is in the main destructive, doing away with sounds or combinations of sounds which, owing to causes varying with nations and even with individuals, are inconvenient to produce; the other, the imitative habit of mind, which may destroy old forms, but is in the main reparative, giving new forms for those which through phonetic change had become obscure, and constantly producing new forms on the analogy of old ones to supply each want caused by the progress of the human mind. For except in very rare cases man turns old speech-materials to new uses. He does not invent absolutely new names for new things as they become known to him or are produced by him. A hippopotamus was called a 'river-horse;' the trees and beasts of Australia are known by the names of quite different species in Europe. A new invention is called by some descriptive name, as a 'photograph,' which has superseded the older but equally descriptive Talbotype and Daguerreotype: when Talbot and Daguerre were forgotten their names were less suggestive than terms with a meaning. Mesmerism in like manner will be superseded by hypnotism, there being a sufficient number of people able to understand the new name, and so to familiarise it to those to whom it means nothing. Similarly, old names may take a new value, becoming thereby really new words if the connection with the old thing is quite broken off. Thus, a 'bead' to us is a round object made of different materials, absolutely unconnected with the same word in Old English which meant a prayer: the link—counting prayers by means of a string of beads—being no longer a matter of common observation. Sometimes both the old and the new meaning co-exist: a man may be called a 'lion,' but a lion is a lion still. Lastly, new words expressing action—verbs and verbal nouns—constantly spring up, being commonly either more picturesque or giving some new circumstance. To murder is old, but to 'burke,' a verb coined from a once famous murderer, gives the added sense of smothering and hushing up; and the word seems likely to survive, though with its origin forgotten. To 'boycott' expresses a slightly new form of exclusive dealing, and as yet its history is remembered.

This slight sketch may suffice to throw some light on the nature of language. It is a work of man, the product of man's mind and vocal organs, just as a statue or a picture is the product of his mind and hands. But it differs from them in some important respects. First, it is not a finished product, permanent and unchangeable. It is subject to incessant change, involuntary on its physical side, partly voluntary on the mental side. It is a constant flux, a 'becoming,' not a 'being,' as Plato might have put it; this change is obscured for literary languages; it becomes clear at once to any one who will take the pains of looking at the development of English from Chaucer's day to ours. Old forms die out, and new ones take their place (see GRAMMAR). Old families of words cease to be used: new ones take their place or are produced under new needs—e.g. the Boycott family—boycotted, boycotting, boycotter, boycottee (extinct by this time), &c., all formed on the analogy of the words of other older families. A second point of difference is that language is not an end in itself as a picture is: it exists for an end, communication between man and man. So long as this is achieved the form which language takes is immaterial: it may change so long as it is intelligible. No doubt language once existent can serve other ends more or less connected with the first; but that communication was the first is undeniable.

But language is not the only means by which communication can be made. Animals, which have no language, certainly communicate. Man can communicate by gestures, by pictures—whether rude scratches made on the ground with a stick or the more polished drawings which developed into Egyptian hieroglyphics—or, lastly, by cries common to man and to beasts, the natural expressions of joy, fear, pain, &c. But such cries are not even the elements of language till they are consciously reproduced to express the feeling even when the stimulating cause may be absent. Language itself arises when two men connect the same feeling with the same expression of it, and so can communicate that to others. There is no reason to believe that any brute has ever attained even to the first of these last two steps. Their progress is arrested. A dog may bark to express delight, or to have a door opened to him, but he does no more than any dog could do 2000 years ago. Man can develop. It is not permissible, however, to lay down that the possession of speech is the barrier between man and the brute, and to settle thereby the question of the origin of man. Speech may be the clear differentia now. But it is at least conceivable that there may have been lost types between man and the common progenitor of man and the anthropoid ape with intermediate stages of speech-development. It is another matter to maintain that such development could have been produced by natural selection alone (see Wallace, *Darwinism*, p. 461, ff.).

The different languages of the world can be classified according to their principle of formation; and within the classes so reached different families of languages may be distinguished in which a common origin can be proved for the different languages of each family. Only the briefest sketch can be attempted here. We find two main classes: I. Those languages which show no signs (or hardly any signs) of inflection (see GRAMMAR)—e.g. in which the plural of 'man' is expressed not by vowel-change (as our 'men') nor by an added suffix (as in Latin 'homin-*es*') which has no independent value, but by such a combination as our 'man-kind,' where each part can be used independently. Such languages are the Chinese, the Tibetan, and those of Annam and the neighbouring states; they are commonly called Isolating. II. Those which possess some degree of flection—i.e. elements which have lost their independent meaning, and are mere grammatical machinery to make nouns, as *ter* in 'pa-ter;' or cases of nouns, as *s* in 'father-s;' or persons of verbs, as *s* or *th* in 'gives' or 'giveth.' Such elements, however, are only the worn-out remnants of words compounded with other words (see GRAMMAR); and the languages of this type may vary very much according to the degree of obscuration in the character of the compound. Some, like the Mongolian, the Finnish, the Hungarian, the Turkish, make very long compounds, yet the original elements, though not all capable of separate use, remain quite distinct and recognisable in each word. These languages used to be called 'agglutinative,' as different from the specially 'inflectional' Sanskrit, Latin, &c.; but even these show signs of the phonetic change which produced 'inflections.' The North American languages incorporate different elements which are each barely recognisable in the compound; the principle of composition is not really different. The Dravidian family of languages in South India—Tamil, Telugu, &c.—is also of the agglutinative sort. The languages of the purely inflectional type—i.e. those where the different elements of the original compound are so firmly welded together as to be frequently indistinguishable—are (I.) the Semitic family, comprising Hebrew and the closely-connected Phœnician; Aramaic, spoken in Mesopotamia, Syria, and in later days in Palestine; Arabic; and some Abyssinian languages. This family is remarkable because of its triliteral roots—i.e. expressions of the several ideas by three unchanging consonants, the relation of the various derived forms of the same idea being expressed by vowel-change. (II.) The Indo-Germanic or Aryan family. The first term is most likely to survive; it denotes the extreme limits of the area over which the languages spread—from Sanskrit India to Germanic (or Teutonic) Iceland. The term Aryan has not been adopted much outside of England. The chief languages of this family are (1) Sanskrit, of which the oldest remains are the Vedic hymns, with the cognate Old Persian and Zend, the language of the Avesta. (2) Armenian, as yet imperfectly known, with records dating from the 5th century A.D. (3) Greek, with its numerous dialects. (4) Albanian, proved to belong to this family by Bopp, and lately investigated by G. Meyer and others, but possessing no ancient records. (5) Italic, including Latin, and the Umbrian and Oscan dialects; from these are descended the modern (so-called) Romance languages—the Italian, Spanish, Portuguese, French, Wallachian, and the speech of certain Alpine districts (Grisons, &c.). (6) Celtic, including the ancient speech of Gaul, with its surviving remnant the Bas Breton; the now extinct Cornish; the Welsh, still likely to survive; the Erse of Ireland; the Gaelic of the Highlands of Scotland (the records of these three date from about the 8th century); and the Manx. (7) The Teutonic, now more commonly called Germanic, comprising Gothic, the language into which Ulfilas translated the Gospels in the 4th century A.D.; the Scandinavian, of which a very old form is isolated in Iceland, more modern forms in Norway, Denmark, and Sweden; the Anglo-Saxon; the Old Frisian; the Old Saxon of the 'Heliand,' the parent of the Platt-Deutsch languages of North Germany;

the Lower Franconian, whence comes the Dutch; the Franconian of Mid Germany; and the Old High German, spoken in different dialects from South to Middle Germany, whence is derived the modern literary German. (8) The Slavonic, to which belong Bohemian, Polish, Old Bulgarian, and the parents of the Russian and numerous dialects of south-eastern Europe; together with the Lithuanian, Old Prussian, and Lettish languages of the south Baltic, which, though their records are late, yet preserve strikingly early linguistic features. See ARYAN LANGUAGES.

That there was such a language as the hypothetic parent of all these Aryan languages is certain (though such knowledge brings us no nearer to the one original language—if one there was—spoken by primeval man). We can recover its character with certainty, for we know its suffixes both formative and inflectional; its vocabulary we know in part only. Now, if there was a language there must have been a people to speak that language—no doubt with many dialects, whence eventually sprang the derived languages which we know, and probably many others which are lost. Dialectal variation is the inevitable condition of all languages where there is no common literary tongue: that tends to level the speech of the whole area: and where there is great facility of communication throughout the area the dialects may die out, as they are rapidly doing in England. But though we assert with confidence that there was a common Indo-Germanic language, spoken by an Indo-Germanic people, we do not maintain that the people who speak the several languages derived from that the common parent are wholly of the same race. England, as we know, is inhabited by the descendants of Celts, of various nationalities enrolled in the Roman legions, of Angles, Saxons, Jutes, Frisians, of Norsemen, and of Franco-Normans; all of whom speak the same English language. But that fact does not make us doubt that there was once a common Teutonic language spoken (in various dialects) by the different members of a Teutonic race which occupied Britain. It is extremely probable that there has been a like history in other lands where other Indo-Germanic languages are now spoken. That does not in the least disprove the existence of an Indo-Germanic race, speaking different Indo-Germanic dialects, settling themselves in the different countries of Europe and western Asia, and mixing their blood with that of the races whom they found already there. The proportion of Indo-Germanic blood in any given nation may be considerable: it may be very little. It is possible that in some nations it may be nothing at all: some stronger, but less civilised race may have overpowered the Indo-Germanic stock, but taken their language. Such loss has its parallels in history—e.g. when the Norsemen conquered part of France, but lost their own language. This would explain the fact that races of marked racial difference—with short skulls, and dark hair and colouring—are found speaking cognate languages with men of long skulls, ruddy colour, and light hair. Such an inconsistency has seemed to some anthropologists to absolutely destroy the value of language as a test of race. It does nothing of the kind. Linguistic arguments are as valuable as anthropologic ones; but neither give conclusive proof, only indications. The two sciences should work independently. Good anthropologists, such as Pösche and Penka, may be bad linguists; but results drawn from harmony of the strongest evidence on either side may be fruitful. Most, however, of these problems will probably never admit of certain solution. The evidence which now would place the habitat of the parent-race in northern Europe is only somewhat more weighty than that which formerly placed it in Pamir.

See especially Paul's *Principien der Sprachgeschichte*, translated by Strong (1888); and the *History of Language* (based on the same book), by Strong, Logeman, and Wheeler (1891). Whitney's *Life and Growth of Language* (Inter. Sc. series), Max-Müller's *Essays on the Science of Language*, and Sayce's *Introduction to the Science of Language* are useful; the latter contains a full list of authorities. By far the best book on the history of the Indo-Germanic languages in their earlier stage is Brugmann's *Comparative Grammar* (trans. vol. i. by Wright, vol. ii. by Conway and Rouse, 1888). Here will be found mentioned all the recent works of any importance in this department. A short book referring chiefly to Greek and Latin is Victor Henri's *Précis de Grammaire Comparée* (1888), also translated. For Romance languages the latest and most complete work is Gröber's great *Grundriss der Romanischen Philologie* (Strasburg, 1886–88), in which the different Romance languages are treated by the most competent authorities. Diez's *Grammatik der Romanischen Sprachen*, though somewhat out of date, is clear and good. A similar book on the Germanic languages is Paul's *Grundriss der Germanischen Philologie* (1889 *et seq.*). Special students of English should use Sievers-Cook's *Grammar of Old English* (Ginn, Heath, & Co. 1885), Sweet's *History of English Sounds* (1888), and Skeat's *Principles of English Etymology* (1887 and 1891). For Phonetics, Sweet's *Handbook of Phonetics* should be consulted. All questions on the early history of the Indo-Germanic people and its probable habitat are exhaustively treated in the *Prehistoric Antiquities of the Aryan Peoples* (Schrader-Jevons, 1890). Isaac Taylor's *Origin of the Aryans* (1890) is a useful smaller book on the same subject. The grammars and other works dealing with the modern languages of Europe are too numerous to be mentioned here.

Philome'la, according to the Greek legend, was changed into either a swallow or a nightingale. Poets are (or rather were) fond of calling the nightingale by its classic name.

Philopœmen, a patriot of Greece, was born at Megalopolis about 252 B.C. In 222 he was one of the defenders of Megalopolis against Cleomenes, king of Sparta, and next year he fought with the Macedonias against the Spartans. He then served in Crete with such distinction that in 210 he was appointed general of the Achæan horse. In 208 he was raised to the highest military dignity in Greece, being elected *stratēgos* or commander-in-chief of the Achæan League. The battle of Mantinea (208), in which the Spartans were again utterly routed, raised him to the pinnacle of fame, and at the Nemean festival which followed he was proclaimed liberator of Greece. So great was his influence that the Macedonian monarch, Philip, began to fear that Greece would regain its independence, and tried, vainly, to have him secretly assassinated. During the next few years he was absent in Crete, and returned to the Peloponnesus in 194 to find the Romans in Greece. On the departure of the consul Flamininus, Nabis of Sparta recommenced hostilities against the Achæans; Philopœmen was once more appointed stratēgos (192), and in a pitched battle nearly annihilated the troops of Nabis. He now exerted all his power to heal the divisions among the Achæans, and to prevent them from affording the Romans a pretext for taking away their independence. In 188 he took a fierce revenge on Sparta for having put a number of his friends to death, and was in consequence strongly censured by the Roman senate, and by Q. Cæcilius Metellus, who was sent out as a commissioner to Greece in 185. Two years later Philopœmen (now an old man of seventy) was elected stratēgos for the eighth time. When lying ill of a fever at Argos he rose from his sick-bed to quell the revolt of the Messenians, but was overpowered by numbers, and fell into the hands of Deinocrates, the leader of the Messenians, who two nights after sent him a cup of poison. Philopœmen drank it and died.

Philosopher's Stone. See ALCHEMY.

Philosophy. In a subject where opinion has been and is still so much divided, as is the case in philosophy, it would be vain to attempt to formulate a definition which would be accepted by every one. The objects of the science, its methods, nay, its very possibility, are still matter of debate between divergent schools. The historical method is our only safe guide in such a case; and by its aid we are happily able to fix upon the main elements that were present to the minds of the Greek thinkers who first consciously used the term with a specific meaning. Practically the first attempts at definition are to be found in Plato and Aristotle, and as these two philosophers dominated the human intellect for two thousand years, the ideas which they expressed on the subject inevitably shaped the conception of philosophy current during that time. In virtue of its long lease of life, this conception has established itself in the associations of language, and is vaguely present to the man of ordinary culture when he uses the term. It may claim, therefore, to be the historical sense of the term—the sense, that is to say, which the historian of civilisation would single out as that which has persistently asserted itself during more than two millennia of human progress. Pronounced deviations from the accepted usage occur mainly in connection with a sceptical or quasi-sceptical theory of knowledge, and will be noticed in their place.

Tradition assigns the first employment of the word to Pythagoras, and makes him use it to signify merely the disinterested pursuit of knowledge. Socrates plays upon the etymology of the word when he contrasts the modesty of the truth-seeker with the more arrogant pretensions of the sophists. But, so far, the nature of the truth or knowledge which the philosopher seeks is not specified; the term is still vague and general. In fact, no kind of knowledge was at first alien to the philosopher. Philosophy has been truly called 'the mother of the sciences,' and it was only by slow degrees that the separate sciences attained an independent life. As specialisation proceeded, however, philosophy could no longer *in a literal sense* 'take all knowledge to be her province;' the details of one department after another of existence were surrendered to the scientific specialist. But the claim of philosophy to be the necessary complement of the special sciences—the only science of existence or of the universe as a whole—was not thereby surrendered. The specialist, so far as he is a mere specialist, is like the man who cannot see the wood for the trees; he loses sight of the proportions of the whole in the details of his own province. The co-ordination of the sciences, the unification of knowledge, is a task which remains to be undertaken by the philosopher. Unity or harmony in our conception of the universe is the aim which philosophy always has in view. Whether this aim is attainable by man or not is a further question; but the idea of a system of things satisfactory to the reason and the moral sense remains the inexhaustible spring of philosophic effort. The philosopher, therefore, has always his eye upon the Whole; his true function is to correct the abstractions of the special sciences. Each science makes, and must make, its own working postulates or presuppositions, and the specialist is ever prone to make the working postulates of his own department the measuring-line of existence as such. But philosophy has to review all these scientific postulates, and if possible to harmonise their conflicting claims by showing the relative and limited validity which belongs to each. Philosophy is in this connection the critic of the sciences—of the postulates which they make and the conceptions which they use; and she exercises this critical office in the interest of the Whole. Something like this was present to Plato's mind when he described the philosopher as ***sunoptikós***, a man who insists on seeing things together, who refuses to consider the parts out of their relation to the whole whose parts they are, and who is therefore the inexorable foe of crude and premature generalisations from this or the other department of investigation which happens for the time to be most in evidence.

In Plato we find, however, already established a second account of philosophy, which, though unquestionably true in itself, has led, in the opinion of the present writer, to many questionable developments. The philosophers, says Plato, 'are those who are able to grasp the eternal and immutable,' 'those who set their affections on that which in each case really exists.' The philosopher, as the man who apprehends and follows after the essence or reality of things, is thus opposed to the man who dwells in appearances and the shows of sense. This distinction may be said to be implied in the demand for any explanation at all, and is present in Greek philosophy from the beginning. What is the substance or unitary reality underlying all the diversity of the world around us? So ran the question which the early Greek thinkers asked themselves; and the explicit opposition between the world as it *appears* to sense and the world as reason recognises it to *be* had already appeared in the systems (otherwise diametrically opposed) of Parmenides and Heraclitus. In the Platonic doctrine of transcendent Ideas the opposition receives a questionable expression; it appears more legitimately in the Aristotelian doctrine of Substance and Cause. The philosopher, indeed, must always continue to ask himself, What is the essence, the ultimate reality of things? who or what is the Being that is manifested in 'all thinking things, all objects of all thought?' In this sense philosophy is still definable, in Aristotle's phrase, as Ontology, the science of being as being.

To very many, however, in modern times the search for this ultimate reality seems a hopeless quest, and philosophy therefore, in the form of metaphysics or ontology, is condemned by them as a disease of the human spirit, from which, under the influence of scientific habits of thought, it is now happily recovering. The Empiricism which bases itself on Hume, the Positivism which founds on Comte, and various phases of Kantian thought agree in this repudiation of metaphysics. The distinction between phenomena and noumena has been revived in a somewhat different form, and has become current in popular thought. Sensible objects and their laws may be known, it is argued, because in such an investigation we are not carried beyond the facts of present and possible experience; they are phenomena. But if we refuse to take this sensuous phantasmagoria simply as it stands—if we insist on referring it to some ultimate ground of existence as an explanation of why and how there is a phenomenal world at all—the object of our search is variously said to be noumenal, metaphysical, metempirical, or transcendental, and to be unattainable by human reason. To those who hold this view philosophy becomes convertible with Epistemology or Theory of Knowledge (Erkenntniss-theorie). It becomes an 'inquiry into the human understanding,' or a 'criticism' of the forms and categories of human thought, by way of fixing the limits of our necessary ignorance, and thus justifying the negative position assumed towards metaphysics. To Hume and Comte, and to Kant himself in some of his moods, philosophy is thus a preventive against itself, or at least against what has ordinarily been understood by philosophy. In Hume's words: 'We must submit to this fatigue, in order to live at ease ever after; and must cultivate true metaphysics with some care in order to destroy the false and adulterate.'

This sceptical or positivistic theory, however, is chiefly the result of the unwarrantable separation of essence and appearance, of noumena and phenomena, which has been already referred to as an unfortunate outcome of Plato's way of stating the philosophic problem. If the noumenal reality is something transcendent, something apart from the world we know, and as it were hidden behind it, then it must inevitably drift into the position of a perfectly otiose thing-in-itself, which has no function to discharge in the universe of knowledge. Whether we then continue to assert its existence, as an Unknown and Unknowable, or take up a purely sceptical position in regard to it, is really of little moment. In both cases the limitation of knowledge to phenomena is justified by the false definition of the essence or noumenon from which the theories in question start. But the noumenon is not a transcendent entity apart from the phenomenon: it is simply the phenomenon itself fully understood. To know only phenomena would be to rest content with the immediate appearances of sense. All science is an attempt to go beyond the immediate appearance, and to understand it by connecting it with something else. Ultimately no one thing can be fully understood except in the light of the whole; so to understand things is to reach their metaphysical reality, to see them *sub specie æternitatis*. Following out this line of thought, the modern philosopher oftener gives his question a teleological than an ontological form. Instead of asking what is the ultimate essence, he asks what is the ultimate meaning, the ultimate end, of the universe. Has it a rational and satisfying end? Does it exist to express a meaning at all, or simply as a brute fact? But end, meaning, and ultimate reality are only different ways of formulating the same problem.

But even those modern philosophers who combat most strongly this sceptical view of the inherent impossibility of reaching metaphysical truth agree in laying great stress on what has recently come to be called Epistemology or Theory of Knowledge. The question of knowledge and the relation of knowledge to reality has stood in the foreground of modern philosophy since Locke. It is evidently fundamental and preliminary, for on the trustworthiness of my knowledge and its power of putting me in communication with independent trans-subjective realities depend all my further investigations. If my results in the theory of knowledge are sceptical, I have no foothold in the world of reality to serve as basis for metaphysical construction. The sceptic and positivist therefore stop short at this point; but the philosopher who believes that he has reached a satisfactory doctrine of knowledge (or belief, as he sometimes prefers to call it) advances to metaphysics proper, or the theory of the ultimate nature of the real which he believes himself to apprehend in knowledge.

The general term Philosophy, though occasionally, as has been said, identified with Epistemology, and more frequently with Metaphysics, has in common usage a wider application. Besides these central disciplines it embraces what may be called the philosophical sciences, such as Logic, Ethics, Æsthetics, Psychology, Sociology, the Philosophy of Law, the Philosophy of Religion, and the Philosophy of History. Some of these, however, have two sides, and may be treated either as positive sciences or as parts of philosophy. Psychology, by which is understood what was formerly called Empirical Psychology, may be said to have established its claim to be an independent science of observation and experiment. But, though it may fall more and more into the hands of specialists, it will always remain connected with philosophy, seeing that the knowing mind is the object which the psychologist investigates. Similarly, Ethics is often treated as the natural history of moral ideas and institutions or of the moral sense, but so conceived it really forms a part of scientific psychology. The strictly philosophical part of Ethics is the theory of obligation, and this is sometimes spoken of as the Metaphysic of Ethics. The meaning assigned to duty and the explanation given of it must of necessity profoundly influence the general conception we may form of the universe. So, again, Æsthetics may be treated as a department of physiological psychology, as has mostly been the case in England; but by many continental writers the Philosophy of Art or the Philosophy of the Beautiful has been intimately connected with metaphysics. Jurisprudence on its philosophical side is closely connected with Ethics, and is sometimes spoken of as the Philosophy of Law. The Philosophy of History and the Philosophy of Religion exist only so far as there can be traced in the facts of history and in the different religions of man the evolution of an idea or purpose. Logic, as the science of the regulative laws of thought, forms a part of the general theory of knowledge. It holds aloof, however, from the central question of Epistemology. It presupposes the relation of our thought to reality, but does not itself investigate that relation, confining itself to the laws by which we may validly pass from one statement to another. It occupies a propædeutic or introductory position in relation to philosophy, and indeed in relation to scientific thought generally.

The History of Philosophy forms not the least important philosophical discipline. Philosophy cannot, indeed, be profitably studied apart from the history of its own development. Speculative thought has flourished in India and elsewhere, but to all intents and purposes the history of philosophy begins with Thales in Greece about 600 B.C. It is usual to distinguish three great periods of philosophic thought—Ancient or Greek Philosophy, from 600 B.C. to about 500 A.D.; Mediæval Philosophy, lasting till 1600; and Modern Philosophy, since that date. Greek Philosophy is in turn divided into three periods—that of the pre-Socratic philosophers (say 600 to 425 B.C.), who devoted their attention mainly to the phenomena of external nature. Pythagoras, Parmenides, Heraclitus, Empedocles, Democritus, and Anaxagoras were the most eminent heads of mutually conflicting schools. The Sophists and Socrates raised the question of knowledge, turning man's attention upon himself; and in the idealistic systems of Plato and Aristotle (say 400-322 B.C.) we have the great age of Greek philosophy. In Aristotle the theoretic impulse of the Greek mind seems to have exhausted itself, and the post-Aristotelian or third period of Greek philosophy was mainly inspired by practical need, by the desire for a theory of life and conduct. The Stoics, Epicureans, and Sceptics, and later the Neoplatonists with their religious mysticism, carry on the tradition of philosophy till the downfall of the Roman empire and the death of Boethius. After the so-called dark ages Mediæval Philosophy may be said to begin in the 9th century with John Scotus Erigena, who is really a Christian Neoplatonist. Mediæval philosophy is mainly the application of the Aristotelian logic to the doctrines of the church, and latterly (when the other treatises of Aristotle became known in western Europe) exhausted itself in an elaborate attempt to harmonise the philosophy of Aristotle with

Christian theology. Anselm and Abelard in the earlier period, Albertus Magnus, Thomas Aquinas, Duns Scotus, and William of Ockham in the later, are probably the greatest and most representative names of the Scholastic philosophy. The Renaissance put an end to Scholasticism, and led, in the 15th and 16th centuries, to various attempts to revive the systems of the older philosophers and to strike out new paths; but the age was one of transition, and no effective beginning was made in Modern Philosophy till the commencement of the 17th century. Bacon's *Novum Organum* was published in 1620 and Descartes' *Discourse on Method* in 1637. Bacon's investigations were mainly logical and methodological, and Descartes was the real founder of modern philosophy. Cartesianism was developed on the Continent into the great monistic system of Spinoza, from which the monadistic or individualistic theory of Leibnitz was a reaction. In England philosophy took an epistemological and even psychological direction with Locke, and this was continued by Berkeley and Hume, who developed Locke's dualism into subjective idealism and scepticism respectively. Hume's sceptical analysis of knowledge gave rise by revulsion to the Critical philosophy of Kant, which combines elements both from the Continental and the English line of thought. From it sprang the idealistic developments of German thought in Fichte, Schelling, and Hegel, and also the realistic systems of Schopenhauer and Hartmann. Herbart and Lotze represent a realism of a more individualistic cast, which affiliates itself directly to Leibnitz, and is comparatively little influenced by Kantian thought. Scottish philosophy has maintained the reality of knowledge and the dualism of experience in answer to the scepticism of Hume, but like English philosophy generally has been mainly psychological in character. It offers in this way no parallel to the vast metaphysical systems which have succeeded one another in Germany.

The best general histories of philosophy are by Erdmann, Ueberweg, and Schwegler, all accessible in English translations. The greater part of Zeller's exhaustive history of Greek philosophy has also been translated. See also the following articles, and works there cited:

Æsthetics.
Agnosticism.
Aristotle.
Association.
Bacon.
Berkeley.
Causality.
Common Sense.
Condition.
Cousin.
Descartes.
Eclecticism.
Eleatic School.
Empiricism.
Ethics.
Fichte.
Hamilton.
Hartmann.
Hegel.
Hobbes.
Hume.
Idealism.
Kant.
Leibnitz.
Locke.
Logic.
Lotze.
Materialism.
Neoplatonism.
Nominalism.
Pessimism.
Plato.
Positivism.
Psychology.
Reid.
Relativity.
Religion.
Rosmini.
Scepticism.
Scholasticism.
Schopenhauer.
Science.
Socrates.
Sophists.
Spencer.
Spinoza.
Theism.
Will.

Philostratus OF LEMNOS, a famous Greek sophist and rhetorician, was born probably about 170–180 A.D., studied under Proclus at Athens, and finally established himself at Rome, where he became a member of the learned circle that gathered round the Empress Julia Domna, wife of Severus. He was alive, according to Suidas, in the time of the Emperor Philip (244–249). His extant works are an idealised life of Apollonius of Tyana; the *Imagines*, a description of sixty-four pictures supposed to be hung in a villa near Naples; the *Lives of the Sophists*, a series of bright and interesting sketches; the *Heroicon*, a declamatory exercise on Homer's injustice to Palamedes; and a series of amatory and somewhat strained *Epistles*.

There is a good edition by C. E. Kayser (Zurich, 1844 *et seq.*); an Eng. trans. by E. Berwick (1809). On the question whether the *Imagines* described were real pictures or no, see, for the affirmative, E. Bertrand, *Un Critique d'Art dans l'Antiquité: Philostrate et son École* (1882), and Brunn, *Die Philostratischen Gemälde* (1861); but for the negative, Friederichs, *Die Philostratischen Bilder* (1860).

Philpotts, HENRY, Bishop of Exeter, was born at Bridgewater, 6th May 1778, studied at Corpus Christi College, Oxford, and was elected Fellow of Magdalen in 1796. He became prebendary of Durham in 1809, Dean of Chester in 1828, and Bishop of Exeter in 1830. A zealous Tory, an extreme High Churchman, and combative by disposition, he was ever the foremost in opposition to measures of reform, and his name would survive if only for his prolonged but unsuccessful refusal to institute Mr Gorham (q.v.) for not believing in baptismal regeneration. Yet if he was narrow he was devoted and sincere, his standard of a bishop's duties was an unusually high one, and he was much beloved throughout his diocese. He died near Torquay, 18th September 1869. See his *Life, Times, and Writings*, by the Rev. R. N. Shutte (vol. i. 1863).

Philtre (Gr. *philtron*, 'love-charm'). A superstitious belief in the efficacy of certain artificial means of inspiring and securing love seems to have been generally prevalent from very early times; and among the Greeks and Romans love-charms, and especially love-potions, were in continual use. It is not certainly known of what these love-potions were composed, but there is no doubt that certain poisonous or deleterious herbs and drugs were among their chief ingredients, to which other substances, animal as well as vegetable, are said to have been added, coupled with the employment of magic rites. Thessaly had the credit of producing the most potent herbs, and her people were notorious as the most skilful practisers of magic arts, whence the well-known 'Thessala philtra' of Juvenal (vi. 610). These potions were violent and dangerous in operation, and their use resulted often in the weakening of the mental powers, madness, and death instead of the purpose for which they were intended. Lucretius is said to have been driven mad by a love-potion, and to have died by his own hand in consequence. In the corrupt and licentious days of the Roman empire the manufacture of love-charms of all kinds seems to have been carried on as a regular trade, the purchasers, if not the makers of them, being chiefly women. The use of philtres seems to have been not unknown during the middle ages; and in the East, the nurse of superstition, belief in the power of love-potions lingers down to the present day.

Phips, or PHIPPS, SIR WILLIAM, governor of Massachusetts, was born at Pemmaquid (Bristol), Maine, on 2d February 1651, one of twenty-one boys in a family of twenty-six children. He was successively a shepherd, a carpenter, and a trader, and in 1687 recovered from a wrecked Spanish ship off the Bahamas bullion, plate, and treasure valued at £300,000; this gained him a knighthood and the appointment of sheriff of New England. In 1690 he captured Port Royal (now Annapolis) in Nova Scotia, but failed in the following year in a naval attack upon Quebec. In 1692, through the influence of Increase Mather (q.v.), he was appointed governor of Massachusetts. He at once put a stop to the witchcraft persecutions by appointing a commission of seven magistrates to try all such cases. He died on 18th February 1694 in London, whither he had been summoned to answer certain charges of arbitrary conduct. See Life by F. Bowen in Sparks' *American Biography* (1834–37).

Phiz. See BROWNE (HABLOT K.).

Phlebitis (Gr. *phlebs*, 'a vein'), inflammation of the veins, although seldom an original or *idiopathic* disease, is a frequent sequence of wounds, and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers. See Veins, Wounds.

Phlebolites (Gr. *phlebs*, 'a vein,' and *lithos*, 'a stone') are calcareous concretions formed by the degeneration of coagulations in veins, or occasionally originating in the coats of the vessel.

Phlebotomy, or Venesection, is, as applied to human beings, treated at Bleeding, Vol. II. p. 221. The abstraction of blood was at one time considered the best and only remedy for the various diseases of horses and cattle, but at the present time it is comparatively rarely performed, except by veterinarians of the older school; but it is useful in subduing acute congestions, such as of the brain, in parturient apoplexy, congestion of the lungs, acute inflammation of the udder, and in a disease characterised by sudden swelling of the head and throat, called malignant œdema. The vessel selected for the operation is usually the superficial jugular vein, which in cattle is large and loosely situated under the skin of the neck.

In consequence of the mobility of the tissues surrounding the vein it cannot in cattle, as in horses, be raised and made sufficiently tense without the use of a cord tied round the animal's neck below the seat of the intended operation. This cord should be from ¼ to ½ inch thick, pulled tight enough to arrest the flow of blood and cause the vein to become distended and tense. It should then be opened with the 'blood stick,' so as to pierce the skin and vein at one blow.

When a sufficient quantity of blood has been abstracted, say from 3 to 6 or even 8 quarts, the cord is slowly slackened so as to prevent a vacuum and the ingress of air into the vein, the lips of the wound brought into opposition and maintained there by a pin passed through them, and around it twine or tow is twisted in the form of a figure of 8. The pin should not be removed for at least thirty hours.

Phleg'ethon (i.e. 'the Flaming'), a river of the infernal regions, whose waves rolled torrents of fire. Nothing would grow on its scorched and desolate shores. After a course contrary to the Cocytus (q.v.), it discharged itself, like the latter stream, into the Lake of Acheron.

Phleum. See Timothy Grass.

Phlogiston (Gr., 'combustible') was the term employed by Stahl, professor at Halle, in his *Zymotechnia Fundamentalis* (1697), to designate a hypothetical element which, by combining with a body, rendered it combustible, and which occasioned combustion by its disengagement, there being left, after its evolution, either an acid or an earth. Thus, sulphur, according to the phlogistic theory—which held undivided sway in chemistry until the time of Lavoisier, who substituted for it the theory of oxygenation (1775–81), and was maintained by a few chemists, especially Priestley, till the beginning of the 19th century—was composed of sulphuric acid and phlogiston; lead, of the *calx* or earth of lead and phlogiston; &c. In consequence of the general adoption of the phlogistic theory, when Priestley, in 1774, discovered oxygen, and when Scheele, a little later, discovered chlorine, the names these chemists gave to their discoveries were *dephlogisticated air* and *dephlogisticated marine acid.* According to modern views, mainly based on Lavoisier's experiments, the *addition* of oxygen takes place in the formation of acids and of earths, instead of the *subtraction* of phlogiston. The question whether the process was, in fact, one of addition or subtraction was finally decided by the balance, an instrument to which chemistry owes most of its marvellous progress during the last three-quarters of a century. See Chemistry, Vol. III. p. 146.

Phlox, a genus of plants of the natural order Polemoniaceæ, distinguished by a prismatic calyx, salver-shaped corolla, and unequal filaments. The species are pretty numerous, mostly perennial plants with simple leaves, and mostly natives of North America. A number of species are common in British flower-gardens. It has of late become a favourite genus with florists, and many very fine varieties have been produced.

Phloxin. See Dyeing.

Phocæa, the most northerly of the Ionian cities in Asia Minor, originally a colony from Athens. It stood on a peninsula between the gulfs of Elais and Smyrna, and had an excellent harbour; and the Phocæans were distinguished among the Greeks for their nautical enterprise. When the city was besieged by the Persians in the time of Cyrus, many of its inhabitants emigrated to Corsica; Massilia (Marseilles) was a Phocæan colony. The old city survived into the later empire; its ruins are still known as *Karadscha Tokia.*

Phlox paniculata (var.).

Phocæna. See Porpoise.

Phocas, a tyrannical emperor of Constantinople (602–610). See Byzantine Empire.

Phocidæ. See Seal.

Phocion (Gr. *Phokiōn*), an Athenian general, was born about the end of the 5th century B.C. He was of humble origin, but studied under Plato, Xenocrates, and perhaps Diogenes also. Phocion first attracted notice in the great sea-fight at Naxos (376), where he commanded a division of the Athenian fleet. In 351, along with Evagoras, he undertook the conquest of Cyprus for the Persian monarch, Artaxerxes III., and was completely successful. In 341 he was successful in crushing the Macedonian party in Eubœa and in restoring the ascendency of Athens. Two years before this he had achieved a similar result at Megara; and in 340, sent to the aid of the Byzantines against Philip, he forced Philip to abandon the siege, and even to evacuate the Chersonesus. Nevertheless, he advocated, even in the midst of his triumphs, the establishment of better relations with the enemy, for he had come under the influence of the philosophical reaction in favour of monarchy instead of a democracy of petty aims and degraded character. He had come to see that a voluntary acquiescence in the supremacy of an enlightened ruler was better for Athens and for Greece than a hopeless struggle in defence of a political system that had lost its virtue. His advice was not taken; but the fatal battle of Chæronea, only two years afterwards, in which the independence of the Greek republics was lost for ever, proved its soundness. After the murder of Philip in 336 we see him struggling at Athens to repress what appeared to him the reckless desire for war on the part of the fanatical patriots, on account of which he was regarded as a traitor; but his personal honour is above suspicion. On the death of Alexander in 323 the aged Phocion endeavoured, but in vain, to hinder the Athenians from going to war with Antipater. After Antipater's death he was involved in the intrigues of Cassander, the rival of Polysperchon, and was forced to flee to Phocis, where Polysperchon delivered him up to the Athenians. He was condemned by 'a mixed mob of disfranchised citizens, foreigners, and slaves' to drink hemlock. His body, flung unburied over the borders of the state, was carried by some of his friends to Eleusis, and burned there. The Athenians soon began to raise monuments to his memory. His life was written by Plutarch and Cornelius Nepos. See *Phocion und seine neueren Beurtheiler*, by Jacob Bernays (1881).

Phocis, a province of ancient Greece, west of Bœotia, and bounded S. by the Gulf of Corinth. The greater part of the country is occupied by the mountain-range of Parnassus (q.v.). The state derives its chief historical importance from possessing the famous oracle of Delphi (q.v.). During the Peloponnesian war the Phocians were close allies of the Athenians. In the time of Philip of Macedon they were involved in a ten years' war, on account of their opposition to a decree of the Amphictyonic Council, concerning the use of a piece of land belonging to the temple of Delphi. This war, commonly known as the Sacred or Phocian War, ended disastrously for the Phocians, the whole of whose cities (twenty-two in number) were destroyed, with one exception, and the inhabitants parcelled out among the hamlets. Phocis and Phthiotis form a province of modern Greece.

Phœbus (i.e. 'the Bright'), an epithet, and subsequently a name, of Apollo. It had reference both to the youthful beauty of the god and to the radiance of the sun, when, latterly, Apollo became identified with Helios, the sun-god.

Phœnicia, the Φοινίκη of the Greeks, the *Phœnice*, or (in rare cases) *Phœnicia* of the Romans, was a tract of country, lying to the north of Palestine, along the coast of the Mediterranean Sea, bounded by that sea westwards, and eastwards extending to the mountain-crests of Bargylus and Lebanon. The limits of the tract northward and southward are variously stated by ancient authorities, and no doubt varied at different periods; but modern researches seem to indicate that the actual Phœnician occupation did not extend beyond Laodicea (Latakia) on the north and Acre, or at the furthest Carmel, on the south. This would give the coast-line a length of about 200, or, counting main indentations, of 230 miles—a fair mean between the 120 miles of Mr Grote (*History of Greece*, vol. iii. p. 354) and the 300 of some writers. The width between the coast and the mountain-ridges of Bargylus and Lebanon varies from 8 or 10 to 25 or 30 miles, perhaps averaging 15 miles. The area of Phœnicia proper may thus be reckoned at about 3000 sq. m. The tract included within these limits is one of a remarkably diversified character. Lofty mountain, steep wooded hill, chalky slope, rich alluvial plain, and sandy shore succeed each other, each having its own charm, which is enhanced by contrast. The sand is confined to a comparatively narrow strip along the seacoast, and to the sites of ancient harbours now filled up. It is exceedingly fine and of excellent siliceous quality, especially in the vicinity of Sidon and at the foot of Mount Carmel. The most remarkable plains are those of Acre, Tyre, Sidon, Beyrout, and Marathus—none of them very extensive, but richly fertile, and capable of producing, under any tolerable system of cultivation, luxuriant crops. From the edges of the plains, and sometimes from the very shore of the sea, rise up chalky slopes or steep rounded hills, which at the present day are partly left to nature and covered with trees and shrubs, partly cultivated and studded with villages. The hilly region forms generally an intermediate tract between the high mountains and the plains; but not unfrequently it commences at the water's edge, and fills with its undulations the entire space, leaving not even a strip of lowland. This is especially the case in the central region between Beyrout and Arka, opposite the highest portion of the Lebanon; and again in the north, between Cape Possidi and Jebili, opposite the more northern part of Bargylus. The hilly region in these places is a broad tract of alternate wooded heights and deep romantic valleys, with streams murmuring amid their shades. Sometimes the hills are cultivated in terraces, on which grow vines and olives, but more often they remain in their pristine condition, clothed with masses of tangled underwood.

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From the hilly tract, which increases in elevation as it recedes from the shore, rise the two great mountain-regions, separated by a clearly-marked depression in 34° 35′ lat. nearly, down which runs the river Eleutherus. The more northern of the two was known to the ancients as Bargylus, and in modern geography bears the name of the Ansayrieh or Nasariyeh mountain-region. It extends from the Orontes near Antioch to the valley of the Eleutherus, a distance of not less than 100 miles, looking down eastward on the lower Cœle-Syrian valley, and westward on the undulating tract known as 'Northern Phœnicia.' Though not comparable to Lebanon, it is a romantic and picturesque region. The lower spurs towards the west are clothed with olive-grounds and vineyards, or covered with myrtles and rhododendrons; between them are broad open valleys, productive of tobacco and corn. Higher up the scenery becomes wild and bold; forests of fir and pine abound, and creep up the mountain-side, in places almost to the summit; while here and there bare masses of rock protrude themselves, and crag and cliff rise into the clouds that hang about the loftiest summits. But the glory of Phœnicia is Lebanon. Extended in a continuous line for a distance of 130 miles, with an average elevation of from 6000 to 8000 feet, and steepest on its eastern side, it formed a wall against which the waves of eastern invasion naturally broke. The flood of conquest swept along its eastern flank, down the broad vale of the Buka'a, and then over the hills of Galilee; but its frowning precipices and its lofty crest deterred or baffled the invader, and the smiling region between its summit and the Mediterranean was, in the early times at any rate, but rarely traversed by a hostile army. This western region it was which held those inexhaustible stores of forest trees that supplied Phœnicia with her war-ships and her immense commercial navy; here were the most productive valleys, the vineyards and the olive-grounds; and here, too, were the streams and rills, the dashing cascades, the lovely dells, the deep gorges, and the magnificent cedar-trees which gave her the palm over all the surrounding countries for variety of picturesque scenery. The principal rivers of Phœnicia were, in the north, the Badas or Nahr-el-Melk, 6 miles south of Jebili; the Nahr Amrith, a strong-running stream which reaches the sea a few miles south of Tortosa (Antaradus); the Nahr Kublé, which joins the Nahr Amrith near its mouth; and the Eleutherus or Nahr-el-Kebir, which reaches the sea a little north of Arka. In the central region are the Nahr-el-Berid or river of Orthosia; the Kadisha or river of Tripolis; the Ibrahim or Adonis; the Nahr-el-Kelb or Lycus; the river of Beyrout or

Magoras; and the Damour or Tamyras. Finally, towards the south are the Nahr-el-Auly or Bostrenus; the river of Sidon; the Litany or river of Tyre; the Zaherany or river of Sarepta; and the Belus or river of Acre (Akko). These rivers, except the Litany, rise from the western flank of the mountain-chains near their crest, and run in deep-wooded valleys, at right angles to the axis of the chains, which is from north to south, having short courses, but conveying generally a good body of water. The Litany alone has its source on the eastern flank of the mountains, and, running down the Cœle-Syrian valley between Lebanon and Anti-Libanus for a distance of 60 miles, turns suddenly to the west, and passes by a deep gorge through the roots of Lebanon to the sea. The Phœnician seacoast is but slightly indented, and possesses but few prominent headlands. The most important are Carmel, if that may be reckoned to Phœnicia; the Ras-el-Abiad, 10 miles south of Tyre; the Ras-el-Jajunieh, a little north of Sidon; the Beyrout promonotory; and in the north Cape Posseidi. Natural harbours were wanting, except where littoral islands offered a protection from the prevalent winds, as at Tyre and Aradus; elsewhere nature provided nothing better than open roadsteads; and the famous harbours of the Phœnicians were all of them the work of art.

The geology of Phœnicia is tolerably simple. Both Bargylus and Lebanon are longitudinal ranges of the early cretaceous limestone, a limestone that is soft and pliable, very easily worked, but wanting the qualities needed for the imitative arts. This simple formation is, however, intruded upon by disturbances of igneous origin, especially in the lower ridges. 'Down many of the valleys run long streams of trap or basalt; occasionally there are dykes of porphyry and greenstone, and then patches of sandstone, before the limestone and flint recur' (Tristram, *Land of Israel*, p. 634). Some slopes are composed entirely of soft sandstone; many patches are of a hard metallic-sounding trap or porphyry; but the predominant formation is a greasy or powdery limestone, and this is the sole material of the higher ranges. The softness of the general material facilitates the formation of a rapid vegetation and the accumulation of vegetable soil, which, washed down by the rivers, covers the more open valleys and the plains which fringe the coast with an alluvium of the most productive character. Its mountain-regions must always have furnished Phœnicia with an inexhaustible supply of excellent timber—fir, pine, and cedar; the lower slopes of its hills were admirably adapted for the cultivation of the olive and the vine, while its maritime plains were equally fitted for the growth of corn and of almost every kind of fruit and vegetable. In mineral products it may have been deficient; but the sandstone of the Lebanon is often largely impregnated with iron, and some strata towards the southern end of the mountain are said to produce as much as 90 per cent. of pure iron ore. An ochreous earth is also found in the hills above Beyrout, which gives from 50 to 60 per cent. of metal. Coal, too, has been found in the same locality. Finally, the geologist Fraas has recently discovered innumerable traces of amber-digging on the Phœnician coast; whence it may be gathered that rare substances were also in the early times among Phœnician products.

Race and Language.—The Phœnicians have been regarded by some as a nation of Hamitic origin, akin to the Egyptians, chiefly on the ground that Sidon is made a descendant of Ham in the tenth chapter of Genesis (verses 6 and 15). But the evidence of language, of physical type, and of mental characteristics far outweighs this argument, which assumes that Genesis x. is framed on strict ethnographic lines, which is disputable. Hence there is a very general, if not a universal, agreement among the more recent ethnologists that the Phœnicians belonged to the Semitic group (Deutsch, Renan, Socin, Levy, Schröder, &c.). Unless historical grounds can be shown for the belief that a nation at some period of its existence changed its language, the form and type of its speech must be regarded as determining, almost beyond a doubt, its ethnography. Now the Semitic character of the Phœnician language is indisputable. It is so closely akin to Hebrew that a moderate Hebrew scholar can understand it without difficulty. Gesenius first, and since his time Schröder and Renan, having subjected the extant remains to the most searching analysis, have satisfactorily shown, not only that Phœnician is predominantly and essentially Semitic, but that it contains no trace in it of any non-Semitic form of speech. Next to Hebrew, its relations are most close with the Assyro-Babylonian form of the Semitic.

Religion.—The Phœnicians were a people in whose minds religion and religious ideas occupied a very prominent place. In all their cities the temple was the centre of attraction, and the piety of the citizens adorned every temple with abundant and costly offerings. The monarchs who were at the head of the various states showed the greatest zeal in continually maintaining the honour of the gods, repaired and beautified the sacred buildings, and occasionally added to their kingly dignity the highly esteemed office of high-priest (Menand. Ephes. Fr. 1). The coinage of the country bore religious emblems, and proclaimed the fact that the cities regarded themselves as under the protection of this or that deity. Both the kings and their subjects commonly bore religious names—names which designated them as the worshippers, or placed them under the tutelage, of some god or goddess. Abd-alonim, Abd-astartus, Abd-osiris, Abdi-milkut, Abd-esmun are names of the former kind; Abibaal ('Baal is my father'), Itho-bal ('With him is Baal'), Baleazar ('Baal protects'), names of the latter. The Phœnician ships carried images of the gods in the place of figureheads (Herod. iii. 37). Wherever the Phœnicians went they bore with them their religion and their worship; in each colony they planted a temple or temples, and everywhere throughout their wide dominion the same gods were worshipped with the same rites and with the same observances. But, while we have ample evidence of the religiousness of the Phœnicians, the distinctive character of their religion still remains a matter of controversy. This arises, on the one hand, from the scantiness, jejuneness, and almost stereotyped character of the native notices, and, on the other, from the distorted and misleading account of the religion which has come down to us from a Hellenised Phœnician of the first or second century after our era, Philo of Byblus. A tendency has recently shown itself to 'rehabilitate' this writer, from whose work, disfigured as it is by his euhemerism, much more, we are told, may be gathered than some have supposed, if we only read it rightly. But it is exactly this necessity of reading into Philo what is not there that makes reliance on him as an authority unsafe. It is only when corroborated by other writers, or by the native remains, that Philo's statements have any value. The native remains show us that in the later historical times, for which alone they exist in any abundance, the Phœnician religion was a polytheistic nature-worship of a somewhat narrow character. There is reason to believe that, like so many other polytheisms, it had an earlier monotheistic stage. Of this stage the names Baal, El, El-Elioun, Rimmon, Molech, Adonai are traces (Max-Müller, *Science of Religion*, p. 177 *et seq.*). Another trace is found in the quasi-universality of Baal and Ashtoreth, names which may be applied respectively to any god or any goddess. But the monotheistic stage passed away at a very early date, and a manifest polytheism succeeded it—a polytheism in which various gods and goddesses (*alonim v' alonuth*) were recognised by every worshipper, as by the Carthaginian introduced into his play of the *Pœnuli* by Plautus (v. 1, line 1).

Of these gods the most prominent, besides Baal and Ashtoreth, were Melkarth, the special god of Tyre; Adonis, the god of Byblus; Sydyk; Dagon; Eshmun, with his brothers, the seven Cabiri; and Molech. Minor deities were Zephon, Tsad, Sakon, Aziz, and Pa'am. In the decline of the nation there was a marked tendency to add to the Pantheon by the introduction of foreign deities, as Ammon, Osiris, Phthah or Ptah, Pasht, and Athor from Egypt, Tanata from Syria, Nergal from Assyria, and perhaps others. The notices are too scanty to enable us to trace out in any detail the nature-worship connected with this polytheistic system, but it is certain that Baal and Ashtoreth represented, to a large extent, the sun and moon, while Dagon was a corn-god, Eshmun a hunter-god, Aziz probably a war-god, and the Cabiri artificer-gods, especially connected with ships and navigation. The gods were worshipped with perpetual sacrifice in their temples, with votive offerings and with festivals. A spring festival to Melkarth, 'the Baal of Tyre,' in the month Peritius (Joseph. *Ant. Jud.* viii. 9, sect. 3), and another to Ashtoreth called 'the brand-feast' (Lucian, *De Dea Syra*, sect. 10), are especially noticed. Anciently it was not considered right to erect statues to the gods in their temples; but the practice was to represent them by conical pillars of stone or wood (Tacit. *Hist.* ii. 3). Two terrible rites particularly characterised the religion—human sacrifice and religious prostitution. A divine original was found for the former of these, El having in a time of great danger immolated his only son upon an altar to avert the evil wherewith the land was threatened. Henceforth such sacrifices were from time to time offered by the state when great disasters seemed impending, and individuals appeased the divine anger against themselves by the offering of their children. At Carthage, we are told (Diod. Sic. xx. 14), an image of El, made of metal, was heated to a glow by a fire kindled within it, and the victims, deposited by their parents in its arms, thence rolled into the fiery lap below. First-born, and especially only sons, or virgin daughters, were deemed peculiarly acceptable to the divinities. The godhead, it was thought, demanded the holiest and most costly gifts possible; and this idea, which lay at the root of the child-sacrifice, may be regarded as also explaining the prostitution of virgins in the temples and groves of the 'Queen of Heaven,' which was certainly an established custom (Luc. *De Dea Syra*, sect. 6; Euseb. *Vit. Constant. Mag.* iii. 55, sect. 3). The institution of the Galli carried out the same idea, and added a final degradation to a system otherwise sufficiently revolting.

Manufactures and Inventions.—Two inventions connected with manufactures were especially claimed by the Phœnicians—the invention of glass, and the discovery of the purple dye. Glass is said to have been discovered accidentally on the Phœnician coast (see GLASS); but as the Egyptians had manufactured glass for many centuries before the Phœnicians occupied the Mediterranean coast, and as there was a very early trade between Phœnicia and Egypt, it is most probable that the Phœnicians borrowed their glass-making from the Egyptians. What was special to Phœnicia in respect of glass was the excellent quality of the siliceous sand near Sidon and in the Bay of Acre. Their glass was of three kinds, transparent colourless glass, translucent coloured glass, and opaque coloured glass, scarcely distinguishable from porcelain. The first they used chiefly for mirrors (Plin. *Hist. Nat.* xxxvi. 26); the second for beads, for imitations of gems, and for bottles, jugs, vases, and amphoræ, which are often of extraordinary beauty. Opaque glass was employed in statues and statuettes. The Phœnician purple dye was derived, principally if not entirely, from two shell-fish which were abundant in the Eastern Mediterranean, the *Murex trunculus* and the *Murex brandaris*. From these, by careful treatment, a number of tints, varying from blue, through violet and purple, to crimson and rose, were produced, and, by different processes, rendered at once brilliant and permanent. With the purple-dye manufacture was closely connected the manufacture of textile fabrics, wherein the Phœnicians appear to have excelled. 'White wool' from Syria (Ezek. xxvii. 18) and Arabia (*ibid.* ver. 21), flax from Egypt, and silk from Persia furnished the materials which were worked into stuffs of excellent quality by the Tyrian and Sidonian artisans, who, partly by the brilliancy of their dyes, partly by their skill in embroidery, obtained for those stuffs a precedence over the products of the looms of Egypt and Babylon. Phœnicia also manufactured on a large scale all manner of household utensils and implements, partly in clay, partly in metal, together with ornaments of various kinds, for the purposes of the export trade which she carried on with barbarous and semi-civilised countries.

Navigation, Trade, and Colonies.—The Phœnicians appear as navigators in the earliest Greek (Hom. *Od.* xv. 415–484), and in some of the earliest Hebrew (2 Chron. ii. 16) notices. They were regarded as familiar with the sea in times anterior to the Trojan war (Herod. i. 1). At first, no doubt, their navigation was timid and cautious. But after a time they became bolder. They sailed direct from headland to headland, and from their own coast to Cyprus, a distance of 70 miles; they continued their voyages during the night, and after a while adventured themselves in the open sea, directing their course by the Polar star, which they found to mark approximately the true north in the seas to which they had access. Their ships, though small, according to our ideas, were well built, and admirably fitted up and arranged (Xen. *Œconom.* sect. 8). For trading purposes they employed ships of a broad, round make (γαῦλοι), but in war they used galleys of a considerable length, which were ordinarily impelled by oars, the rowers sitting on a level, or else in two ranks, one above the other, or sometimes in three. The earliest representations of Phœnician vessels which have come down to us are in the sculptures of Sargon and Sennacherib (*circa* 700 B.C.); those of the latter showing a double tier of rowers. The crews of these vessels do not appear to exceed the number of twenty-five; but the Phœnician war-galleys in the fleet of Xerxes (480 B.C.) carried a crew of 200 sailors, besides thirty men-at-arms (Herod. vii. 184). Phœnician trade was in part a land trade conducted by travelling companies of merchants, in part a traffic by sea. Of the land trade the best account which we possess is that given in the 27th chapter of Ezekiel (verses 13–24), by which it appears that this traffic extended over the greater part of western Asia, including northern Syria, Syria of Damascus, the land of Israel, Arabia, Mesopotamia, Assyria, Babylonia, parts of Armenia, and much of central Asia Minor. Northern Syria furnished the Phœnician merchants with *butz* (probably cotton), and with embroidery and precious stones. Syria of Damascus gave the 'wine of Helbon' and 'white wool.' Israel supplied corn of a superior quality, called 'corn of Minnith,' together with *pannag*, an unknown substance, honey, balm, and oil. Arabia provided spices, as cassia, and calamus or aromatic reed, together with frankincense, and perhaps cinnamon and ladanum. She also supplied wool and goats' hair, cloths for chariots, gold, wrought-iron, and precious stones, together with ivory and ebony, which she probably imported from Abyssinia. Babylonia and Assyria furnished wrappings of blue, embroidered work, and chests of rich apparel. Upper Mesopotamia partook in this traffic. Central Asia Minor, the home of Tubal and Meshech, supplied slaves and vessels of brass. Armenia gave horses and mules of a superior quality. There may have been some further land traffic with Egypt, since the Phœnicians had a settlement at Memphis (Herod. ii. 112), with Persia for silk, and with Central Africa for slaves and skins.

But the land trade of Phœnicia, extensive as we have shown it to have been, was eclipsed by its maritime commerce. The Phœnicians had, in the early times, the command of the entire Mediterranean, of the Propontis, and of the Euxine. They traded largely with the Greeks (Herod. i. 1) and with the natives of almost the entire coast tract between Colchis and the Pillars of Hercules. It was in connection with this maritime trade that they sent out the great bulk of their colonies. Cyprus seems to have been first occupied, then Cilicia, Lycia, Rhodes, Crete, and the Cyclades and Sporades. From these islands the advance was easy to those of the Northern Ægean, Lemnos, Imbros, Thasos, and Samothrace. Then the coast of Thrace was colonised, the Propontis was entered, and a few settlements were perhaps made on the southern coast of the Black Sea. In the opposite direction an advance was made from Crete and Cythera towards the west. The shores of Sicily were occupied, together with the littoral islands and the opposite shores of Africa. Utica, the first African colony, was followed quickly by Hippo Zaritis, Hippo Regius, Hadrumetum, Leptis Major, Leptis Minor, Thapsus, and ultimately by Carthage. The Balearic Islands and the southern parts of Sardinia were soon afterwards occupied, and finally southern Spain and the western coast of Africa, as far as Cape Nun, opposite the Canary Islands. But Phœnician trade far outran Phœnician colonisation. From Tartessus in Spain, outside the Straits, the Atlantic and Bay of Biscay were explored, a trade with Cornwall and the Scilly Islands was established, and the Baltic possibly was entered in the search for amber. North-western Europe was laid under contribution to increase the wealth of the small group of states on the Syrian coast; and at the same time from Lixus, and later from Carthage, western Africa was visited, and a *dumb* commerce established with the natives of the parts about the Senegal and Gambia. Towards the east, moreover, Phœnicia at one time held a share in the trade of the Red Sea (1 Kings, ix. 26–28), sent her ships into the Indian Ocean, and perhaps pushed her commerce as far as Malabar and Ceylon. As a general rule, she imported raw materials, and exported manufactured articles; but there were exceptions to this rule; and, to some extent, she employed herself in a carrying trade, being the negotiator between the east and west, introducing into Greece the finished productions of Egypt and Assyria, of Babylon and Hindustan, while she conveyed to those countries Greek pottery and Greek works of art, Greek wine, and Greek musical instruments.

Art and Literature.—Phœnician art is wanting in originality, but it is not without a certain amount of merit. In the earlier times Egypt and Assyria, in the later Greece, furnished the 'motives,' at once of the architecture, and of the decorative art of the country. Massiveness, heaviness, and a sparing use of ornament characterise the architecture, or, at any rate, its extant remains, which are chiefly walls, tombs, and sepulchral monuments. The walls of Aradus and Sidon are built of blocks almost equal in size to those of the pyramids. Pyramidal forms occur in the sepulchral monuments, though simple pyramids were not affected. No considerable remains of any temple or palace have as yet been found, and it is doubted whether the so-called temples were not rather small shrines or cells placed within a peribolus, adorned with trees, fountains, walks, colonnades, and cloisters. Such a shrine still exists near Amrith (Marathus), and is known as the 'Maabed,' or 'Temple.' It stands in the middle of an excavated court, and rises to the height of 27 feet. Its only ornaments are a cornice and string-course (Renan, *Mission de Phénicie*, pp. 62–68). An erection of more pretension and considerably greater merit, situated near the same place, bears the name of *meghazil*, 'spindle,' and is much admired by some moderns. M. Renan calls it 'a real masterpiece in respect of proportion, of elegance, and of majesty' (*ibid.* p. 72). It is, however, no more than 32 feet in height, and, though in good taste, implies but little architectural skill—much less any grandeur of conception. The tombs attached to the monuments are sepulchral chambers of some size, but without ornament. They generally contain either niches for the reception of corpses or sarcophagi. The sarcophagi are in some cases of a highly ornamental character, having elaborate reliefs both on their sides and ends. Two found by General Cesnola in Cyprus, and one discovered near Sidon, are especially interesting. The reliefs on these tombs are decidedly superior to the statuary, which is rude, coarse, and wanting both in tone and elegance. Phœnician art culminates in the embossed metal pateræ which have been found in so many places, sometimes with Phœnician inscriptions, and always in an unmistakable Phœnician style (Perrot and Chipiez, *Histoire de l'Art dans l'Antiquité*, vol. iii. pp. 759–789; Eng. trans. 2 vols. 1885). The representations on these pateræ have abundant life and spirit.

The subject of Phœnician literature introduces us to the vexed question of the origin of the Phœnician alphabet, and the amount of credit due to the people for inventing it. The time is long past for echoing the opinion of the Greeks, and regarding the Phœnicians as the original inventors of letters. The hieroglyphical writing of the Egyptians, several of the cuneiform syllabaries, and the script of the Hittites are all of them much more ancient than the earliest Phœnician writing, and must have been more or less known to the Phœnicians before they hit upon their own system. Their alphabet, no doubt, like all others of which we have any knowledge, originated in a picture-writing, but whether their characters were modifications of the Egyptian, or of the Hittite, or of the Cypriot, or were abbreviated forms of a picture-writing peculiar to themselves, will probably never be settled. (For the view that the Phœnician letters are derived from the Egyptian hieroglyphics, see ALPHABET, Vol. I. pp. 185–188, where the forms of the Phœnician letters are shown.) The only merit which they can claim, as inventors or improvers of writing, is that of simplification. They discarded the surplus signs with which other nations had encumbered themselves, as determinatives, ideographs, and the like; they assigned to each character a single definite articulation, and to each articulation a single definite character. They thus got rid of the immense multiplicity of earlier systems, and invented an alphabet the value of which was so transcendent that it has maintained itself ever since, and among civilised nations has superseded every other, having only received certain slight modifications. Their alphabet was invented by the Phœnicians for business purposes, which required despatch; and it was employed almost wholly for business purposes until a comparatively late date. The Phœnicians proper, so long as they remained a nation, scarcely possessed anything that we should call a literature. They employed writing for short inscriptions on votive offerings, on tombs, and on coins, for curt records of the history of their country, or rather of their several towns, and no doubt for commercial transactions, but they scarcely wrote books or indulged in what we understand by the art of composition. One work on a philosophic subject (the atomic theory) is assigned to Mochus, a Sidonian (Posid. ap. Strab. xvii. 2, sect. 22), and one on religion, or rather on cosmogony, almost certainly apocryphal, to Sanchuniathon, a Berytian. But otherwise Phœnician literature belongs, not to Asia, but to Africa. The fragment of the *Periplus* of Hanno (q.v.), which has come down to us in a Greek dress, shows that the Liby-Phœnicians at any rate could write interesting books of travels; and the Latin writers speak highly of Hiempsal, Mago, Hamilcar, and others, who had composed valuable works upon the history, geography, and 'origines' of Africa, and also upon practical agriculture (Sallust. *B. J.* sect. 17; Cic. *De Orat.* i. 58; Amm. Marc. xxii. 15; Solin. *Polyhist.* sect. 34).

Origin and History.—Two accounts have come down to us of the origin of the Phœnicians. According to Herodotus, Strabo, Pliny, and others, they dwelt anciently on the shores of the Persian Gulf (Erythræan Sea), whence they crossed by land to Syria, and settled on the coast of the Mediterranean. Herodotus (vii. 89) declares this to be their own account of themselves, and Strabo says that there was a similar tradition among the inhabitants of the gulf, who showed, in proof of it, Phœnician temples on some of the islands. Justin, on the contrary, in his epitome of Trogus Pompeius, declares that they were driven out of their country by an earthquake, and passed to the Mediterranean from the 'Syrian lake,' or Dead Sea. This latter version of the story has been connected by some with the destruction of the Cities of the Plain recorded in Genesis. Whichever account be preferred, it would seem that the Phœnicians regarded themselves as immigrants into their country, and not (like most ancient nations) as aboriginals. The settlements upon the Mediterranean coast were no doubt made by degrees, and the settlers at different places were, from the first, independent of each other. Among the earliest of the sites occupied were those of Sidon, Arka, Aradus, and Simyra (Gen. x. 15–18). Tyre was not settled till considerably later, and Tripolis was a colony from Tyre, Sidon, and Aradus. Gebal, Akko (Acre), Berytus (Beyrout), and Sarepta are mentioned, together with Tyre, in Egyptian inscriptions of the 14th century B.C. (*Records of the Past*, vol. ii. pp. 110, 111); and it would seem that from about 1600 to 1300 Phœnicia must have been a dependency of Egypt. But on the decline of Egypt under the twentieth dynasty the flourishing time of Phœnicia began. Sidon especially grew to greatness, and became known as 'Great Sidon' (Josh. xi. 8; xix. 28). Under her hegemony Akko, Achzib, and Aphek were able to resist the conquering Israelites (Judges, i. 31). She even at this time pushed her land dominion as far as Dan or Laish, on the head-waters of the Jordan (*ibid.* xviii. 7, 8). Her vessels traversed the Mediterranean, and she became known to the Greeks as the chief commercial power in the world, and as eminent in various branches of industry. At the same time she began that system of colonisation which Tyre afterwards pursued with so much success. Her emigrants occupied Citium and other places in Cyprus, the Ægean Islands, Malta, Utica, and other sites on the North African coast, together with many points in Sicily. She also endeavoured to extend her influence into Philistia, and, after colonising Dor (Scylax, *Periplus*, sect. 104), made war on Ascalon. Here, however, she received a rebuff. The Philistines under Ascalon attacked her by land, and so pressed the siege that the bulk of the citizens fled from the town by sea, and took refuge at Tyre (Justin. xviii. 3), which may thus have acquired her pre-eminency. Certainly in the second period of Phœnician history (1252 to 877 B.C.) Tyre rather than Sidon takes the lead. The Tyrian colonies of Thasos, Abdera in Thrace, Pronectus in Bithynia, Gades, Malaca, Sexti, Carteia, Belon, and a second Abdera in Spain, Caralis in Sardinia, Hadrumetum, and the lesser Leptis in North Africa, Tingis and Lixus on the West African coast are founded. The new Judæan kingdom established by Saul and ruled by David (*circa* 1050) finds Hiram (Hirôm) of Tyre a powerful neighbour, and enters into friendly relations with him. The friendship continues under Solomon, and both the Hebrew and the Tyrian annals (Dius, Fr. 2; Menand. Fr. 1) mention the communications which took place between them. Hiram gave Solomon timber, and lent him workmen for both his palace and temple, receiving in return large annual payments in corn, wine, and oil, and ultimately obtaining a cession of territory (Cabul), which, however, he did not much value (1 Kings, ix. 10–13). The friendship led on to a participation of Solomon in the Tyrian trade, both with Tarshish, or Tartessus, in Spain (*ibid.* x. 22), and with Ophir, perhaps the coast of Malabar (1 Kings, ix. 26; x. 11). Hiram reigned forty-three years, and greatly beautified and improved his capital, which he enlarged by substructions and by uniting to it a separate island, besides adorning it with new temples, and probably with a new palace. He is thought to have also sent an expedition to Africa, and reduced the people of Utica to subjection. His dynasty is thus given by Menander: Hiram reigned forty-three years, from about 980 to 936. Baleazar, his son, who succeeded him, reigned seven years, from 936 to 929. Abd-Astartus, Hiram's grandson, then succeeded, and reigned nine years, from 929 to 920, when he was murdered by four of his foster-brothers, the eldest of whom took the throne, and reigned twelve years, from 920 to 908. He was succeeded by a monarch of the ancient stock, Astartus, who also reigned twelve years, from 908 to 896. Ascrymus, a brother of Astartus, then mounted the throne, and reigned nine years, from 896 to 887, when he was murdered by another brother, Pheles, who, after a reign of eight months, was in his turn murdered by Ithobal, priest of Ashtoreth, who held the throne for thirty-two years, from 887 to 855. Ithobal appears as Eth-baal, and is called king of Sidon (1 Kings, xvi. 31), since he probably reigned over both cities. He gave his daughter, Jezebel, in marriage to Ahab, and was thus the means of introducing the Baal worship among the Israelites. The foundation of Botrys on the Syrian coast, north of Gebal, and the colonisation of Aüza in Numidia are assigned to him. He was succeeded by his son, Badezor, who reigned six years, from 855 to 849, and then gave place to his son, Mattan, who reigned nine, or more probably twenty-nine years, from 849 to 820. At his death the crown fell to his son, Pygmalion, a boy of eight or nine years old. A dispute, however, arose about the succession between Pygmalion and his uncle, Sicharbas (married to Pygmalion's sister Elissa or Dido), and the result was Sicharbas' murder, and the flight of Elissa to the North African coast, where she founded Carthage, 814.

A foreign enemy began to threaten Phœnicia in the reign of Ithobal. Earlier Asiatic monarchs, as Chedorlaomer and Tiglath-pileser I., had made no permanent impression on the Syrian region; but from the time of Asshur-nazir-pal (883–860) Assyria began a series of attacks upon all the tribes and nations in these parts, which resulted in their subjugation and submission to the Assyrian yoke. Asshur-nazir-pal, about 877, was the first to cross the Euphrates, enter the Orontes valley, and commence the conquest of the Syrian tribes. He received tribute from the Phœnician cities of Aradus, Gebal, Sidon, and Tyre. His son, Shalmaneser II., completed the reduction of Phœnicia, defeating Mattan-Baal of Aradus, and compelling the other monarchs to a fixed system of tribute. The relations between Assyria and her vassal then continued peaceful for about a century (840–740). Assyria encouraged the Phœnician land traffic, and the Phœnicians gladly paid their tribute and their homage in return for the protection afforded them. But about 740 a new policy was adopted. Tiglath-pileser II. was an active and enterprising prince, who energetically applied himself to the consolidation and unification of the empire. He began the process in northern Syria, rearranging the population in the various towns, taking from some, and giving to others, adding in most places an Assyrian element, appointing Assyrian governors, and requiring of the inhabitants 'the performance of service like the Assyrians' (*Eponym Canon*, p. 120, line 28). Among the places thus treated between 740 and 738 were the Phœnician cities of Simyra and Arka. The result was a general awakening of distrust among the Phœnician populations. Simyra and Arka revolted in 720, in conjunction with Hamath, Arpad, Damascus, and Samaria (*ibid.* p. 126, lines 33–35). Tyre took the alarm even earlier. Under Luliya, or Elulæus, she built herself up a great power, extending her sway over Sidon, Akko, Ecdippa, Sarepta, Hosah, Mahalliba, &c., and at the same time seeking to bring under her yoke the distant island of Cyprus. These movements provoked Assyria to action. About 727 Shalmaneser IV., the successor of Tiglath-pileser II., made an attempt to crush Elulæus from the land side. Baffled in this, he succeeded in detaching from the Tyrian alliance a number of the minor Phœnician towns, and with the help of their fleets assaulted the island Tyre by sea. But the Tyrians defeated his attack, and he was compelled to withdraw and seek to force them to a surrender by cutting off their supplies of water (Menand. Ap. Joseph. *A.J.* ix. 14, sect. 2). But they withstood him for five years, at the end of which the Assyrian monarch lost his throne by a revolution (722), and Tyre was for many years unmolested. At last, however, Sennacherib (*circa* 701) felt strong enough to renew the attack, and, having united against Tyre most of the other southern Phœnician cities, drove Elulæus from his throne, and forced him to take refuge in Cyprus. A tranquil period then set in, but only to be followed by further revolts and subjugations. In 680 Abd-Melkarth, king of Sidon, revolted against Esar-haddon, and was captured and slain. Eight years later, in 672, Baal, king of Tyre, who had taken the place of Abd-Melkarth, joined Tirhakah against his suzerain (*Eponym Canon*, p. 142, lines 12, 13), and was severely punished (*ibid.* pp. 144, 145); and about 645 Hosah and Akko both revolted against Assur-bani-pal, the son of Esar-haddon, and were attacked, conquered, and punished with utter destruction. The Assyrian period, which began so fairly in the 9th century, terminated in the 7th in a series of revolts, sieges, and massacres.

The Assyrian power came practically to an end about 630, and Phœnicia found herself once more independent. Tyre again sprang into notice, occupying the foremost place, and establishing a hegemony over the other cities (Ezek. xxvii. 8–11). But this prosperity and glory were short-lived. Within a brief space Phœnicia, and Syria generally, became a bone of contention between Egypt and Babylon, the two powers which made the earliest efforts to profit by Assyria's fall. First Egypt, under Neco (608), occupied the territory, and then Babylon, under Nebuchadnezzar (605), seized it. Tyre received a grievous blow at the hands of this latter prince, who, after a siege of thirteen years, forced the island city to submit to him. Phœnicia remained a Babylonian dependency from 585 to 538, when Cyrus took Babylon, despite the efforts of the Egyptians to make themselves masters of it. A fragment of Menander gives the internal history of Tyre during this interval. Nebuchadnezzar's opponent, it appears, was a second Ithobal, who reigned from about 597 to 573. He was succeeded by his son, Baal II., who held the throne for ten years, from 573 to 563. A revolution then took place, kings being replaced by 'judges,' officers of an inferior status. Of these, Ecnibaal reigned for two months, Chelbes for ten, and Abbarus for three. The office was then divided, as at Carthage, between two, and Mytgon and Gerastartus held it for six years (562–556). But now another internal struggle took place, and the monarchy was restored in the person of a certain Merbal, who was sent for from Babylon, a descendant of the ancient kings. This prince reigned four years, from 556 to 552, and was succeeded by his son, Hiram II., who had a reign of twenty years, from 552 to 532. It was in this king's reign that the Babylonian empire came to an end, and Phœnicia had another brief interval of independence (538 to 527).

The Babylonian was followed by the Persian period, which lasted from 527 till 333. Phœnicia submitted to Cambyses without a struggle, and became an integral portion of the Persian empire. In the arrangement of the provinces she held a place in the fifth satrapy, which was composed of Syria, Phœnicia, Palestine, and Cyprus. She was allowed, however, to keep her native kings, and to organise for internal purposes a native government. Tyre, Sidon, and Aradus united themselves by federal ties, and sent representatives to a common council, which met at Tripolis. An excellent understanding was for some time maintained between the suzerain power and her feudatory, which zealously supported Persia in her various maritime wars, forming the main element of her naval strength. It was Phœnicia which crushed the Ionian revolt at Ladé (495), which caused the failure of the Athenian expeditions to Egypt (460–455), and which enabled Persia to extort from the Lacedæmonians the peace of Antalcidas (387). A curious feature of this period was the intimacy and friendship established between Phœnicia and Athens, which, feeling that its power of coping with Sparta depended greatly on the support of the Phœnician fleet, gave exceptional privileges to the Phœnician people and states. Phœnicians were allowed to settle in Attica, particularly at Phalerum and the Piræus, to erect tombs there, and have their own places of worship, while ultimately (about 370) the relation of *proxenia* was entered into between Strato, king of Sidon, and the Athenian people. Towards the later part of the Persian period, however, the allegiance of Phœnicia began to waver. Evagoras of Salamis, when in revolt against Mnemon, is thought to have obtained a certain amount of Phœnician support (Kenrick, *Phœnicia*, p. 405). In the 'War of the Satraps' (366) the defection of Phœnicia from the Persian cause is certain. Later on came the great Phœnician revolt. Encouraged by the successful stand which Nectanebo had made against Ochus, Tennes, king of Sidon—probably the Tabnit of the Sidonian inscriptions—raised (in 351) the standard of rebellion. All the other cities joined him. Alliance was made with Egypt; the Persian garrisons in Phœnicia were massacred, the royal park was plundered, and the stores laid up for the Persian cavalry were destroyed (Diod. Sic. xvi. 41, sect. 5). The first attempt which Persia made to crush the rebellion failed; but in 345 Ochus himself invaded Phœnicia with an army of 330,000 men, and Tennes, regarding resistance as hopeless, submitted, and received the Persians within the walls. But the inhabitants generally refused to submit. Shutting themselves up within their houses, together with their wives and children, they applied the torch to their dwellings, and lighted up a general conflagration. Forty thousand persons are said to have perished in the flames (Diod. Sic. xvi. 45). Tennes, notwithstanding his submission, was executed, and the crown passed to his son Abd-Astartus (Strato II.). The last Sidonian dynasty is traceable for five generations, through the following six sovereigns—Esmunazar I., father of the first Tabnit (*circa* 460–440); Tabnit I., his son, who married his own sister, Am-Ashtoreth; Esmunazar II., their son, whose tomb is in the collection of the Louvre; Strato I., this Esmunazar's brother, who reigned from about 400 to 361, and was *proxenos* of Athens; Tennes II., Strato's son, who reigned from 361 to 345, when he was put to death by Ochus; and Strato II., the son of the second Tabnit, who held the throne from his father's death to the final extinction of Phœnician independence (333) by Alexander.

Alexander's invasion of Asia in 334 found the Phœnicians still attached to Persia. The fleet of Memnon, which commanded the Ægean, consisted principally of Phœnician vessels, the contingent of each state being under the direction of the native monarch, or his son. No sign of disaffection showed itself until the defeat of Darius at Issus (333), when the collapse of the Persian power, and the advance of the Macedonians into Syria in overwhelming force, made a change of policy necessary. Aradus, Byblus (Gebal), and Sidon then surrendered themselves; and Tyre would have done the same had not Alexander made the unpalatable demand that he should be received into the island-city. Upon this the Tyrians resolved to defy him, and, under their king, Azemilcus, stood the famous siege, which is perhaps the most glorious event in Phœnician history. It was not till all their sister-cities had deserted them, and the Macedonian monarch had filled up the strait between the mainland and their isle, that they were conquered. Then at last the brave and tenacious people succumbed to destiny, and, losing their nationality, became absorbed into the Greco-Macedonian empire.

No native history of Phœnicia has come down to us, and it is questionable whether any such history was ever written. The so-called 'Phœnician History' of Philo Byblius, ascribed by him to Sanchoniathon, is not historical but mythological. Phœnician history has to be gathered from scattered notices in the Hebrew and classical writers, and from a few—a very few—native monuments. The best modern works on the general subject are Movers's *Die Phönizier und das Phönizische Alterthum* (5 vols. 1841–56) and Kenrick's *History and Antiquities of Phœnicia* (1855), to which the writer may perhaps be allowed to add his own *History of Phœnicia* (1889). There is a valuable article by Movers in the *Encyclopædia* of Ersch and Gruber, and another chiefly by Gutschmid in the *Encyclopædia Britannica;* and some excellent essays on the principal characteristics of the Phœnicians, written by Emanuel Deutsch, will be found in his *Literary Remains* (1874). Recently the attention of scholars has been directed mainly to the three points of the geography of the country, the language and literary remains, and the æsthetic art and architecture. The geography has been largely illustrated by Renan in his *Mission de Phénicie* (1864), by Walpole in his *Ansayrii* (1851), by Tristram in his *Land of Israel* (1865), and by Lortet in *La Syrie d'Aujourd'hui* (1884). The language and literary remains, which engaged the attention of Gesenius towards the middle of the 19th century, were subjected by him to careful analysis in his important work, *Scripturæ Linguæque Phœniciæ Monumenta* (1837), which is still an authority of importance; but the work has since been further carried on with remarkable success by Judas, *Études démonstratives de la Langue Phénicienne et de la Langue Libyque* (1842); by the Abbé Bourgade *Inscriptions Phéniciennes* (1852); by Dietrich, *Zwei Sidonische Inschriften* (1855); by Ewald, *Erklärung der grossen Phönizischen Inschrift von Sidon* (1856); by Schröder, *Die Phönizische Sprache* (1869); and recently by M. Renan and other scholars in the magnificent work entitled *Corpus Inscriptionum Semiticarum* (Paris, 1881–90), where the Phœnician inscriptions occupy almost the entire first volume. Phœnician art and architecture have been largely discussed by M. Renan in his *Mission de Phénicie*, and exhaustively treated by M. Clermont-Ganneau in his work, *L'Imagerie Phénicienne* (Paris, 1880), and by MM. Perrot and Chipiez in their magnificent *Histoire de l'Art dans l'Antiquité* (1882–87), where the subject of Phœnicia occupies the third volume. Byways of Phœnician art have been pursued by General di Cesnola in his *Cyprus* (1877), and by his brother, A. di Cesnola, in his *Salaminia* (1882); also by Ceccaldi, *Monuments antiques de Cypre* (1880); by Signor Cara, *Relazione degli idoli Sardo-fenici* (Cagliari, 1875); and by M. de Vogüé, *Mélanges d'Archéologie Orientale* (1860). Research is still going on upon Phœnician sites, as in the vicinity of Beyrout and Saida (Sidon), and again in Cyprus. The Beyrout journal *Le Bachir* contains from time to time interesting notices of the objects exhumed in Phœnicia proper, while accounts of the work done in Cyprus have appeared in the *Times* and elsewhere.

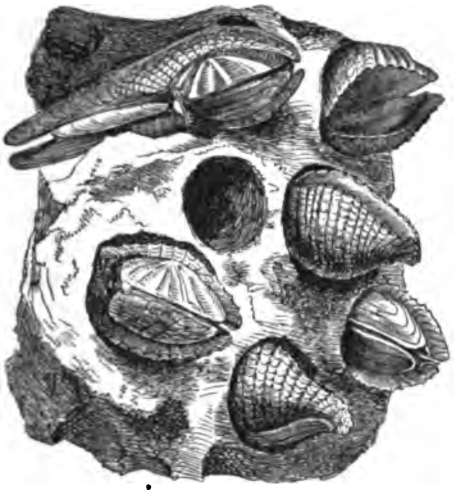
Phœnix, the name of a mythical Egyptian bird, supposed by some to be a kind of plover, like the *kibitz*, often depicted with human arms, and called in hieroglyphs *rekh*. Others consider it to be the *bennu*, or nycticorax, a bird sacred to Osiris. It visited Egypt after the death of its father, and entered the shrine particularly dedicated to it at Heliopolis, and there buried its parent, putting the body into an egg or case made of myrrh, and then closing up the egg. Another account is that the Phœnix, when about to die, made a nest for itself in Arabia, from which a new Phœnix sprung of itself. This bird proceeded to Heliopolis, and there burned and buried its father. But the more popularly-known version is that the Phœnix burned itself, and a new and young Phœnix sprang from the ashes. The Phœnix was, according to the most authentic accounts, supposed to visit Egypt every 500 years; the precise period, however, was not known at Heliopolis, and was a subject of contention till its appearance. The connection of the Phœnix period with that of the Sothiac cycle appears to be generally received by chronologists, as well as the statement that it designated the soul and the inundation of the Nile. A great difference of opinion has prevailed about the Phœnix period—a cycle generally of 500 years, but varying also from 250 to 7000 years. Lepsius makes it a cycle of 1500 years. The Phœnix was fabled to have four times appeared in Egypt. For a long and serious argument by a fellow of an Oxford college in 1840 in favour of the existence of the phœnix, see *Notes and Queries* for 22d December 1882, p. 481. He followed Clement, Tertullian, Epiphanius, and other church fathers.

Phœnix. See DATE PALM, and PALMS.

Phœnix Park. See DUBLIN.

Phœnixville, a town of Pennsylvania, on the Schuylkill River, 28 miles by rail NW. of Philadelphia. Here are the extensive works of the Phœnix Iron Company and the Phœnix Bridge Company, which together employ 2400 men. Other manufactures are cotton goods, stockings, shirts, needles, pottery, &c. Pop. (1890) 8514.

Pholas, a genus of marine boring bivalves, of the family Pholadidæ. The shell is thin but hard, gapes at both ends, and has accessory valves. The two principal valves are beset with inequalities, producing a rasp-like structure. Chiefly by means of the foot, but in a manner incompletely understood, these boring molluscs make cylindrical holes in the rocks or in wood. Over thirty living species are known—e.g. the common *Pholas dactylus*, popularly known as the *piddock*, and the *datolo di mar* of the Italian markets. It is used both for food and bait. The allied genus Pholadidea is also represented on British coasts, and so is the wood-boring Xylophaga. To the family Pholadidæ also belongs the ship-worm, or Teredo (q.v.). See also BORING-ANIMALS.



A piece of rock bored by Pholas.

Phonetics, the science of the sounds of the voice. These are produced by air sent from the lungs through the windpipe, where it may or may not set in vibration two elastic membranes in the larynx, called the 'vocal cords,' producing 'voice' in the first case, and otherwise a wind-rush called 'flatus.' After passing the larynx the voice or flatus enters the mouth (the cavity of which, variously modified by the tongue or lips, affects the sound by its 'resonance'), or else the nose (when the entrance to the same from the throat is not blocked by the pressure of the uvula against the back of the pharynx, greatly modifying the sound by the vibration of the complicated membranes which line the nasal passages), or else both (as in the French nasal vowels). See VOICE, and the illustration of pharynx, uvula, &c. at DIGESTION. Properly speaking, phonetics comprehends the examination of many sounds which are not used in any language, and very different selections have been made by different nations. Here attention is confined to those used in 'received' (as opposed to 'dialectal') English, and a few other European languages.

As the sounds of speech are essentially differentiated by the variously shaped cavities of the mouth, two kinds must be carefully distinguished—'fixed sounds,' where the cavities remain unchanged during utterance; and 'glides,' where the forms of the cavities are constantly changing during utterance. These glides necessarily occur in passing from one fixed position to another, and very often the fixed position is not used for the production of a fixed speech-sound, but merely for the beginning or end of a gliding sound. Thus, in *pat*, *tak* (italics always indicating systematic writing), the *a* represents a certain fixed sound known as a 'vowel,' but the *p*, *t*, *k* represent only fixed positions which have absolutely no accompanying sound, and merely begin or end the (unwritten) glides on to and from the vowel. Hence they were called 'con-sonants' or 'with-sounders,' inasmuch as they sounded with the vowel but not alone. The term 'consonant' has, however, now a much more extended meaning, and the above *p*, *t*, *k* are distinguished as 'mutes.' On the other hand, *b*, *d*, *g*, in *bad*, *bag*, have voice-sounds of their own, though very brief and imperfect, and commence and finish the same glides as before, but they are also called consonants, and are distinguished as 'sonants.' Again *s*, *sh*, in *sash*, have distinct hisses of their own, which can be continued any length of time, but also determine glides on to and from *a*, and are still called consonants, being distinguished as 'hisses.' Similarly *th* and *f*, in *theef*, 'thief,' are hisses and determine glides on to and from *ee*. But in *dhai theev*, 'they thieve,' the *dh*, *v* are 'buzzes' which can also be continued indefinitely, but have a harsh, grating sound, and when in the pause (but not otherwise) easily lose their voice and end in hisses, as *hiz eizz*, 'his eyes.' The consonants nearest to vowels are the so-called 'liquids'—viz. the two 'flaps,' central *r* and lateral *l*, and the three nasals *m*, *n*, *ng* in *roa·ring*, *lol·ing*, *sum*, *sun*, *sung*. These are so very vowel-like that they can be actually sung upon, especially the three nasals which produce 'hums.'

It would seem to be an easy task to discover at least all the fixed sounds or positions capable of being produced by the organs of speech, and then, noting each by a symbol, leave the glides to form their connection. But it is not so; and had the invention of letters had to depend upon that discovery, we should still have been illiterate. Actually signs were invented for whole words, and then used for the sounds with which they commenced. All was very rough and rude, and the characters chosen could not have been readily altered, even had the requisite knowledge existed. Hence in all languages, and notably in English and French, though the intention of writing was to recall the sound, the word-symbol could not be readily analysed into representatives of the component sounds, till it came to pass for the above two languages that a word seen and not heard could not be uttered, and a word heard and not seen could not be written. Hence arose in many minds the idea of recasting orthography by strict analysis of the sounds—i.e. on a phonetic basis—and to print books in accordance with the new conception, in order to teach reading, at least in the first instance, to children and foreigners. These attempts are popularly spoken of as 'phonetics,' but they are only a practical and very small branch of it, to which it is not necessary to allude further. Some of these alphabets are adapted for the scientific expression of speech-sounds, and among them that here printed in italic letters and called 'Glossic,' which will now be briefly explained and then considered somewhat in detail. The ordinary spelling is given in roman letters, the Glossic below it in italics.

SHORT KEY TO GLOSSIC.

1. Long stressed vowels—
beat, bait, baa, bought, boat, boot.
beet, bai·t, baa·, bau·t, boa·t, boo·t.
With vanishes— *bai·yt, boa·wt.*

2. Short stressed vowels—
knit, net, gnat, knot, nut, nook.
nit·, net·, nat·, not·, nut·, nuok·.

3. Short unstressed vowels—
merry, parental, influence, follow.
mer·i, pŭren·tŭl, in·flooŭns, fol·oa.

4. Vowel diphthongs, unanalysed—
file, foil, foul, fuel.
feil, foil, foul, feu·il.

5. Aspirate—
hay, behave, mishap.
hai·, bi-hai·v, mis-hap.

6. Mutes and sonants—
pea bee, toe doe, cape gape.
pee· bee·, toa· doa·, *kai·p gai·p.*

7. Hisses and Buzzes—
whey way, feel veal, thin then,
whai· wai·, fee·l vee·l, thin· dhen·,

seal seal, rush rouge, hue you.
see·l see·l, rush· roo·zh, yhoo· yoo·.

8. Flaps—
ear-ring hearing, gull struggle.
ee·ŭ-ṛing· hee·ŭring, gul· strug·l.

9. Nasals—
sum chasm, pun open, sung hunger.
sum kaz·m, pun· oa·pn, sung· hung·gŭ.

10. Consonantal diphthongs, unanalysed—
chest fetch, jest, judge.
ches·t fech·, jes·t, juj·.

Observe that long vowels under the stress have a turned period (·) after them, and that short vowels under the stress have a turned period after the following consonant. Unstressed short vowels are not particularly indicated here, otherwise than by the stress being marked on some other vowel, except in the case of *ŭ*.

The above scheme suffices for received English, but a few more signs, hereafter assigned, are required for some sounds in received German, Italian, Spanish, and French.

The difference between consonants and vowels is only one of degree. Both have their own special resonance cavities through which flatus, whisper, or voice can pass. But the vowel cavities are best adapted to allow the passage of clear smooth voice, capable of being sung upon with a good quality of tone, and the consonants are more adapted for 'hisses,' or that peculiar mixture of flatus and voice known as 'buzzes.' The 'whisper' proper is a middle kind of sound for which the vocal cords are not brought perfectly close, but close enough to allow the extreme edges of the cords to vibrate as the breath passes, so that a mixture of obstructed flatus and imperfect voice results. Let any one pronounce the above key-words in lines 1 to 4 of the short key in a loud 'stage whisper,' and he will sufficiently seize the effect, which need not be further alluded to, except to draw attention to the difference between whisper and flatus, for the last of which the 'glottis,' or tongue-shaped cavity between the vocal cords, is as widely open as possible, and the sound is produced only by the wind-rush. The reader should try to speak line 1 of the short key with flatus.

The shapes of the resonant cavities of the mouth suitable for vowel-sounds have been analysed by Mr Melville Bell for his 'Visible Speech' into nine kinds according as the back, middle, or tip of the tongue is high, mid, or low, reckoned from the lower jaw to the palate, the mouth in each case being wide open, and the nasal passages closed. Each of these nine can be modified by more or less closing the lips (called 'rounding'), doubling the former number. Again, each of these eighteen vowels may be either narrow or wide. The best phonetists are not yet agreed respecting the cause of this distinction, but its reality is certain, and may be readily perceived by comparing narrow *bee·t* with wide *bit·*, narrow *bai·t* with wide *bet·*, narrow *nau·t* with broad *not·*, narrow *poo·l* with wide *puol·*, 'pull.' By this means thirty-six vowels are obtained, which again can be varied in different ways. English has only twelve different vowels under the stress as shown in lines 1 and 2, and only four need be noticed when unstressed as shown in line 3. But this is a large number. Other languages have generally fewer, and this makes English so difficult for foreigners to pronounce. A few of the foreign vowels, however, present similar difficulties to Englishmen, among which are the following:

ADDITIONAL VOWELS.

ee short, as distinct from *i* in Fr. (French) and It. (Italian).

ae long in Fr. *bae·t*, 'bête;' Ger. (German) *gŭshprae·ky'hŭ*, 'Gespräche.'

aa short in Ger. *maan·*, 'Mann;' It. *aan·noa*, 'anno.'

ah long and short, Fr. *pah*, 'pas,' a broad sound between *aa* and *au*, but not rounded.

ao long and short or middle length, between *oa* and *au*, Fr. *nao·r*, 'nord;' Ger. *haol·ts*, 'Holz.' Also used by older speakers in English as *mao·ŭ;* now usually *mau·ŭ*, 'more.'

eo narrow in Fr. *peo·*, 'peu;' Ger. *Geo·tŭ*, 'Goethe,' a narrow *ai* without vanish, spoken with the lips rounded as for *oa*.

oe wide, Fr. *voe·v*, 'veuve;' Gr. *Boek·ŭ*, 'Böcke,' a wide *e*, spoken with the lips rounded as for *oa*.

ue long and short, Fr. *aafue·*, 'affût,' *uet·*, 'hutte;' Ger. *ue·bŭr*, 'über,' *uep·iky'h*, 'üppig,' a broad *i* (or, as Dr Sweet thinks, a narrow *ee*), with lips rounded as for *oo*.

THE FOUR FRENCH NASALS.

aen' in *vaen'*, 'vin,' an attempt to say *ae* or *a* with the nasal passages fully open.

aan' or *ahn'* in *saan'* or *sahn'*, 'sans,' an attempt to say *aa* or *ah* with the nasal passages fully open.

oan' or *aon'* in *boan'* or *baon'*, 'bon,' an attempt to say *oan* or *aon* with the nasal passages fully open.

oen' or *un'* in *oakoen'*, 'aucun,' an attempt to say *oen* or *un* with the nasal passages fully open.

When two different vowels glide into each other they form a diphthong. Line 4 of the short key shows the four principal diphthongs purposely noted by arbitrary instead of systematic signs. If we wished to represent their analysis we should write *fuyl*, *foyl*, *fuwl*, *fyoo·il*, where the *y* and *w* are used to show very short unstressed *i*, and *uo*, which form the second element of the first three, the first element being short but stressed. In the cases of 'way,' 'know,' and similar words, especially in the pause, it is very usual in the south of England to let the voice glide off to a *y* and *w* sound known as the 'vanish;' but then the first element is long, as *wai·y*, *noa·w*. There are, however, a number of 'murmur diphthongs' where the second element is the murmur *ŭ*, into which the flap *r* degenerates (in London, not in Scotland), as shown for *ŭ* in line 8 of the short key, or in the four usual cases—*ee·ŭ* or *i·ŭ*, 'ear;' *e·ŭ* 'air;' *ao·ŭ* or *au·ŭ*, 'oar;' *poo·ŭ* or *puo·ŭ*, 'poor.' The *r*, however, revives if a vowel follows, as *hee;ŭ*, *hee·ŭring*, 'hear, hearing;' *pao·ŭ*, *pao·ŭring*, 'pour, pouring;' or *pau·ŭ*, *pau·ring*, more commonly in London.

The mode in which a vowel begins to sound is called a 'glottid,' because it depends upon the opening of the glottis. If the vocal cords are quite close and ready to act, as they should always be in singing, the vowel-sound commences immediately on the breath reaching the larynx, and this is called the 'clear' glottid. If the closure of the glottis be exaggerated, so that the vowel comes out with a kind of explosion, the result is the 'catch' glottid, written (;) in discussions. This is common before all vowels beginning words or compound parts of words in German, as *;aay·nŭ*, *;er;in·ŭruong*, 'eine Erinnerung.'

On the other hand, if the glottis is not quite closed at first, but closes gradually as the breath passes, we have first a slight escape of flatus, followed by a slight whisper, and then by the vowel itself. This forms the 'gradual' glottid, which is not uncommon, especially in passing from a hiss to a vowel, as in *see;* and even from a mute to a vowel, to distinguish more clearly mutes from sonants, as *pee* from *bee*. As a general rule none of these three glottids need be marked, though the 'gradual' may be distinguished in phonetic discussions by (°), as *pee*, *p°ee*. A similar effect called the 'recoil' occurs after mutes in the pause, and may be written in the same way in discussions; compare *pop°·* with *pop·gun*, not *pop°·gun*. An exaggeration of this (°) often occurs in the so-called 'aspirate' or 'rough breathing,' which essentially consists of a jerked emission of breath, whether voice or flatus, and the exertion of jerking out a vowel often introduces a strong flatus through the vowel position. Both are represented by *h* (or, when not initial, to prevent confusion, by *-h*), but in discussions the latter may be represented by *h°*, as *hot*, *h°ot*.

The consonants which have positions that gradually diminish in the power of allowing distinct voice to pass from the nasal liquids, as *m*, through the lateral liquid *l*, the flap *r*, the buzzes, as *z*, and hisses, as *s*, to the sonants, as *d*, and the mutes, as *p*, may be arranged either as in the short key or by the parts of the vocal organs which form the passage (putting, however, the mutes first as most marked by absolute stoppage of voice) as in the table, where capitals refer to the short key, and the other letters are explained afterwards.

TABLE OF CONSONANTS.

	Contacts or Straits formed by	Lips.			Tongue Tip.				Tongue Mid.			Tongue Back.	
		Round. 1	Flat. 2	With Teeth. 3	With Teeth. 4	With Gums. 5	With Palate. 6	Tongue Reverted. 7	With Point and Palate. 8	With Palate. 9	With Back Palate. 10	With Hard Palate. 11	With Soft Palate. 12
	ORAL												
	CONTACTS												
i.	Mute	*P*				*t'*	*T*				*ky'*	*K*	*kw'*
ii.	Sonant	*B*				*d'*	*D*				*gy'*	*G*	*gw'*
	STRAITS												
	Central fixed												
iii.	Flated	*WH*	*f'*	*F*	*TH*	*S*	*sh'*	*SH*		*YH*	*ky'h*	*kh*	*kw'h*
iv.	Voiced	*W*	*v'*	*V*	*DH*	*Z*	*zh'*	*ZH*		*Y*	*gy'h*	*gh*	*gw'h*
	Central flapped												
v.	Flated											*'rh*	
vi.	Voiced						*R*					*'r*	
	STRAITS												
	Lateral												
	Tremulous												
vii.	Flated						*lh*						
viii.	Voiced					*l'*	*L*		*ly'*				
	NASAL												
ix.	Flated						*nh*						
x.	Voiced	*M*				*n'*	*N*		*ny'*			*NG*	

ADDITIONAL CONSONANTS.

Col. 2. *f'*, *v'* are *f*, *v* without touching the teeth, and of these *v'* is the regular German 'w.' Both occur in modern Greek and Hungarian.

Col. 5. *t' d'*, *l'*, *n'* are the common continental forms of our *t d*, *l*, *n*, the tip of the tongue being brought more forward, so as to lie fully against the gums. The first two occur dialectally sometimes before r, but are not received. They need not be distinguished from *t d*, *l*, *n*, except in discussions.

Col. 6. *sh' zh'* are *sh zh* pronounced without the hollow at the back of the tongue, which is more in the *ee*-position. But the distinction need not be made except in discussions.

lh, *nh* are the flated voiceless forms of *l*, *n*. The first occurs unilaterally in the Welsh 'll,' and the latter dialectally in English for initial 'kn' in 'know.'

Col. 8. *ly'*, *ny'* are attempts to pronounce *l* and *n* at the same time as *y*, and hence are different from *ly*, *ny* in *milyŭn*, *minyŭn*, 'million, minion,' where the *y* follows. They occur as 'gl, gn' in Italian 'figlio, segno,' *fee·ly'oa*, *sai·ny'oa*, and Spanish 'll, ñ.' The *ly'*, although still written as 'ill' in French, has of late been replaced in speech by simple *y*, but *ny'* remains as 'gn;' thus, 'sillon, signer,' *siyoan'*, *siny'ai*.

Col. 10. *ky'*, *gy'* are attempts to utter *k*, *g* at the same time as *y*, and used to be heard (may still occasionally be heard), as in 'cart guard,' *ky'aa·t gy'aa·d*, and similar words.

ky'h, *gy'h* are the hissed and buzzed forms of *ky'*, *gy'* in German *zee·ky'h zee·gy'hŭ*, 'siech siege;' but *ky'h gy'h* are considered by some (even German) phonetists as the same as *yh*, *y;* thus, *see·yh*, *zee·yŭ*.

Col. 11. *kh*, *gh* are the hissed and buzzed forms of *k*, *g*, in German *zaakh'ŭ zaa'ghŭ*, 'sache sage,' and kh occurs also in Scotland. It is the Spanish 'j,' sometimes 'x' or 'g,' before 'e, i,' as *ee'kho*, *keskhao·te*, *khee·fe*, 'hijo, Quixote, gefe (jefe).'

'rh, *'r* are flaps made with the uvula instead of the tip of the tongue; *'r* is common in Northumberland, in north France, and in north Germany, where also *'rh* is found in the pause, as in '*riky'h·t'ŭ'rh*, 'richter.'

Col. 12. *kw'*, *gw'* arise from an attempt to utter *w* at the same time as *k*, *g*, and *kw'h*, *gw'h* are the corresponding hiss and buzz in German *t'aawkw'h·ŭn'*, *t'aawgw'h·ŭn'*, 'tauchen, taugen.'

This table is of course very incomplete, but it will serve as a framework for introducing other consonantal sounds. The glides of all these consonants to and from all the vowels should be carefully studied in actual words, but cannot be considered here.

Speech consists of sentences, and it is only by careful analysis that these are separated into words, syllables, glides, and fixed sounds, so that the letters which represent the last only, and have here been treated first, are determined with much difficulty among the mass of sound heard. Any one who attempts to write an unknown language from pure dictation, without seeing its usual writing (if it have one), will feel this immediately. And from this mass of sound to disentangle the words, as they are usually separated, is still more difficult.

An attempt has been made by Dr Sweet for English (*Elementarbuch des gesprochenen Englisch*, Leip. 1886, and *Primer of Spoken English*, Oxford, 1890), and by M. Paul Passy for French (*Les Sons du Français* and *Le Français parlé*, both 1889), to write exactly what is spoken, dividing the words, or sometimes only dividing the breath-groups, and a study of these books will show the difficulty of the problem. *The Existing Phonology of English Dialects* (1889), by the late Dr Ellis, the writer of this article, shows an attempt to write all English dialects, practically previously unwritten, and mostly from pure dictation, and very difficult it was found, the alphabet here given being quite insufficient for the purpose. For a fuller account of phonetics, reference may be made to his *Speech in Song* (1878), in which this alphabet is used. See also the articles in this work on ALPHABET, GRIMM'S LAW, LETTERS, SHORTHAND, VISIBLE SPEECH, VOICE.

To show the nature of phonetic writing, this rapid sketch of the subject may be concluded with a rough attempt to write received English in the educated colloquial form used in London (not in Scotland).

Egzaa·mpl ŭv Foanet·ik Spel·ing.

Aa·ŭ-faa·dhŭ, ei-m-shoo·ŭ, dhŭt-dhat· neu·-braa·nch ŭv-ou·ŭ Jau·jez fai·vrit wuod·bei·n, wich-iz groa·ing ni·ŭ-dhŭ poa·st not-faa·-frŭm-dhŭ nau·th wau·l-ŭv-dhŭ gaa·dn, must-bi-sai·f-tŭ-mezh·ŭr ŭbou·t too·-fee·t, au-mo·ŭr, in-lengkth tŭ-dai·y, ŭnles· sum mishap·-iz ŭku·ring aur-it-ŭz-sud·nli lo·st-its eu·zhooŭl vei·tŭl en·ŭji; fŭr ei·-v ke·ŭrfuoli ŭbzu·vd-its rai·t ŭv in·krees ev·ŭri-wee·k dhis mun·th, ŭn-noa·ted-it dou·n ak·euretli on-eu·ŭ-slai·t, ŭn-ei-noa·w it-ŭz-ekspi·ŭriŭnst noa-ve·ŭriai·shŭn, baa·ring wans, deu·ŭring-ŭ des·pŭretli ŭnoi·ing in·tŭvŭl ŭv-koa·ld, po·ŭring rai·n.

In ordinary orthography,

Example of Phonetic Spelling.

Ah! father, I am sure, that that new branch of our George's favourite woodbine, which is growing near the post not far from the north wall of the garden, must be safe to measure about two feet, or more, in length to-day, unless some mishap is occurring or it has suddenly lost its usual vital energy; for I have carefully observed its rate of increase every week this month, and noted it down accurately on your slate, and I know it has experienced no variation, barring once, during a desperately annoying interval of cold, pouring rain.

Phonograph, an instrument for mechanically recording and reproducing articulate human speech, song, &c. The phonograph was invented by Mr T. A. Edison (q.v.) in the spring of 1877, at his Menlo Park Laboratory, New Jersey, and came into existence as the result of one of the many lines of experiment he was then engaged upon. Following up some of his telegraphic inventions, he had developed a machine, which by reason of the indentations made on paper, would transfer a message in Morse characters from one circuit to another automatically, through the agency of a tracing-point connected with a circuit-closing device. Upon revolving with rapidity the cylinder that carried the indented or embossed paper Mr Edison found that the indentations could be reproduced with immense rapidity through the vibration of the tracing-point. He at once saw that he could vibrate a diaphragm by the sound-waves of the voice, and, by means of a stylus attached to the diaphragm, make them record themselves upon an impressible substance placed on the revolving cylinder. The record being made thus, the diaphragm would, when the stylus again traversed the cylinder, be thrown into the same vibrations as before, and the actual reproduction of human speech, or any other sound, would be the result. The invention thought out in this manner was at once tried, with paraffined paper as the receiving material, and afterwards with tinfoil, the experiment proving a remarkable success, despite the crudity of the apparatus. In 1878 Mr Edison made a number of phonographs, which were exhibited in America and Europe, and attracted universal attention. The records were made in these on soft tinfoil sheets fastened around metal cylinders. For a while Mr Edison was compelled to suspend work on this invention, but soon returned to it and worked out the machine as it exists practically to-day. It occupies about the same space as a hand sewing-machine. A light tube of wax to slide on and off the cylinder is substituted for the tinfoil, which had been wrapped around, and the indenting stylus is replaced by a minute engraving point. Under the varying pressure of the sound-waves, this point or knife cuts into the tube almost imperceptibly, the wax chiselled away wreathing off in very fine spirals before the edge of the little blade, as the cylinder travels under it. Each cylinder will receive about a thousand words. In the improved machine Mr Edison at first employed two diaphragms in 'spectacle' form, one to receive and the other to reproduce; but he has since combined these in a single efficient attachment. The wax cylinders can be used several hundred times, the machine being fitted with a small paring tool which will shave off the record previously made, leaving a smooth new surface. The machine has also been supplemented by the inventor with an ingenious little electric motor with delicate governing mechanism, so that the phonograph can be operated at any chosen rate of speed, uniformly. This motor derives its energising current either from an Edison-Lalande primary battery, a storage battery, or an electric-light circuit.

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The new and perfected Edison phonograph has already gone into very general use, and several thousands are distributed in American business offices, where they facilitate correspondence in a variety of ways. They are also employed by stenographers as a help in the transcription of their shorthand notes. Heretofore these notes have been slowly dictated to amanuenses, but they are now frequently read off to a phonograph, and then written out at leisure. The phonograph is, however, being used for direct stenograph work, and it reported verbatim 40,000 words of discussion at one convention held in 1890, the words being quietly repeated into the machine by the reporter as quickly as they were uttered by the various speakers. A large number of machines are in use by actors, clergymen, musicians, reciters, and others, to improve their elocution and singing. Automatic phonographs are also to be found in many places of public resort, equipped with musical or elocutionary cylinders, which can be heard upon the insertion of a small coin; and miniature phonographs have been applied to dolls and toys. The value of the phonograph in the preservation of dying languages has been perceived too, and records have already been secured of the speech, songs, war-cries, and folklore of American tribes now becoming extinct. It is also worthy of note that several voice records remain of distinguished men, who 'being dead yet speak.' Their tones can now be renewed at will, and their very utterances, faithful in accent and individuality, can be heard again and again through all time.

Improvements are being made in the wholesale reproduction of phonographic cylinders, by electrotyping and other processes; and the machine, in a more or less modified form, is being introduced as a means of furnishing a record of communications through the telephone. Phonographic clocks, books, and other devices have also been invented by Mr Edison, whose discovery is evidently of a generic nature, opening up a large and entirely new field in the arts and sciences. See also TELEPHONE.

Phonography. See SHORTHAND.

Phonolite. See CLINKSTONE.

Phormium. See FLAX (NEW ZEALAND).

Phosphates. See PHOSPHORUS, MANURE.

Phosphatic Diathesis, in Medicine, designates the condition in which there is a tendency in the Urine (q.v.) to deposit white gravel.

Phosphorescence. Strictly speaking, the term is applied to the phenomenon, exhibited by certain bodies, of remaining luminous in the dark for some time after being exposed to a strong light. Certain preparations, such as calcium sulphide (see LUMINOUS PAINT), indurated limestone, &c., possess this property in a very high degree. With the great majority of phosphorescent bodies, however, the duration of the phenomenon is very short, rarely more than a small fraction of a second. Becquerel, who studied this phenomenon with great care, invented a very ingenious instrument for the purpose, called a *phosphoroscope*. The body to be tested is placed in a small drum, which has an opening at each end. In this drum there revolve two discs, mounted on the same axle, and pierced symmetrically with the same number of holes. They are so adjusted that when a hole in one disc is opposite to the hole in the corresponding end of the drum the second disc closes the hole at its end of the drum, and *vice versâ*. Light is admitted by one of the holes in the drum so as to fall on the object, and it is examined through the other hole. It is obvious that, when the discs are made to revolve, the object is alternately exposed to light and presented to the eye. By a train of multiplying wheels, these alternations may be made to succeed each other as rapidly as the observer pleases, and thus the object is presented in the dark to his eye as soon after its exposure to light as may be desired. Almost all bodies are found to be phosphorescent; for instance, some kinds of pink rubies when exposed to sunshine in this apparatus appear to glow like live coals in the dark. When phosphorescence is continuous, bodies receiving light and giving off radiation of a lower refrangibility, we have the phenomenon observed by Brewster and Herschel in quinine and certain crystals of fluorspar, and thence called *Fluorescence*. The green colouring matter of leaves, a decoction of the bark of the horse-chestnut, and the common *canary* glass (coloured with oxide of uranium) are bodies which exhibit this phenomenon very well. Perhaps the most striking method of studying the phenomenon is to receive in a darkened room the solar Spectrum (q.v.) on a sheet of white paper, and to pass over the coloured spaces a brush dipped in a solution of sulphate of quinine with sulphuric acid. No change is produced on the less refrangible rays, but in the blue and indigo spaces a strange change of colour is at once apparent where the liquid has been spread. This appears more strongly in the violet, and vividly in the spaces beyond the violet, where rays fall which excite no luminous sensation in the eye. By this experiment the visible length of the spectrum may easily be doubled. By using the electric light, which is peculiarly rich in these highly-refrangible rays, a prism of quartz, which allows them to pass very freely, and various fluorescent substances, Stokes has obtained spectra six or eight times as long as those otherwise visible. The characteristic of all these rays is that they are *less* refrangible than those from which they are produced. The entire phenomenon is, as Stokes first showed, identical in principle with Leslie's photometer, in which light was measured when changed into heat by absorption in the coloured glass, of which one of the bulbs of his differential thermometer was formed. Ordinary phosphorus (from which the phenomenon took its name) becomes luminous in the dark by slight friction; whence the common trick of drawing self-luminous figures on doors and walls with a stick of phosphorus, or an ordinary lucifer match wetted.

PHOSPHORESCENCE IN ORGANIC BEINGS.—The emission of light by minerals after insulation and the cognate phenomena of luminosity on heating, friction, cleavage, crystallisation, &c. are of quite different nature from the production of light by organisms, the special subject to which we now turn.

Luminosity due to Putrefaction or to Disease.—The fact that many organic substances (especially fish) become luminous when decaying has long been known, and has often been erroneously adduced as the chief cause of the phosphorescence of the sea. It is only quite recently that the discovery of luminous bacilli has rendered possible any general explanation of these facts, and even yet its wide applicability remains to be proved. They have been shown to exist in several instances which will be mentioned below, and the constant association of these low forms of life with putrefactive processes at once suggests the hypothesis that luminosity under such circumstances may be due to their presence. Perhaps they may also account for the few instances in which the human body has been recorded as phosphorescent during life.

Luminosity of Healthy Living Organisms.—(1) In the *vegetable* kingdom the instances of the occurrence of this property are but few, and the majority of these belong to the algæ and fungi, the bacilli or bacteria above mentioned being referable to the former. Most of the fungi are Hymenomycetes (*Agaricus*, spp.): in some cases the mycelium (root-like threads) gives out the light; in others, as in *A. olearius*, not uncommon at the roots of olive-trees, it is the under surface of the mushroom-like head. The light is only seen while growth is progressing; it ceases so soon as the fungus is mature. A moss (*Schistostega osmundacea*), some grasses, a Euphorbia (*E. phosphorea*), a lily (*Lilium bulbiferum*), a poppy (*Papaver orientale*), and a nasturtium (*Tropæolum majus*) have all been recorded as luminous. The last instance is worthy of note as having been observed by the daughter of Linnæus in 1762.

(2) In the *animal* world there is not one of the larger groups, up to and including the fishes, which does not afford some good examples of this phenomenon. A complete list of these would be outside the scope of such an article as the present; it must suffice to mention some of the best instances in each class, indicating briefly the nature of the photogenic mechanism. Among the Protozoa the small spheroidal *Noctiluca miliaris* is perhaps the most widely spread instance of this property, this organism, or others allied to it, abounding at certain times around the coasts of the greater part of the world. The light is emitted from the general protoplasm of the body; a pocket-lens shows some points to be brighter than others, whilst a higher magnifying power shows these to be really groups of smaller points, just as a nebula is gradually resolved into stars by increasing powers of the telescope. On the high seas Noctiluca seems to be replaced by species of Pyrocystis, one of the discoveries of the *Challenger* expedition; these may possibly, however, be stages in the life-history of very similar forms. Among the Porifera (sponges) the only recorded luminous form is the larva of a species of Reniera. The poverty of this class is,

however, more than compensated by the wealth of the Cœlenterata. The common hydroid colony *Obelia geniculata*, often growing upon the fronds of Laminaria (sea-tangle), is a familiar instance. Numerous Medusæ (jelly-fishes) must be added to the list; and here the light is variously emitted in different species: (*a*) from the whole surface; (*b*) from the marginal corpuscles; (*c*) from the radial canals; (*d*) from the ovaries. Sometimes the same genus includes both luminous and non-luminous forms. Most Pennatulidæ (sea-pens) furnish instances of the possession of this property; such are the long, reed-like Funiculina found in Loch Torridon (Ross-shire) and on other parts of the Scottish coast, and Pennatula, the subject of classic researches by Panceri, where the light emanates from eight bands or tracts of specially modified tissue situated in the wall of the stomach. Alcyonarians, Siphonophores, and Ctenophores also furnish contributions to the list; amongst these last the small ovoid jelly Beroë was shown by Allman not to give out its light until it had remained for some time in the dark.

A few species of Ophiuroids (brittle stars) and the deep-sea asteroid Odinia constitute the only known instances of luminosity among the Echinodermata, but the worms furnish a larger array. More than one case has been noticed among earthworms, the most complete description being due to Professor Giard. This worm (Photodrilus) is 1½ to 2 inches long, and the luminous material is due to a series of glands opening into the œsophagus. In these forms the luminosity ceases immediately after sexual congress. Among the marine Chætopoda the power resides in the dorsal scales (elytra) of the Polynoidæ, the tentacles, dorsal tubercles, &c. of Chætopterus, and the bunch of cephalic tentacles of Polycirrus.

Of phosphorescent mollusca the small pelagic *Phylliroë bucephala* is of importance, because the transparency of its tissues permits of its easy study and the successful localisation of its luminosity, which is found to reside in nerve ganglia, as well as in certain small rounded cells situated at the ends of the nerve twigs. The rock-boring bivalve (Pholas) is one of the longest known instances of animal phosphorescence, being recorded by Pliny, who noticed that if any one chews the animal the whole interior of his mouth becomes luminous. In this form the light is emitted from five definite patches all situated within the mantle cavity—(1) an arc corresponding with the anterior margin of the mantle, (2, 3) two triangular patches near the opening of the branchial siphon, (4, 5) two long parallel bands within the same siphon. The luminous material is secreted by the epithelial cells covering these portions of the body, and has been shown to consist essentially of two substances, a white crystalline body (luciferine) and a ferment (luciferase); by the mixture of these two in a test-tube it is possible to reproduce the light at will, without the presence of living matter. The ferment is most likely produced by a certain bacillus, which occurs in large numbers in small pits in the walls of the siphon.

Interesting observations upon bacilli as the cause of phosphorescence have also been made on Crustacea of the genera Talitrus and Orchestia (sand-hoppers) in a state of disease; the malady, and the consequent luminosity, can be transferred to healthy specimens by inoculation, and the germs can be reared in artificial media in the usual manner. It would appear that the sand-hoppers infect themselves with the bacilli from dead fish on which they habitually feed. Many other Crustacea, however, are luminous under normal conditions, as, for instance, some Copepoda (Sapphirina), and more particularly the Schizopoda, one of which, *Nyctiphanes norvegica*, is not uncommon in the deep waters of Loch Fyne as well as on the Norwegian coast. Definite organs (photospæria) are here present for the production of light; one in the stalk of each eye, one at the root of each first, and one at the root of each penultimate, thoracic limb, and one under each of the first four segments of the abdomen. Each organ, as has been proved by microscopic sections, is in reality a miniature bull's-eye lantern, only equalled in complexity by the organs of certain fishes. Several phosphorescent Ascidians are known, the most conspicuous being the pelagic colony Pyrosoma, in which each individual zooid has two rounded luminous organs. The researches of the recent deep-sea expeditions have revealed quite a large number of phosphorescent fishes, with specialised organs of many different types. Some of these appear to be glandular, whilst others are optical instruments of great complexity, with spheroidal and parabolic reflectors to send the light in definite directions and with lenses to concentrate it. In some of the abyssal Lophioids (angler-fish) the modified dorsal fin-ray which acts as a lure has a phosphorescent extremity, no doubt to render it more attractive.

There still remain for consideration the phosphorescent *insects*, which belong almost exclusively to the Hemiptera (bugs) or the Coleoptera (beetles). To the former belong the lantern-flies (Fulgora and allied genera), though it must be mentioned that the possession of this power by these insects has been denied by more than one good observer. Luminous beetles appertain to the families Lampyridæ and Elateridæ. The glow-worm (*Lampyris spendidula*) and the Italian firefly (*Luciola italica*) are good examples of the former, and have been often described. In both cases the organs, which are situated in a certain number of the posterior segments of the abdomen, consist of two layers, of which the dorsal contains large quantities of uric acid salts, and the ventral clear cells, which are arranged in cylindrical lobules. In some species both sexes are luminous, in others only one. In the Mexican firefly or Cucúyos (*Pyrophorus noctiluca*), which belongs to the Elateridæ or click-beetles, the organs are three in number, one in each upper and hinder angle of the prothorax, and one much larger occupying the centre of the ventral surface of the first abdominal segment. This last is invisible while the insect is at rest, but shines forth when it spreads its wings and raises its abdomen in flight. Both the eggs and larvæ of this species are luminous.

As regards the physical peculiarities of the light, it varies in colour in different cases, being blue in the mycelium growing in rotten wood, in Cunina, Beroë, Pyrosoma, and Lampyris; green in a species of Agaric, Pteroeides, in Ophiuroids, and in Pyrophorus; yellow in Noctiluca, Bolina, and with a reddish tinge in a species of Cestum; purple in Funiculina and Fulgora; whilst in *Pyrosoma atlanticum* and an Appendicularia observed by Giglioli it has been stated that the light varies in colour. In all cases in which the matter has been investigated the spectrum has been found to be continuous; the amount of heat given off in connection with the process seems to be quite infinitesimal, though actinic rays have been shown to be present. The phenomenon would appear to consist in a definite vital process, which, in these cases, leads to the production of radiant energy just as in other instances to the evolution of heat or of electricity.

The uses of this property to its possessors may, so far as is known at present, be grouped under four heads: (*a*) It enables the sexes to find each other, as in Luciola and earthworms; (*b*) it is possessed by so many stinging Cœlenterates that in them we may fairly regard it as a warning signal, and it may have been adopted by stingless forms for the same purpose by mimicry; (*c*) it may serve to attract prey, as in the phosphorescent lure of the deep-sea angler-fish (Melanocetus, &c.); (*d*) it may illuminate the surrounding regions and enable the light-producing animal to find its way, as in *Pyrophorus*, *Nyctiphanes*, and many deep-sea fish. So many deep-sea animals are possessed of luminous qualities that it has been assumed that these living lights play an important part in the economy of life in those regions; this hypothesis is commonly known as the 'abyssal theory of light.' See the articles FIREFLY, GLOW-WORM, and works there cited.

Phosphorus (sym. P; atom. wt. 31; molec. wt., vapour = P_4 = 124; do. at white heat, P_2 = 62) is one of the metalloids or non-metallic elements, although, in its combining relations, it is closely connected with the metals arsenic and antimony. This substance affords an excellent example of Allotropy (q.v.); that is to say, it may be made to occur under different forms presenting different properties. Ordinary phosphorus and the red variety are the only important forms. We shall speak of them as phosphorus and red phosphorus respectively.

Phosphorus at ordinary temperatures is an almost colourless or faintly yellow solid substance of sp. gr. 1·836, having the glistening appearance and the consistence of wax, and evolving a disagreeable alliaceous odour, which, however, is probably due to the action of the oxygen of the air upon it. It fuses at 44·2° C. (111·5° F.) into a colourless fluid; and, if the air be excluded, it boils at 290° C. (554° F.), and is converted into a colourless vapour of sp. gr. 4·35 (air = 1·00). If, however, it be heated to about 60° C. (140° F.) in the air it catches fire, burns with a brilliant white flame, and is converted into phosphoric anhydride; and indeed it is so inflammable that it will catch fire at ordinary temperatures by mere friction. As the burns which it occasions are often severe and dangerous, great caution is required in handling it; and in consequence of the readiness with which it catches fire, and of its tendency to oxidise when exposed to the air at a temperature higher than 0° C. (32° F.), it is always kept in water, in which it is insoluble. It is slightly soluble in ether, but dissolves freely in benzol, in the fixed and essential oils, and in bisulphide of carbon; and, on allowing its solution in a volatile solvent to fall upon filtering paper, the finely-divided phosphorus absorbs oxygen so rapidly as spontaneously to catch fire as soon as the solvent has evaporated. Phosphorus shines in the dark from the slow combustion which it undergoes; and hence its name, from the Greek words *phōs*, 'light,' and *phoros*, 'bearing.' Its power of forming ozone is noticed in the article on that substance. Taken internally, phosphorus is a very powerful irritant poison; and it is the active ingredient of some of the preparations employed for the destruction of vermin. Its fumes give rise to a peculiar form of necrosis of the jaw and to fatty degeneration of the kidney, which used to be common amongst the makers of lucifer matches.

Red phosphorus is prepared from the ordinary variety by heating the latter in a closed iron vessel to a temperature of 240° C. (464° F.). It was discovered by Schrötter in 1845, and is a compact solid substance of a dark red colour, and with a metallic lustre. It differs much in its properties from common phosphorus, being devoid of odour, does not shine in the dark, undergoes no change when exposed to the air even for years, and cannot be set on fire by moderate friction or percussion. Moreover, it is insoluble in all the solvents of common phosphorus, and is not poisonous. It bears heating to nearly 260° C. (500° F.) without taking fire, and has a specific gravity of 2·16. By using red instead of white phosphorus for lucifer matches there is no risk to the health of the operatives. Safety matches contain chlorate of potash and ignite on a surface containing a mixture of red phosphorus and sulphide of antimony (see MATCHES).

Phosphorus is not met with in nature in an uncombined state; but it occurs in rocks of various kinds and ages, and in some countries abundantly as apatite or phosphorite, both of which are composed of phosphate of lime. It is also found in the form of Coprolites (q.v.), or the dung of extinct animals, and more rarely as wavellite (phosphate of alumina) and vivianite (phosphate of iron). In many volcanic rocks apatite is found in minute crystals or particles, and by the decomposition of these rocks it passes into the soil. From the soil it is extracted by plants, which accumulate it (especially in the seeds of the cereals) in quantity sufficient for the wants of the animals which they supply with food. In the animal system phosphate of lime forms 57 per cent. of the bones; phosphates of the alkalies, especially of soda, occur freely in the animal fluids; and in fibrine, albumen, and nervous matter phosphorus is universally present, although we do not clearly know in what form of combination it occurs.

Phosphorus was originally discovered in 1669 by Brandt, a Hamburg chemist, who obtained it from urine. Gahn and Scheele were, however, the first to discover its presence in bone, and to employ that material for its preparation. The following are the leading steps of the method now usually employed in obtaining it on the large scale. Bones are burned to whiteness, and powdered; and this bone-ash is then mixed with sulphuric acid in such quantity as to decompose the phosphate of lime occurring in the ash, $Ca_3(PO_4)_2$, partly into insoluble sulphate of lime, partly into a soluble superphosphate of lime, whose composition is represented by the formula $H_4Ca(PO_4)_2$. The solution of the superphosphate is evaporated to a syrup, mixed with charcoal, and submitted to distillation in an earthen retort exposed to a red heat. Phosphorus rises in vapour, and is conveyed by means of a bent tube into water, in which it condenses in yellow drops. Two distinct processes take place within the retort. The first consists in the decomposition of the superphosphate of lime into bone-earth and hydrated phosphoric acid; while the second consists in the deoxidation, by means of the carbon, of the liberated phosphoric acid into phosphorus—a process accompanied by the evolution of carbonic oxide gas. After being pressed in a fused state through wash-leather, and further purified, it is forced into tubes, in which it is allowed to solidify, giving it the usual form of *sticks*. Sombrerite (see APATITE) is now largely substituted for bones in the manufacture of phosphorus.

Phosphorus forms two known oxides—phosphorous anhydride, P_2O_3, obtained by the slow oxidation of phosphorus in dry air; phosphoric anhydride, P_2O_5, obtained by the combustion of phosphorus in an excess of dry air or oxygen. The latter is a snow-like substance which has a great avidity for water, and is therefore very useful in the laboratory as a desiccating agent.

Phosphorus forms five acids—hypophosphorous acid, $H{\cdot}PH_2O_2$, monobasic (the anhydride, P_2O, is not known); phosphorous acid, $H_2{\cdot}PHO_3$ (= $P_2O_3 + 3H_2O$), dibasic, obtained by slow oxidation of phosphorus in moist air or by passing chlorine gas through phosphorus under hot water; metaphosphoric acid, HPO_3 (= $P_2O_5 + H_2O$), monobasic, obtained by dissolving P_2O_5 in water or by heating ordinary phosphoric acid to redness; pyrophosphoric acid, $H_4P_2O_7 (= P_2O_5 + 2H_2O)$, tetrabasic, obtained by acting upon lead pyrophosphate with sulphuretted hydrogen, the lead salt being prepared from soda pyrophosphate, which is obtained by heating such a phosphate as Na_2HPO_4, of which two molecules give off one of water and form $Na_4P_2O_7$; phosphoric or orthophosphoric acid, H_3PO_4, tribasic, prepared by boiling P_2O_5 in water, or from bone-ash and sulphuric acid; the last-named acid has three sets of salts, the hydrogen in the acid being more or less completely replaced —e.g. NaH_2PO_4, Na_2HPO_4, and Na_3PO_4, which are obtained by more or less completely neutralising phosphoric acid with soda.

The discovery of phosphoric acid was made in 1740 by Marggraf; the discovery of its true chemical nature is, however, due to Lavoisier, and that of its various modifications and its polybasicity to the investigations of Graham. The salts of phosphoric acid are phosphates; and they are of great value, when in a soluble form or when they can become soluble through weathering, as manures (see MANURE). Of late years mineral phosphates have been largely worked up; and a new source of phosphatic manure has become available in the alkaline slag of the Thomas-Gilchrist process, whereby the phosphorus is removed from iron by means of lime.

Phosphorus combines with hydrogen in three proportions to form phosphuretted hydrogen gas, PH_3; liquid phosphide of hydrogen, P_2H_4; and solid phosphide of hydrogen, P_4H_2. Of these the first alone requires notice in these pages. There are various processes for obtaining the gas, one of the simplest being by boiling fragments of phosphorus in a concentrated solution of hydrated potash, in which case hypophosphite of potash is formed, while phosphuretted hydrogen gas is extricated. The reaction is explained by the equation $4P + 3KHO + 3H_2O = 3KPO_2H_2 + PH_3$. The gas thus evolved is colourless, possesses a characteristic fœtid odour, and has the remarkable property of taking fire spontaneously in atmospheric air or in oxygen gas, with the production of anhydrous metaphosphoric acid and water. There is reason to believe that *perfectly pure* phosphuretted hydrogen gas does not possess the power of igniting spontaneously, and that the self-lighting gas always contains a minute quantity of the vapour of the liquid phosphide, P_2H_4. The luminous phenomenon known as Ignis Fatuus (q.v.) has been referred to the natural evolution of the gas. The compounds of phosphorus with sulphur, chlorine, iodine, bromine, &c. are not of practical importance.

Phosphorus is rarely employed in medicine as a nervous stimulant, in consequence of its poisonous properties. The symptoms induced by this poison are those of acute inflammation of the stomach and bowels; the treatment is the administration of large quantities of mild demulcent fluids, and of magnesia. Dilute phosphoric acid is included in the British Pharmacopœia, but is not very much employed. It may be prescribed in much the same cases as those in which sulphuric and nitric acids are employed, and is less likely to disturb the digestive functions, if employed for a long period, than the other mineral acids. It has also been recommended, when properly diluted, as a serviceable acidulated drink for assuaging the thirst in diabetes. It may be prescribed in half-drachm doses.

Photius, Patriarch of Constantinople at a critical period, was a member of a patrician family of Constantinople, and was born in the early part of the 9th century. Distinguished by his abilities, he served in various important public offices, and secured the favour of the Emperor Michael and his powerful favourite Bardas. The patriarch Ignatius, having in vain tried to correct the vices of the profligate emperor, was deposed and banished. Photius, although a layman, was appointed in his stead, hurried in a few successive days through all the stages of sacred orders, and finally installed as patriarch. Two successive councils of bishops under court influence confirmed the deposition of Ignatius and the election of Photius. In 862, however, Pope Nicholas I. (q.v.) called a new council at Rome, which declared Photius' election uncanonical and invalid, deposed and excommunicated him, and reinstated Ignatius in his see. Being supported, however, by the emperor, Photius retained possession, and retaliated on the pope by assembling a council at Constantinople in 867, in which he raised a controversy of doctrine and discipline between the churches of the East and West themselves. In all these doctrinal differences the council condemned the Western Church, excommunicated Nicholas and his abettors, and withdrew from the communion of the see of Rome. Michael being put to death by Basilius the Macedonian in 867, Photius was banished to Cyprus, and Ignatius reinstated; and in 869 the eighth general council, at which Pope Adrian II.'s legates presided, was assembled at Constantinople. Photius was again condemned and excommunicated, and the intercommunion of the churches restored. Yet on the death of Ignatius Photius was reappointed to the patriarchate. In 879 he assembled a new council at Constantinople, renewed the charge against the Western Church, and erased from the creed in the article on the Procession of the Holy Ghost the word *filioque* (see SPIRIT). The separation of the churches, however, was not completed till the time of Michael Cerularius (see GREEK CHURCH). Photius was finally deprived, and exiled to Armenia by Leo, the son of Basilius, in 886, and died soon afterwards, probably in 891. His chief remains are *Myriobiblon*, called also *Bibliotheca*, a summary review of 279 works which Photius had read, many of which are now lost; a *Lexicon*; the *Nomocanon*, which is a collection of the acts and decrees of the councils and ecclesiastical laws of the emperors; several minor theological treatises; and a collection of letters, many of them extremely interesting and elegant. See Hergenröther's monograph on Photius (1869).

Photography, the art of producing pictures by means of the action of light on sensitised surfaces. It is usual to regard the observation by the alchemists of the 16th century that *Luna Cornea* or Horn Silver (native chloride of silver) is blackened on exposure to light, as the first chemical step in the history of photography, while the foundation of photographic optics was laid by Della Porta in the invention of the camera obscura (1569) at a somewhat earlier period. This property of chloride of silver, and also the darkening of nitrate of silver by light in the presence of organic matter, constitute the leading facts on which the science of photography is based. In 1777 the famous Swedish chemist Scheele found, by experiment, that Horn Silver was blackened quickest at the violet end of the solar spectrum, thus proving that the rays of light are not all alike chemically active. A quarter of a century later Ritter of Jena demonstrated the existence of chemically active non-visible rays beyond the violet rays of the spectrum.

The honour of having been the first to produce pictures by the action of light on a sensitive surface is now very generally conceded to Thomas Wedgwood, an account of whose researches was published in 1802 in the *Journal of the Royal Institution*, under the title, 'An Account of a Method of copying Paintings upon Glass, and of making Profiles by the agency of Light upon Nitrate of Silver; with Observations by H. Davy.' The misfortune was that no attempts made either by Wedgwood or Davy to prevent the uncoloured portions from being acted on by light (or, as we now say, to *fix* the picture) were successful.

Nicéphore Niepce of Châlon-sur-Saône was the first to enjoy the satisfaction of producing *permanent* pictures by the influence of solar radiations. This was accomplished in 1814, and the name chosen to designate his process was Heliography. It consisted in coating a piece of plated silver or glass with asphaltum (bitumen). The plate so prepared was then exposed in the camera obscura for a length of time, varying from four to six hours. Wherever the light acted it rendered the asphaltum insoluble in its usual solvents. Hence, on subsequent treatment with one of these solvents, the shadows of the image dissolved away, and the lights were represented by the insoluble asphaltum remaining on the plate.

Daguerre appears to have begun in 1824 the experiments which eventually led to the discovery of the daguerreotype process. On Daguerre learning that Niepce was working in the same direction as himself, the two formed a partnership in 1829. The discovery of the Daguerreotype (q.v.) was announced in January 1839, but the details of the process were not made public till August of the same year. It consists in exposing a metal plate covered with iodide of silver for a suitable time in a photographic camera, the plate being afterwards transferred to a dark room, and exposed to the vapour of mercury, which develops the latent image, it being afterwards fixed. Although this process has become almost obsolete, it was really the first which was of any practical value, and experts all agree that no other known process renders some subjects —e.g. the human face—with such fidelity and beauty.

W. H. Fox Talbot read a paper to the Royal Society on 'Photogenic Drawings' on 31st January 1839, just six months previous to the publication of Daguerre's process. He produced these in this way: Writing-paper was steeped in a solution of common salt (chloride of sodium), and dried. It was then dipped in a solution of nitrate of silver, which is changed by the action of the common salt into the chloride of silver, some of the nitrate, however, remaining unaltered. Paper so treated is sensitive to light, so that when a fern-leaf, for example, is placed close down upon it between two plates of glass, and daylight is allowed to act on the prepared surface, the paper blackens except where it is covered, and thus a reversed picture of the leaf on a black ground is obtained. This was then placed over another sheet of paper, prepared in the same way, and the light allowed to act through it. Another picture of the leaf was thus produced, but this time with its lights and shades the same as in nature. The white image on a dark ground was called by Fox Talbot a negative, and the print from it he called a positive. These terms are still current in photography; the *negative* image being produced in the camera, as the first and leading operation—any number of *positives* being obtainable from it on paper, glass, or any other material capable of forming a support for a photographic image. The Calotype process was patented by Fox Talbot in 1841. In this process Talbot produced his negative by preparing paper on the surface with iodide of silver, subsequently washing it over with a mixture of nitrate of silver, with gallic and acetic acids, and then exposing it in the camera to the object he wished to copy. The invisible image or picture thus obtained was developed by aceto-nitrate of silver and gallic acid. The paper negative was then rendered translucent with wax, and used for the production of many positives in the way described above. The introduction of collodion by Archer marked the next great step in photographic progress, and this, known as the wet-plate process, has been almost eclipsed by the gelatine dry plate now almost universally used.

Photographic Apparatus.—The most important piece of apparatus used by the photographer is a form of the Camera Obscura (q.v.), generally called simply a camera, with its attached lens that throws the image on a ground glass screen placed at the back, to enable it to be sharply focused. A thin flat box with a shutter, together called a dark slide or 'back,' contains the sensitised plate. When the picture is focused the screen is withdrawn and the 'back' inserted in its place; the shutter is then drawn out, and the sensitised plate, which exactly occupies the place of the glass screen, being now exposed, receives the picture. In a brief time, which nowadays varies from a fraction of one to several seconds in a good light, the shutter is closed, and the slide returned to a room illuminated by a light not chemically active, generally red, orange or yellow green, where the plate is taken out and developed.

The introduction of dry plates for photography, which may be used in the camera a long time after their preparation, has had a great influence in modifying apparatus; and more especially is this true of the photographic camera. Under the older system (wet-plate photography) the plate had to be used immediately after it had been coated and furnished with its sensitive film, or it became useless. One dark slide or back, to hold the plate during exposure was therefore all that was necessary, for only one plate could be prepared and used at a time, a dark room or tent being necessary for the operations. But now that the plates will keep almost indefinitely between preparation and use, any convenient number can be made ready for insertion in the camera, to be exposed to the action of the light one after another. For this purpose what are called double dark backs are employed, each holding two plates—one on each side, and each side being furnished with a light-tight shutter which is drawn out so as to allow the lens to cast the image on the plate inside as soon as the back is fixed on the camera.

Much ingenuity has been applied to camera construction of late years, but, although many new modes of carrying the plates and bringing them under the influence of the lens have been devised, the double-back system, as just described, is the one most generally adopted when glass plates are employed. Various *changing-boxes* have been devised, which contain a dozen or more plates, and dispense with all but one dark slide, that is constructed to receive and discharge any plate of the series at will. Hare's changing-box is the one most generally known. This has a special form of dark back, which can be charged with one plate from the box at a time, and is then inserted in the camera for exposure. Recently, for small-sized photographs, a device has been largely adopted whereby the camera itself becomes a storage for the plates, a simple mechanical arrangement permitting the exposed plate to fall to the bottom while another takes its place.

But the most recent change in photographic apparatus is due to the introduction, or rather the revival, of sensitive films supported, not on glass, but on a flexible material. We have already seen that Fox Talbot employed paper for his negatives; and, although paper was superseded by glass when the collodion process came into existence, photographers were quick to recognise that such a brittle material had serious disadvantages. Many experimenters endeavoured to produce or find some material which, while possessing the transparency of glass, should be of a less brittle nature, and among these Mr Woodbury in 1876 produced such a compound from collodion, castor-oil, and Canada balsam. This mixture, after being allowed to dry on a sheet of glass, was coated with an emulsion sensitive to light, and after again being dried was stripped from its support and cut into suitable sizes for the camera. It is noteworthy also that the inventor at the same time proposed that such films, being perfectly flexible, might be rolled and unrolled (panorama fashion), so that successive lengths might be submitted to the luminous image, and thus the whole business of changing plates be accomplished by the turn of a handle outside the apparatus. The same idea was taken up by Warnerke a few years later, and his patented *roller-slide* became obtainable commercially. Warnerke also made a sensitive dry collodion film for use in his apparatus, but its cost—which was at the rate of a penny per square inch—limited its use to a few.

To Messrs Morgan & Kidd of Richmond belong the honour of having first applied a gelatine emulsion to paper. This paper is now made by many dealers, and is commonly called bromide paper. Its principal use is for enlarging, but at the time of its introduction it was used for negative work, the paper being rendered semi-transparent by an after-operation. It must also be noted, too, that for this work the inventors employed a roller-slide of the kind suggested by Woodbury. The Eastman Company next took up the matter, introduced a roller-slide, together with a paper film of very reliable quality. This paper is sold in spools, ready wound, so that the buyer had merely to take a spool from its case, insert it in the roller-slide, and he immediately had material ready for reeling off forty or fifty negatives, to be subsequently separated by cutting, developed, and rendered transparent with a preparation of vaseline. These films were objected to by some on account of the trace of grain from the paper which was left on the picture printed from it, and a 'stripping film' was next adopted as previously proposed by the Rev. W. Palmer. By this modification the surface bearing the image could be stripped from the original paper and transferred to a stiff sheet of insoluble gelatine, which became its final support. Film photography has recently been brought to still greater perfection by the employment of transparent and flexible celluloid in sheet form. It is curious to note that this substance, invented by Parkes about 1855, was long ago proposed as an efficient substance for use in photography, and it would doubtless have been so used if collodion, when applied to it, had not had a solvent action. But as it is quite insoluble in water, it forms a perfect support for a gelatine film, and, now that it can be manufactured nearly as clear as glass, it represents the best thing yet introduced. Its general use is limited by its cost, which is greatly in excess of glass, but it presents so many advantages that it is very largely employed. The material is now made thin enough to be wound on spools and used in roll-holders. Beyond the advantage of lightness, portability, freedom from breakage, reduced cost of carriage, &c., which the films undoubtedly possess, there is one gain in their employment, of a technical nature, which is important enough to receive recognition here. They are free from halation. Halation is apparent in negatives taken upon glass plates as an encroachment of the light parts upon the dark portions, and is seen in its most aggravated form in the blurring out of windows in interior views. It is caused chiefly by reflection from the back surface of the glass.

The great rapidity of modern dry plates allows a photograph to be taken in such a mere fraction of a second that the camera can be held in the hand during the operation. Various hand-cameras are now made, and meet with extensive employment, especially by tourists, and are more or less disguised as despatch-boxes; but they are becoming so common that the disguise is more apparent than real.

The extreme sensitiveness of modern dry plates has also given rise to what is known as flash-light pictures, which are photographs taken by the almost instantaneous flash produced by scattering powdered magnesium into a lamp-flame. Many ingenious forms of lamps have been devised for this purpose. They mostly consist of a spirit-lamp in conjunction with a receptacle for the magnesium powder, with a pneumatic ball and tube attached. Pressure of the ball urges a puff of air into the powder, and carries it into the flame. This system is much used for taking groups and portraits at night in private and public rooms. The best workers employ a branch tube from the ball, which exposes the lens at the moment of maximum light.

Lenses.—The quality as well as the kind of lens used is of great importance. An explanation of the different forms and properties of Lenses is given under that head, but it is necessary to say a few words here about the kinds used in photography. They may be divided into two classes—portrait lenses, and view lenses. The former are of large aperture, but give a small image; while the latter have a small aperture, but give an image which covers a far larger surface. In the portrait lens rapidity of action has been the chief thing considered, for it is used in a studio where the amount of light available is always more or less limited. A portrait lens unless of the 'doublet' form is not suitable for view purposes; but a view lens can well be used for portraiture under certain conditions, and is one of the best lenses to use for groups. Under the head of view lenses come a large number which have fanciful names attached to them that are apt to mislead the tyro, but which are all more or less alike. In the early days of photography telescopic objectives were made to do duty in the camera, but they gave a very small field, and were in other respects unsuited to the purpose. Then came (1841) the portrait lens designed by Petzval, and made by Voigtlander of Vienna, an invention which marks an era in photographic progress. The single view lens, which is the cheapest and for pure landscape is still unequalled, had its first improvement in the patent aplanatic lens made by Grubb in 1857. Although called a single lens, it consists of a combination of crown glass of concavo-convex form, cemented to a flint divergent meniscus. The single lens was modified later on by Dallmeyer, who subsequently, in 1888, introduced a new form of view lens which, possessing the usual advantages, had the quality, hitherto unknown in a single landscape lens, of giving an image free from curvilinear distortion. The same feature had been secured by Dallmeyer in his well-known triplet lens, which was invented in 1860, and which, as its name implies, consisted of three combinations. This lens was serviceable for copying, architectural subjects, as well as for landscape, and was a great favourite with photographers. It has now been superseded by the doublet form of lens, which, under the name of rectilinear, symmetrical, &c., is the most commonly used form of photographic objective. It generally consists of two combinations of similar construction placed with their concave surfaces facing one another, the necessary stops or diaphragms for increasing definition and reducing spherical aberration being inserted in a slit in the brass mounting tube midway between them. These lenses are constructed to take different angles of view, according to the requirements of a given case: for taking subjects in a confined situation, such as a narrow street, or for depicting the façade of a large building at very limited range, a 'wide-angle' lens is necessary. For the convenience of those carrying a number of lenses, Ross has devised a series of 'symmetrical' lenses that all fit one flange. Every lens is sold with a set of diaphragms or stops; and, in the case of the lens last mentioned, these usually take the form of a rotating plate, pierced with the necessary apertures. But in other lenses the diaphragms are in the form of separate plates, and are kept in a small leather case by themselves, the operator removing any of the series, and inserting it in the lens when wanted. These diaphragms are marked with what is known as their focal value, which means that the number marked represents the fraction which the aperture of the diaphragm is of the focal length of the lens. To make this plain, let us suppose that the focal length of the lens is 6 inches, and that the diaphragm in question has an aperture of a quarter of an inch. As there are in 6 inches 24 of such quarter inches, the figure 24 will represent its value, and this will be expressed thus: $\frac{f}{24}$. In like manner, a half-inch diaphragm would be marked $\frac{f}{12}$, and a one-eighth inch diaphragm $\frac{f}{48}$. There is, however, another method of marking lens stops, which has been adopted by the Photographic Society of Great Britain, and which is called the 'Uniform Standard,' or U.S. for short. In this system $\frac{f}{4}$ is called No 1, and the U.S. number for any other size is found by dividing the focal length of the lens by the diameter of the opening as already described, squaring the result, and then dividing by 16. Of late years a remarkable improvement, which, however, had for some time been applied to microscopes, has been made in photographic lens diaphragms, in a contrivance which, from its resemblance to the natural diaphragm of the eye, which expands or contracts automatically according to the amount of light to which the organ is subjected, is called the iris diaphragm. This consists of a number of flat blades or tongues of thin blackened metal, which are fastened to a ring in the lens mount. By a turn of this ring the blades expand or contract, so that the aperture can be enlarged or diminished as required, while a scale marked on the outside of the lens mount, and a travelling pointer, indicate the focal value of every change of aperture. We may mention here one more important change in lens manufacture—the introduction of aluminium instead of brass for the necessary metal work, by which the weight of the instrument is greatly reduced. The same useful metal, only now rendered available by its cheaper manufacture, is also coming into use as a substitute for brass in the other metal fittings of cameras. A new kind of glass, known as Jena optical glass, is now being employed in the construction of photographic lenses. By its use a larger field can be covered with a given aperture than was the case under former conditions.

Wet-collodion Process.—Collodion (q.v.) is the name given to the solution of pyroxyline, a kind of gun-cotton, in a mixture of ether and alcohol. When this is flowed over a glass plate it gradually dries into a transparent film. It was first introduced for photographic purposes in 1851 by Mr Scott Archer, and has been of great and important service. For fully a quarter of a century the wet-collodion process was almost exclusively practised by photographers—in the earlier years for the production of positives on glass, and occasionally on leather or other non-fragile materials; latterly by modifications the process was more extensively employed for the production of negatives. Dry-collodion processes have also been in use, although on a much more limited scale. These are the stages in the wet-collodion process: (1) A glass plate made perfectly clean is coated with collodion, to which the bromide of cadmium and either iodide of potassium or iodide of ammonium have been added. (2) The collodionised plate is 'sensitised' by immersion in a bath of nitrate of silver, containing 35 grains to every ounce of distilled water. (3) Production of latent image by exposing the sensitised plate in the camera after the object has been focused. (4) Development of latent into visible image by flooding the plate with a solution of sulphate of iron (ferrous sulphate), or of pyrogallic acid, to either of which some acetic or citric acid is added. (5) Fixing of the permanent image by immersion of the plate in some solvent of those parts of the sensitive surface upon which the light has not acted. This solvent for wet plates is cyanide of potassium, but for more modern processes hyposulphite of soda is employed.

Dry-plate Processes.—It is hardly necessary to do more than name a few of the earlier dry-plate processes, since, except for experimental purposes, they have all been beaten out of the field by the recent one known as the gelatino-bromide process. Several advantages arise, especially for field-work, from using dry sensitive plates. With the wet process the operator, when away from his studio, must take with him a dark tent, collodion, a silver bath, and developing agents, besides a supply of water for washing purposes; but these *impedimenta* are not required with dry plates. Dry-plate processes are of two principal kinds: (1) Those in which the collodion is applied to the glass plate, and afterwards sensitised in the silver bath, as in the wet way, but with a 'preservative' such as albumen 'flowed' over the surface, and the plate allowed to dry. (2) Emulsion processes, in which the sensitive silver salt is held in suspension in the collodion or gelatine. A good emulsion can be prepared by adding some soluble bromide, such as bromide of cadmium, to the collodion, and afterwards an alcoholic solution of nitrate of silver. The glass plates are simply coated with this emulsion, washed in water to remove the soluble salts, and set aside to dry, when they are ready for use. The collodion emulsion process is still employed to a limited extent, chiefly for the production of transparencies; recent experiments indicate that it may yet compete with gelatine emulsion in sensitiveness.

The earliest form of the gelatino-bromide process, at present so universally employed, appears to be due to Dr Maddox, who published the details of a workable emulsion of this nature in 1871. The process was improved in 1873 by Mr Kennett, and again in 1878 by Mr Charles Bennett. It was found that if the emulsion was kept at a temperature of 90° F. for some days, or boiled for half an hour, the sensitiveness of the plate coated by it was so greatly increased that a view which could only be taken formerly in 30 seconds could now be taken in one. A very sensitive gelatine emulsion can also be formed by using ammonia along with the bromide of silver. Dry plates produced by some form of the gelatino-bromide process are now manufactured on a large scale. When properly made they will keep good for years, and they can be developed months after having been exposed. But it is generally admitted that the best results are obtained when the plates are not old, and when development follows exposure without undue delay.

PHOTOGRAPHIC PRINTING. *Silver Prints.*—The details of the well-known silver-printing process are briefly as follow:

(1) Suitable paper is coated on the surface with a smooth thin layer of albumen, to which chloride of sodium or of ammonium has been added. (Originally

the paper was salted only—i.e. the albumen was dispensed with—and this old method is being largely revived.)

(2) Silvering of the paper by floating it on a solution of nitrate of silver, from 30 to 60 grains of this substance being used for every ounce of water, according to the amount and kind of chloride in the paper. It is afterwards dried.

(3) Exposure to light. The silvered paper is exposed beneath the negative in a printing frame, the time of exposure varying according to the brightness of the light and the character of the negative.

(4) Toning. In order to give a pleasing colour to the print it is usual to tone it in a solution of chloride of gold. Quite recently the metal platinum has been used for toning silver prints on plain paper with very fine results. One method has been introduced by Blanchard, and another by Lyonel Clark, the latter employing the same salt, the chloro-platinite of potassium, which is used for the platinum printing process to be presently described.

(5) Fixing. The print, when taken from the toning bath, is steeped in a solution of hyposulphite of soda, which removes the undarkened silver salt that is still sensitive to light, and so fixes the image.

(6) Washing. Silver prints require to be washed quickly and thoroughly after treatment with the hyposulphite of soda. Prolonged soaking is harmful, and imperfectly washed prints soon spot and fade. Gelatine is now largely coming into use as a substitute for albumen: it is more suitable for the rendering of delicate detail, and the prints with due care exercised in their production ought to be more permanent. The papers known as Aristotype, Argentotype, and Celerotype are gelatine emulsions of chloride of silver spread on paper.

Printing in Salts of Iron.—The metal iron in some of its chemical preparations is now very largely employed in a number of photographic printing processes—e.g. cyanotype, chrysotype, kallitype, platinotype, &c.—and is capable of producing results with all the fidelity and delicacy of the silver process, in some cases at considerably less cost, while the manipulations are greatly simplified. There are certain preparations of iron, known as *ferric* salts, that are not affected in appearance when certain other chemicals are brought in contact with them; other preparations of iron, known as *ferrous* salts, produce highly-coloured pigments when combined with these same chemicals.

The action of light can change ferric into ferrous salts; hence, if a piece of paper be coated with a ferric salt, dried, and placed under a fern leaf, a piece of lace, or a photographic negative, and exposed to light, an image in a ferrous salt is produced which is capable of being developed into a highly-coloured image when acted on by a suitable reagent; and not only so, but, as this reagent has no action on the ferric salt, they may be mixed together in the first instance and thus applied to the paper, when the action of light will develop the highly-coloured image, a simple wash in water completing the operation. This is in outline what is known as the *Cyanotype or Blue printing* process, first published by Sir J. F. W. Herschel in 1842, which in detail is as follows:

Two solutions are made up, one containing sixty-four grains of ammonio-citrate of iron to the ounce of water, the other forty-eight grains of ferricyanide of potassium to the ounce of water. Mix equal quantities of these solutions, and with a soft sponge or flat camel-hair brush quickly and evenly cover one side of good smooth white paper. This is best done by gas or candle light; then place to dry where it will not be affected by daylight. The paper so prepared is chiefly used for copying plans and drawings on tracing cloth: the tracing, which should be in a good opaque black ink, is placed on the top of the paper, and both are covered with a glass plate to keep them in perfect contact. Ten minutes in a very bright light will suffice for exposure. The print is now washed, when the lines of the drawing will appear white on a blue ground. The same kind of paper can be exposed beneath a photographic negative in order to secure a rough proof of the picture, but in this case the time of exposure is much increased. A disadvantage of the above process is that the original black drawing on white paper appears as a white drawing on a dark-blue ground.

The following modification, known as the Pellet process, produces blue prints on white paper: Gum arabic, 25 parts; common salt, 3 parts; perchloride of iron, 8 parts; tartaric acid, 4 parts; and water to make up to 100 parts. Well-sized paper is coated with the above and treated as in the preceding; it is very sensitive to light. A good tracing in bright sunlight is sufficiently printed in from ten to fifteen seconds. The print is developed by immersion in a saturated solution of ferrocyanide of potassium (yellow prussiate), and the design immediately appears in blue. The print is now rinsed in cold water, and then transferred to a 10 per cent. solution of hydrochloric acid; another rinse in cold water completes the operation.

Chrysotype.—This is a modification of cyanotype, also published by Sir J. Herschel. The paper is merely coated with the ferric ammonium citrate, and may be developed after exposure with a neutral solution of gold chloride, washed with water and dried. The resulting print is in metallic gold in a finely-divided state, and is of a fine purple colour. A dilute solution of nitrate of silver may be substituted for the gold when the image is in metallic silver.

Kallitype.—In this process paper is washed with a strong solution of neutral ferric oxalate. After printing in the usual way, it is developed by the following solution: Nitrate of silver, 50 grains; citrate of potash, 800 grains; bichromate of potassium, 1 to 2 grains; rain water, 10 ounces. The precipitate formed is next dissolved by the addition of ammonia (strength, ·880)—about a drachm will be sufficient. After filtering add 35 drops of strong nitric acid, and the developer is ready. This solution is very cheap and easily prepared. The resulting prints possess a fine rich black colour.

Platinotype, or Platinum Printing Process.—The metal platinum can be deposited from some of its chemical preparations in an extremely fine black powder when brought in contact with one of the iron salts altered by light. Herschel explained how to get prints in platinum, but the process now employed is that discovered by Willis. Captain Abney, F.R.S., thus describes the chemical action upon which the process is based: 'Mr W. Willis, jun., found that he could obtain an image in platinum black, by means of development, if he sensitised his paper with ferric oxalate, with which was mixed a solution of chloro-platinite of potassium. The action of light on this paper is to reduce the ferric salt to the ferrous state, and when the ferrous salt is in solution the platinous salt is reduced by it. By floating the exposed paper on a solution of neutral potassium oxalate, which is a solvent of the ferrous oxalate, the platinum salt in contact with it is immediately reduced to the metallic state, and an image is thus built up. To fix the prints they are immersed in dilute hydrochloric acid, which dissolves away any ferric oxalate there may be, and also gets rid of any oxalate of lime.'

Paper prepared as above described is supplied commercially. And after being exposed to light beneath a negative in a printing-frame for about one-third of the time necessary in the case of a print on silvered paper, its lemon-yellow tint is found to change, where the light has reached it, to a pale, dirty-gray colour. Development is conducted in an iron enamelled tray, beneath which a spirit-lamp or bunsen burner is placed, so as to keep the oxalate solution at a temperature of about 175° F. Under-exposed prints will benefit by this temperature being exceeded, whilst those which have received more light than they should have had can be advantageously treated with a much colder developer. The print is floated on this warm bath, which turns the faint image of the picture to a dense black, and fixation follows by placing the picture in a series of water baths made slightly acid with hydrochloric acid; these remove the iron from the paper; a simple rinse in plain water completes the operation. The developer can be mixed in bulk, for it keeps well, and the same quantity will develop a large number of prints one after the other. The platinum prepared paper will keep well if damp be excluded. For this reason it is sold in tin tubes, which have at one end a small quantity of calcium chloride, a salt which is so greedy of moisture that it will absorb all in its neighbourhood. The favour with which this process has been received, because of its permanence and its quick results, is well indicated at photographic exhibitions, where a large proportion of the pictures shown are invariably platinotypes. Mr Willis, the inventor, has introduced a *cold* bath platinum process, in which the metallic salt is contained in the developer, and this modified method is said to present many advantages. The developer thus prepared is not of a lasting kind, and only enough must be mixed to meet the existing demand. Another modification of the platinum process, made known by Willis, but more generally associated with the name of Captain Pizzighelli, yields a dark image in the printing-frame. The only necessary after-treatment is a bath of weak acid, followed by washing in plain water. There is every reason to suppose that platinum will be the printing process of the future, but unfortunately the price of the metal, which in 1890 went up more than 100 per cent., is calculated for the present to limit its use.

Bichromated Gelatine Process.—So far back as 1839 Mungo Ponton announced that paper steeped in bichromate of potash and dried changed its colour when exposed to light. It was subsequently discovered that light not only alters the composition of the bichromate, but also oxidises the size (gelatine) of the paper. Gum, starch, and albumen were also found to become, like gelatine, insoluble when exposed in contact with the bichromate of potash or ammonia to the action of light. If ordinary gelatine be soaked in cold water, it absorbs the water and swells, and then if heated, or if hot water be poured on it, the gelatine melts. If some bichromate of potassium or ammonium had been added to the cold water, the gelatine would absorb the chemical along with the water. If now the gelatine be dried and exposed to light until the stain imparted by the bichromate is altered in colour, it will no longer swell in cold water, neither will it dissolve in hot water; the action of light has made the bichromated gelatine insoluble. It is to gelatine thus chemically modified that we owe the 'autotype' or 'carbon'—more correctly 'pigmented gelatine'—process. The Collotype, Woodburytype, and some forms of photo-zinco engraving and photogravure, also certain kinds of 'phantom' photographs, and one method for vitro enamels, depend on the same principle.

The Autotype, Carbon, or Pigmented Gelatine Process.—Pigmented gelatine paper is an article of commerce, and the Autotype Company supply this 'tissue' sensitised ready for printing. The tissue consists of a thick coat of gelatine, with which has been intimately mixed a certain amount of permanent pigment in very fine powder—if for a black, Indian ink may be employed; other colours are added to modify the tint. The paper so coated is sensitised with ammonium bichromate, and then exposed under a negative till it is supposed to be sufficiently printed. The image is not visible as in a silver or iron print, therefore some indirect plan of telling the proper time of exposure, such as by the use of an actinometer, must be resorted to. The change which takes place in the gelatine film is this: the surface next the negative has been rendered insoluble wherever the light has acted, and that to a depth corresponding to the intensity of the light. It results from this that almost the whole of the surface of the gelatine has been rendered insoluble—to the greatest depth where the light has acted most strongly. Soluble portions, however, remain enclosed between its surface and the paper. No picture is visible till these are removed. To overcome this difficulty—the removal of the soluble portions imprisoned between the insoluble skin and the paper at the back—took many years of experimenting, and all sorts of devices were resorted to. One plan was to expose the back of the tissue to the negative, thus printing through the paper, but the grain of the paper showed offensively. Fargier spread the pigmented gelatine on glass, exposed it thus under a negative, and then coated the film with collodion. On subjecting the whole to the action of warm water, the latter penetrated the collodion and softened the gelatine, which eventually floated off the glass, being held together by the collodion. This was now supported on paper (collodion side down), and washed from the back with warm water, and so the first half-tone photographs in pigmented gelatine were obtained.

Swan experimented on similar lines, and in 1862 he took out a patent for pigmented gelatine films spread upon collodion supported on glass. When dry the whole was stripped from the glass, and thus the first tissue was made. The difficulty of removing the entangled pigment still remained, and this Swan overcame by coating the collodion surface of his tissue with india-rubber solution, and applying it to a piece of paper similarly coated. When both were dry the whole was passed through a press, and then soaked in warm water; thus the soluble portions could be removed, leaving that part of the film acted on by light untouched, and projecting *in relief* according to the varying action of light as it passed through the gradations of the negative. By this method and a subsequent modification Swan sent out a number of fine pigment prints, but it was so troublesome, expensive, and unsatisfactory in the hands of the average photographic printer that printing by bichromated gelatine never became popular until J. R. Johnson, about the close of the year 1868, discovered that the pigmented gelatine paper ('autotype tissue'), when sensitised by the bichromate and correctly exposed to light under a negative, only required to be soaked in cold water, and then evenly applied to *any surface impervious to air*, such as glass, zinc, oilcloth, &c., when the gelatine surface would adhere very tenaciously to the support—after the principle of the schoolboy's sucker—by atmospheric pressure alone. Then by soaking in hot water the paper at the back came off, carrying with it much of the unaltered pigment and gelatine, and by laving the image remaining on the support with the hot water the picture in all its delicate gradations appeared clean and perfect. It was this discovery that made what is generally known as autotype or carbon printing a practical working process. The method above described is called the single transfer process, and produces a print reversed as to right and left. The double transfer process merely differs in the adoption of a temporary support of opal glass, zinc, or paper coated with a suitable preparation (the most convenient being Sawyer's flexible support), which holds the print till developed, and from which the print is then transferred to its final support—it is then non-reversed. When practicable it is usual to take a reversed negative, and thus avoid the double transfer.

Powder Process.—By what is called the powder process prints are produced on paper in plumbago, or any other impalpable powder insoluble in water. It has been a good deal used on the Continent. A slightly sticky or 'tacky' preparation of sugar, gum, glycerine, and potassium bichromate, when exposed to light, loses its tackiness in proportion to the intensity of the light acting on it. A glass plate coated with this preparation will therefore, when exposed under a negative, represent the picture, so to speak, by different degrees of tackiness. In this state a fine powder sprinkled over it will adhere in proportion to the stickiness of the surface. When the superfluous powdèr is removed, and the film coated with tough collodion, it can be detached and, if required, put on any support such as paper, but the soluble portion of the gum, &c. is previously removed by washing.

Photographic Enamels on Glass and Porcelain.—If the image as described in the preceding paragraph be developed by suitable metallic oxides —such as the underglaze colours of the porcelain painter—and the resulting image coated with collodion be washed, the film can be transferred to glass, china, or enamelled metal, and after firing in a suitable kiln it will become vitrified, and will be as permanent as a burnt-in painting on the same substances. Some of the very finest vitro enamels are, however, produced by a 'substitution' process, in which a collodion transparency is toned to saturation with platinum, or iridium, all traces of silver being carefully eliminated. This modified film is now transferred to an enamel tablet, and burnt in as in the previous method.

Diazotype.—A new colouring matter or dye of a primrose tint was discovered by Arthur G. Green in 1887, who named it 'primuline.' This dye affixes itself very tenaciously to cotton fibre, so that by merely boiling the fabric in its aqueous solution a permanent yellow colour results; and this yellow basis acts as a mordant, permitting, when acted on by appropriate developing agents, the building up of an immense variety of 'ingrain colours' that admit of wide practical use.

By passing the yellow cloth through a bath of acetic acid and nitrate of soda the material is said to be 'diazotised,' and then is of a brighter yellow colour that is extremely fugitive under the influence of light. This constituted for a time an insuperable objection to its use as a dye, but suggested photographic possibilities. Experiments proved that, if a material containing diazotised primuline be exposed to light under a design, those parts acted on by light speedily decomposed, while the parts protected remained unaltered; the latter on treatment with a phenol or amine produce many permanent compound colours, and the former remain unchanged. Upon this is founded the diazotype process, by means of which every kind of fabric, cotton, muslin, velveteen, wool, linen, silk, &c., as well as colloid films and paper, are dyed by the influence of light. The process is exceedingly simple, very cheap, and gives a *positive* print, the most opaque objects or parts of a design coming out darkest, the reverse being the case in ordinary silver printing.

Mr Green, in conjunction with his partners Messrs Cross and Bevan, published the process at a meeting of the British Association at Leeds in 1890.

MECHANICAL PRINTING. *Woodburytype and Stannotype Processes.*—It has long been known that if a leaf, a bit of lace, or any similar object was placed on a sheet of soft metal, and considerable pressure applied, the impression of leaf or lace was sunk into the metal. From this metal plate prints were taken as from an engraved plate, and the process was called Nature-printing (q.v.). If we laid an ordinary autotype print instead of a leaf on a flat piece of iron, covering it at the same time with a smooth piece of sheet-lead, and then put them under sufficient pressure, the result would be an imperfect Woodburytype mould in the soft lead. The metal reverse would be faulty, because in this case the gelatine film is too thin to give enough of relief. In order to obtain a proper mould a layer of sensitised gelatine, considerably thicker than that used for an autotype print, is exposed under a negative. It is developed as in the autotype process, and presents the image in considerable relief. The print is then covered with the lead, and they are pressed together in a hydraulic press, which produces a reverse or mould of the picture in the soft metal without injuring the gelatine relief.

The production of ordinary Woodburytype prints is a purely mechanical operation, the chemical action of light not being called into play; they exhibit true gradation of tint, and in that respect Woodburytype is the only perfect photo-mechanical printing process known. The mould is placed in a printing-press of a peculiar but simple construction, and a warm solution of pigmented gelatine forms, so to speak, the printing-ink. This is poured on the mould, and a thin, hard, strongly-sized paper placed on the top of it. The lid of the press has beneath it a perfectly flat glass plate, which is now brought down on the mould and the lid firmly locked by a catch. The pressure causes all the superfluous gelatine to exude, whilst that in the mould adheres to the paper. In a short time the gelatine sets, when the plate is raised and the print withdrawn. It has now only to be placed in a solution of alum, which renders the gelatine forming the picture insoluble.

The Stannotype (or printing from a surface of tin) has been called a simplified Woodburytype process. Mr Woodbury, to whom it also is due, thus describes it: 'A positive is first made from the negative—preferably by the carbon process. From this carbon or other transparency a negative is made also in carbon; but in this case the tissue possesses much more body and much less colour, so as to obtain a certain amount of relief. This (gelatine) relief negative is then coated with a thin india-rubber varnish. A piece of tinfoil is laid over it, and the whole passed through a pair of india-rubber rollers—a species of mangle, in fact. We have now a printing-mould ready for placing in the press and printing from in gelatinous ink.' This procèss does not always give the beautiful results obtainable by the original Woodburytype method, but remarkably good results are secured by it.

Heliotype and Phototype Processes.—Both of these are photo-mechanical methods, in which the gelatine relief is itself used to print from in some form of printing-press, instead of being covered with tinfoil as in the stannotype process. Lithographic ink is used. The film or layer of gelatine forming the printing surface requires to be specially and carefully prepared. This process, under the name of Collotype, is much used for book illustration and advertising purposes.

Photo-lithography and Zincography.—The only difference between these is that a lithographic stone is used in the one case and a plate of zinc in the other for the mechanical printing. It is necessary that the original drawings should be done in lines and not in half-tint. At least, it is doubtful whether much success has as yet attended the production of half-tint photo-lithographs. A negative is taken from the drawing by the camera, and from it a print is made on paper coated with bichromatised gelatine much in the same way as in the autotype process. But before the print is developed it receives a coating of lithographic transfer ink specially prepared for the purpose. It is next floated in warm water till the lines are seen as depressions. With the aid of a sponge and water at a temperature of about 150° F. the soluble portion is removed, leaving the picture in insoluble gelatine with its coating of transfer ink. It now only requires to be washed, dried, and transferred to the stone or zinc plate (see LITHOGRAPHY). These processes have been greatly superseded by the various photo-engraving and zinc processes (fully described in the article ILLUSTRATION OF BOOKS), by which printing blocks suitable for a typographic press can be produced in a few hours.

Photography is now much employed as a means of reproducing drawings on wood blocks for the engraver. This process is of much importance, as the original drawing is preserved, not only for comparison with the finished engraving, but it may be for its artistic value. The original drawing also may be made of any convenient size, and reduced on the wood—a great consideration when minute objects are to be represented. The necessities of wood-engraving require that the drawing-on-wood should be reversed; hence the necessity of a reversed negative in any direct printing process. The negative may either be printed direct on to the wood, or a modification of the carbon process employed. In the first case, one process is first to render the surface of the block waterproof, and then it is whitened with Chinese white. The block is then sensitised with chloride of silver, and printed under a reversed negative. It is then toned with gold and fixed with hyposulphite of soda, washed and dried, and is then ready for the engraver.

In the carbon process, a carbon tissue is made with very little gelatine and a large amount of carbon or other pigment. The block is rendered waterproof and whitened with baryta; the carbon print is developed on the wood with warm water, and, when dry, is ready for the engraver.

Photo-micrography consists in photographing microscopic objects by causing a microscope to take the place of the ordinary photographic lens in the camera, so that the enlarged image is cast upon the sensitive surface of the collodionised or gelatine plate. Such photographs, again enlarged by the optical lantern, are much used for class instruction.

By reversing the arrangement necessary for the enlargement of microscopic objects it will be seen that minute photographs of engravings, or other objects, may be produced which would require a microscope for their inspection. In this way communication was maintained during the investment of Paris, when copies of letters and newspapers were inserted in quills, and fastened to carrier pigeons.

ASTRONOMICAL PHOTOGRAPHY.—The application of photography to astronomy has within the past few years assumed immense importance, and great results have been achieved through the wedding of the camera with the telescope. Until recent times the only remarkable photographs of the celestial bodies were those of the moon, which were executed by Warren de la Rue, Rutherford, and others. The moon being from its size and brightness a comparatively easy body to photograph, the old processes were sufficient for the purpose, and most perfect results were obtained. Jansen and others have secured photographs of the sun which exhibit markings upon its surface with great distinctness, and many photographs of the corona when the orb has been under eclipse have been taken when the somewhat rare opportunity has occurred. But it is in picturing the distant stars and nebulæ that the greatest work has been achieved by photography, and results obtained which would have been impossible without the aid of the highly sensitive dry plates now at the disposal of the astronomer. Among the triumphs already obtained in this direction may be mentioned Roberts' photograph of the 'Andromeda Nebula,' Common's photograph of the Nebula in Orion, and several similar negatives obtained by the brothers Henry of Paris. One by these last workers, a photograph of the Pleiades, should receive special mention. A certain star in this well-known group appeared in the photograph in question with a nebulous haze attached to it. This star was not known to be associated with a nebula, and the astronomers of Paris in vain endeavoured to detect it by aid of the most powerful telescope at their disposal. The nebulous mass was therefore discredited, until another photograph of the Pleiades arrived shortly afterwards from America which exhibited exactly the same peculiarity. Once more the nebula was searched for, and at length was declared to be faintly discernible. From this it would seem that the photographic film is more sensitive to faint impressions than is the retina of the eye, and in a certain sense this is true. These star photographs are often exposed to the action of the light from those distant bodies for three or four hours, during which time the clock-work train attached to the telescope keeps the images of the tiny points of light stationary on the plate, in opposition to the rotation of the earth. Each image, however faint, has therefore a comparatively long time to make an impression on the sensitive chemical surface, and exerts a cumulative action, with the result that the images of stars are registered which no human eye has ever beheld. To put the matter more plainly, it may be said that a certain section of the sky covered by the field of a powerful telescope is seen to contain a definite number of stars. When this same space is photographed their number is often doubled. At a convention of astronomers held in Paris in 1887 it was decided to take steps for photographing the whole of the heavens. For this purpose the sky has been chartered out into squares, and each observatory helping in the work will photograph a certain number of these spaces. The work is estimated to entail ten years' labour, this long time being partly accounted for by the circumstance that, owing to the occurrence of unsuitable weather and the interruptions caused by moonlight, there are only about fifty nights in the year when sidereal photography is possible. There are many difficulties in photographing the stars, some of which have led to discussion, and have caused doubts to be raised as to the accuracy of the results attained. The chief of these is represented by the circumstance that the photographs exhibit discs of light, varying in size according to the brightness of the stars, instead of mere points of light, which the extreme distance of the bodies should secure. This expansion of size is believed to be due to irradiation, want of complete achromatism in the lenses, and reflection from the back of the photographic plate. These difficulties will no doubt be surmounted in the future, and it may be mentioned that they are only observable when a refracting telescope is employed. Hence the use of reflecting telescopes for this work has been suggested; but, although by this means some of the faults mentioned are banished, other inconveniences arise which form obstacles to good work. Dr Huggins has done much valuable work in photographing the spectra of the heavenly bodies.

Durability of Photographic Prints.—Experience has proved that silver prints, however carefully prepared, cannot be depended upon for permanency. Much vexation has frequently arisen from the fading of these, and on this account they are no longer used for book illustration. They will keep better unmounted than mounted, and they should be kept in a dry situation, as damp increases their tendency to fade. Platinotype prints are believed to be permanent by those best able to judge. Autotype, Woodburytype, and other prints in pigmented gelatine are permanent if stable colours are employed, and of course those obtained by any of the photo-mechanical processes are certainly so when printed, as they usually are, in lithographic or printers' ink.

Miscellaneous Applications and Improvements.—The report that the art of photographing in the colours of nature has been discovered crops up year after year with curious persistency, and may be generally traced to the work of unscrupulous persons who seek to deceive the public for their own advantage. It is difficult to see how the much-talked-of photography in colours as popularly understood can ever be achieved. By the introduction of specially prepared gelatine dry plates—known as *orthochromatic* ('right colour') or *isochromatic* ('equal colour'), both very vague terms—it is possible to reproduce colours in their true shade relation to one another. For instance, suppose that one seeks to photograph by ordinary plates a blue vase containing yellow flowers. In the resulting picture the vase will be white and the flowers will be black. But if we use isochromatic plates the vase will be rendered as a gray and the flowers will appear almost white, which is obviously more true to the way in which the eye observes the original. This change in the behaviour of the sensitive surface is brought about by adding to the gelatine emulsion of which it is composed a minute quantity of certain dyes. Vogel in 1873 discovered that certain coal-tar dyes produce a change of sensitiveness in silver compounds; and in the same year Tailfer and Clayton secured a patent for the preparation of colour-sensitive plates prepared by the same agency. They use an ammoniacal solution of eosine; and plates made under the patent are now supplied commercially. They are much used in copying all coloured objects, such as oil-paintings; and there is little doubt that they will play an important part in sidereal photography, in the registration of coloured stars. Meteorologists are now depending upon photography to furnish them with cloud studies, and with pictures of Lightning (q.v.). A study of the latter is likely to extend our knowledge concerning the phenomena connected with thunderstorms, and has already elucidated a few problems. Mr Muybridge, of the United States, has placed the study of animal movements upon a new footing, since he introduced the system of analysing by means of photography the motions of a trotting horse, running dog, &c. By means of special apparatus he has found it possible to take a dozen consecutive pictures of a single movement. In photographs of a trotting horse taken in this way some of the attitudes appear quite unnatural (see HORSE). This is because the eye is not capable of appreciating a movement which is quicker than about $\frac{1}{10}$th part of a second, the image of anything seen remaining upon the retina for at least that time. The photographic lens, on the other hand, can record a movement which occurs in the $\frac{1}{500}$th of a second, and it is no cause for wonder that to the eye it should seem unnatural. In connection with this matter ought to be named Professor Marey of Paris, who has done much to perfect this phase of photography. He has introduced improved apparatus for photographing animal movements, and has recently applied it even to the study of the movements of microscopic creatures.

One of the most important applications of photography is in the production of transparencies (lantern slides) for the optical lantern. Every subject is now thus illustrated, and such pictures are an immense advantage to education.

BIBLIOGRAPHY.—Chapman Jones, *Science and Practice of Photography*; Abney, *Instruction in Photography*, and *Photography with Emulsions*; Eder, *Modern Dry Plates*; Robinson and Abney, *Art and Practice of Silver Printing*; Robinson, *Picture-making by Photography*; J. R. Sawyer, *The A. B. C. Guide to Autotype*; Liesegang, *Manual of Carbon Process*; Meldola, *Photographic Chemistry*; Chadwick, *The Magic Lantern Manual*; Hepworth, *Photography for Amateurs* and *Book of the Lantern*; Wilkinson, *Photo-engraving and Lithography*; Monckhoven, *Photographic Optics*; Burton, *Optics for Photographers*; Dallmeyer, *Choice and Use of Photographic Lenses*; Harrison, *History of Photography*; Schnauss, *Collotype and Photo-lithography*. See also periodical literature, and especially the annual publications, *Year-book of Photography*, *Almanac*, &c.

Photogravure. By this process the finest possible results are obtained, but the expense of producing pictures by its aid, which is akin to the operation of copperplate printing, limits its use to high-class book-work. It is also used by Boussod, Valadon & Co., by Durand of Paris, by the Autotype Company, by Messrs Annan & Swan of Glasgow, and others for the production of large pictures which rival the finest steel engravings in their delicacy and finish. Photographs can be reproduced in this form, but the process seems to be more largely employed for obtaining engraving-like copies of celebrated pictures. The process is so perfect that every touch of the painter's brush is clearly seen in the copy, and even the upstanding ridges of paint in the bolder touches are rigidly reproduced. There are naturally different ways by which printing plates for use in this process are made, and a brief description of two methods only must here suffice to give an indication of the line of operations. (1) A gelatine relief is obtained by exposing bichromated gelatine to the action of light beneath a negative. But the gelatine employed is mingled with a certain quantity of graphite (black lead) in a more or less granular form. This addition causes the resulting relief to have a surface which is granular in character, and which is also a conducting one to electricity. If therefore the relief be placed in an electrotype bath it will speedily become covered with a deposit of copper. From the copper plate so formed copies on paper can be obtained by the usual copperplate printing process. (2) A bichromated gelatine print —negative in character—is developed upon the specially prepared surface of a copper plate, which is then subjected to the action of a solution of perchloride of iron. This penetrates the gelatine more or less quickly according to its varying thickness, and then attacks the copper, which is eaten away by the chemical action that ensues. Thus in the end the copper plate bears on its surface an etched image, penetrating more or less in depth according to the shadows and lights of the gelatine image previously affixed to it. The plate is next 'steel'-faced and printed in the copperplate press. (It is often necessary to resort to hand-finishing in order to get the finest results.)

Photometry (Gr. *phōs*, 'light,' and *metron*, 'measure'), the art of measuring the intensity of a source of light, by comparison with a standard of reference (see Gas-lighting). The principles involved in the usual instruments are: (1) Lambert (1760), Rumford: equality of shadows cast by two sources at different distances; when the shadows are equal the intensities are proportional to the squares of the distances. (2) Equality of illumination through slits in screens; distances and intensities as before. (3) Bouguer, Ritchie, Leonhard Weber: reflection of light from two sources, so that they travel side by side to the eye, the distances being adjusted until they appear equal; calculation as before. (4) Wheatstone, the same; but the two reflections are from a polished sphere, which is set in motion, so that the comparison is between two looped luminous curves, produced through the persistence of vision. (5) Bunsen: a grease-spot on paper, equally illuminated on both sides, disappears. (6) Babinet: light from one is polarised by reflection, from the other by refraction; both pencils are sent through a double rotating quartz, and looked at through a double-refracting prism; they give coloured images, and the distances are adjusted until the images, on over-lapping, give a white field. All these methods are unsatisfactory when the sources of light are of different colours, as—e.g. a candle and an arc-lamp. Instruments have accordingly been devised for applying the above methods to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer, or a difference of sensitiveness between his two eyes, affects the result. In other instruments used as photometers what is measured is not the luminous intensity so much as the radiation: among these we may mention the Radiometer (q.v.); Leslie's photometer, which is a differential thermometer; Bunsen and Roscoe's, which measures the quantity of hydrochloric acid formed in a given time from chlorine and hydrogen; Léon's, which measures the amount of nitrogen liberated from iodide of nitrogen; and various instruments based on photographic reactions, which truly measure not the luminous, but the actinic intensity. Stellar photometry is generally contrived by stopping off more or less of the surface of the object-glass, or by polarising apparatus, so as to bring the apparent brightness of a star down to that of a standard of comparison. The usual photometric standards are (1) the English standard candle (see Gas-lighting); (2) the Hefner-Alteneck amyl-acetate lamp, which has now displaced the candle in Germany; (3) the carcel, a standard colza-oil lamp, used in France; (4) the Electrical Standards Committee's unit, the light given off by one square centimetre of platinum at its fusing-point; and (5), in scientific work, an incandescent electric-lamp under stated conditions of resistance and current, maintained constant.

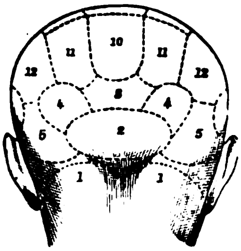
Photophone is the name of a comparatively simple apparatus which may be said to achieve the feat of transmitting articulate speech to a distance along a beam of light. It was first described in 1880 by Professor Graham Bell, known in connection with the telephone, at the Boston meeting of the American Association; but already in 1878 its inventor had announced the possibility of 'hearing a shadow' by means of a similar agency. The success of the photophone depends on the peculiarities of the metal selenium. Crystalline selenium offers a high degree of resistance to the passage of an electric current; it is eminently sensitive to light; and the resistance is less when exposed to light than in the dark, being in some cases only a fifteenth in the light of what it is in the dark.

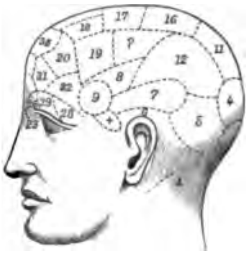
Founding on these peculiarities, Professor Graham Bell, his friends, and assistants devised some fifty forms of apparatus, for so varying the transmission of light to prepared selenium as to produce audible sound. In the photophone found most serviceable the transmitter is a plane mirror of silvered microscope glass or thin mica; the receiver, fixed at a distance without any connection, is a parabolic reflecting mirror, in the focus of which is placed a sensitive selenium 'cell,' connected in local circuit with a battery and telephone. When the apparatus is used, a strong beam of light is concentrated by a lens in the plane mirror; the speaker directs his voice against the back of this mirror, which is thrown into vibrations corresponding with those of the voice. The reflected beam of light, to which corresponding vibrations are also communicated, is directed through a lens to the receiving mirror, and creates in the selenium cell a rapidly variable current, which at the end of the telephone attached becomes audible again as vocal sound. When first described, the photophone had been used effectively with a distance of 230 yards (over a furlong) between transmitter and receiver. The rays of the oxyhydrogen light, or of an ordinary kerosene lamp, suffice for transmitting articulate speech. The loudest sounds obtained from the photophone were produced by means of a perforated disc, noiselessly revolving so as rapidly to interrupt the light in transmission.

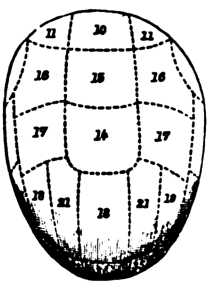
It was also found that a very audible sound could be procured from the selenium without the aid of telephone and battery. A beam of intermittent light will produce a strong musical note from the selenium. Further experiment showed that selenium is not the only substance thus sensitive to light. Still louder sounds than these obtained from the selenium directly, though not articulate, were got from diaphragms of hard india-rubber and of antimony; and sounds of varying intensity were given out by many other substances, including gold, silver, platinum, copper, zinc, lead, paper, parchment, and wood.

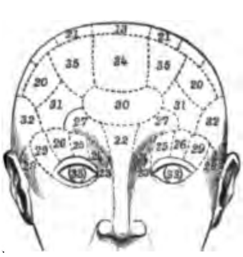
Photosphere. See Sun.

Phrenology (Gr., 'a discourse on the mind') was the name given about 1815 to the theory of mental philosophy founded on the observation and discovery of the functions of the brain concerned in intellectual and emotional phenomena, as formulated by Gall (q.v.). In Britain the system was amply expounded by Gall's pupil Spurzheim (q.v.), by George and Andrew Combe (q.v.), and by Dr Elliotson, founder and first president of the Phrenological Society; and in America by Dr Charles Caldwell of Kentucky, the brothers Fowler, and S. R. Wells. The connection of mind and brain was an old theory, and a kind of localisation of mental function in the brain had at various times been attempted from the days of Albertus Magnus downwards; but the first full-fledged system of empirical cranioscopy or phrenology must be attributed to Gall, who established his scheme by inspecting the exterior of the heads of a considerable number of persons of different characters; and believing himself to find portions of the scalp corresponding to their mental and moral faculties, marked out on a model of the head the areas which were prominent in proportion to the strength of the various faculties. These faculties were by Spurzheim divided into two orders—Feelings and Intellect, or Affective and Intellectual Faculties. The Feelings were divided into two genera—the *Propensities* and the *Sentiments;* while the Intellectual embraced the *Perceptive* or *Knowing* and the *Reflective Faculties.* Various modifications of Gall's scheme of localising the faculties were made by his pupils. American phrenologists (the Fowlers and S. R. Wells) increased the number of the faculties to forty-three; dividing the affective series into the domestic, selfish, moral, and self-perfecting groups, and the intellectual into the perceptive and reflective groups. The following is a representation of the human head from four points of view, showing the positions of the cerebral organs, according to Spurzheim and Combe:









AFFECTIVE.

I.—Propensities.

1. Amativeness.
2. Philoprogenitiveness.
3. Inhabitiveness or Concentrativeness.
4. Adhesiveness.
5. Combativeness.
6. Destructiveness and Alimentiveness.
7. Secretiveness.
8. Acquisitiveness.
9. Constructiveness.

II.—Sentiments.

10. Self-esteem.
11. Love of Approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit. 21. Imitation.

INTELLECTUAL.

I.—Perceptive.

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Colouring.
27. Locality.
28. Number.
29. Order.
30. Eventuality.
31. Time. 32. Tune.
33. Language.

II.—Reflective.

34. Comparison.
35. Causality.

The new science made many converts and became popular in most European countries. By 1832 there were about thirty phrenological societies, and several journals published in the interests of the system, which was supported by Macnish, Laycock, and Archbishop Whately. On the other hand, it was strongly controverted by Sir Charles Bell, Sir William Hamilton, Jeffrey, Brougham, Thomas Brown, and others; and their strictures and the progress of the scientific study of brain and mind in their various relations have to a large extent rendered it obsolete as a scheme. There is doubtless a large amount of truth in many of the generalisations. But anatomy and physiology have proved that the exterior surface of the brain is by no means an index to mental processes or characters; still less is such a guide furnished by the minute variations in the shape of the skull, which in a general way correspond to the exterior surface of the brain. Size of brain does not correspond directly to mental power or activity; nor is the superficial conformation the most important feature of the brain. Parts of the external surface are known to have functions other than those attributed by phrenologists; the frontal sinus of the skull is sometimes large enough to occupy the region allotted to four or five phrenological organs; and there are many osteological differences in the various bones of the skull which obviously have nothing to do with brain-functions or mental processes. An outline of what is known as to the localisation of brain-functions will be found at BRAIN, Vol. II. p. 391. For craniological characters, see SKULL, ETHNOLOGY; and see also PHYSIOGNOMY, PSYCHOLOGY.

See the phrenological works cited at GALL, SPURZHEIM, COMBE; Broussais, *Cours de Phrénologie* (1836); Flourens, *Examen de la Phrénologie* (1842); O. S. Fowler, *Practical Phrenology* (1846); Laycock, *Mind and Brain* (1860); Professor Bain, *On the Study of Character, including an Estimate of Phrenology* (1861); the *Phrenological Journal* (1823–47); Carus, *Grundzüge einer neuen Kranioskopie* (1841), and *Atlas der Kranioskopie* (2d ed. 1864); Willich, *Physiognomie und Phrenologie* (1870); Scheve, *Katechismus der Phrenologie* (7th ed. 1884).

Phrygia, a country in Asia Minor, the extent and boundaries of which varied very much at different periods of ancient history. In prehistoric ages it is believed to have comprised the greater part of the peninsula, but at the time of the Persian invasion it was limited to the districts known as Lesser Phrygia and Greater Phrygia—the former stretching along the shores of the Propontis and the Hellespont to Troas (afterwards part of Mysia), the latter occupying the centre of Asia Minor. Phrygia was in general a high and somewhat barren plateau, though its pastures supported immense flocks of sheep, noted for the fineness of their wool. The most fertile part was the valley of the Sangarius, but the most beautiful and populous district was the south-west, at the base of the Taurus, where the Mæander and other streams had their rise. The mountains and streams yielded gold; Phrygian marble was anciently celebrated, and the cultivation of the vine appears to have been extensively carried on. The Phrygians were apparently closely related to the Armenians, and have left their traces in almost all parts of Asia Minor. Later they were forced within narrower limits by the intrusion of Semitic and other aliens—Lydians, Carians, Thracians. In the 6th century Crœsus conquered all that was left of Phrygia, and in 549 he succumbed to the Persians. The influence of Phrygian religion on Greek mythology seems to have been great. Among their deities were Men or Manes, Cybele, and Athys; and Phrygia seems to have been a great centre of orgiastic worship and celebrations. For the Phrygian cap, see BONNET.

Phryné, one of the most celebrated courtesans of antiquity, was the daughter of Epicles, and was born at Thespiæ in Bœotia. Her position in life was originally very humble; she is said to have at one time earned a livelihood by gathering capers; but as the fame of her marvellous beauty spread she obtained numerous lovers, who lavished gifts on her so profusely that she became enormously rich. In proof of this the story goes that she offered to rebuild the walls of Thebes if the citizens would allow her to place this inscription on them: 'Alexander destroyed them; Phryne, the courtesan, rebuilt them.' The Thebans declined the proposal. Her enemies accused her of profaning the Eleusinian mysteries. Summoned before the tribunal of the Heliasts, she was defended by the rhetorician Hyperides, one of her lovers, who, perceiving that his eloquence failed to convince the judges, threw off her robe and showed her naked loveliness. She was immediately acquitted, and carried in triumph to the Temple of

Venus. The famous 'Venus Anadyomene' of Apelles is said to have been a portrait of Phryne. Praxiteles, also a lover of hers, employed her as a model for his 'Cnidian Venus.'

Phry'nichus, (1) an Athenian tragic poet, who gained his first dramatic prize in 511 B.C., twelve years before Æschylus, and his last in 476, when Themistocles was his *choragus*. He seems to have gone to the court of Hiero in Sicily, and to have died there. He introduced masks representing women, and to the light mimetic chorus of Thespis added the sublime music of the dithyrambic choruses. His most famous tragedies were the *Phœnissæ*, which is supposed to have inspired the *Persæ* of Æschylus, and another which had for its subject the capture of Miletus by the Persians. So overpowering was its effect that the audience burst into a passion of tears, fined the poet a thousand drachmæ for so harrowing a description of the sufferings of a kindred people, and forbade the piece ever again to be represented. His scanty fragments will be found in Nauck's *Tragicorum Græcorum fragmenta* (1856).

(2) A poet of the old Attic comedy, who was honoured by the abuse of his great contemporary Aristophanes (*Ran.* 14) for his low buffoonery. His fragments are collected in Meineke's *Fragmenta Comicorum Græcorum* (1839–57) and Koch's *Comicorum Atticorum fragmenta* (1880 *et seq.*).

(3) A Greek grammarian and sophist who flourished under Marcus Aurelius, and wrote a collection of select specimens of Attic usage intended for the benefit of his friend Cornelianus, secretary to the emperor. It consists of about four hundred short unconnected *dicta* on the orthography, signification, and use of particular words, and upon the rules of accidence, especially in verbs. The edition by Lobeck (1820) was followed by *The New Phrynichus*, by W. Gunion Rutherford (1881).

Phthalein. See DYEING, Vol. IV. p. 141.

Phthiotis, the south-east corner of Thessaly (q.v.), the home of Achilles.

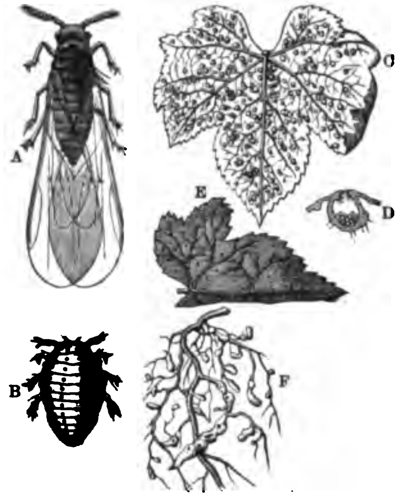
Phthisis. See CONSUMPTION.

Phylactery (Gr. *phylactērion*, 'an amulet'), the name given in the New Testament to small square boxes of parchment or black calf-skin, containing strips of parchment or vellum with certain texts of Scripture (Exod. xiii. 2–10, 11–17; Deut. vi. 4–9, 13–22) written on them. The phylacteries are worn on the left arm and on the head by all Jews (except Karaites) above thirteen years of age on week-day mornings during the time of prayer. This is done in accordance with their interpretation of Exod. xiii. 9–16. Some Russian and Polish Jews wear phylacteries all day; and they have at times been worn as amulets against demons. The writing of phylacteries is in the hands of privileged scribes (*Soferim*) only, and many and scrupulous are the ordinances which they have to follow in the execution of this task.

Phyllite, a schistose clay-rock, containing a variable proportion of quartz in grains, together with mica, usually chlorite, and sometimes many accessory minerals. The rock is more crystalline than clay-slate, and passes into mica-schist. The surfaces of the folia in phyllite are frequently finely wrinkled.

Phyllotaxis. See LEAF, Vol. VI. p. 548.

Phylloxe'ra (Gr. *phyllon*, 'a leaf,' and *xēros*, 'dry'), a genus of insects belonging to a family (Phylloxerinæ) nearly related to aphides and coccus insects, and included within the sub-order Homoptera in the order Hemiptera or Rhynchota. Two or three species occur in Europe, living like many related forms as parasites on plants. Most important is *P. vastatrix*, which ravages the vine, and has cost France alone a pecuniary loss far exceeding that of the Franco-German war. It seems to have been discovered in North America in 1854, and in all likelihood was carried thence to Europe, where it appeared about 1863. It now occurs in all vine-growing countries. In some of its features it is like a little aphis, measuring about $\frac{1}{25}$th of an inch in one of its stages, or only a fourth of that in others, varying from yellow to reddish brown in colour. The antennæ are thick, with three joints; the legs are short and thick; there is no trace of the 'honey-tubes' characteristic of aphides; the winged forms, which are all parthenogenetic females, have four wings. As in the nearly related genus Chermes—a destructive parasite of conifers—the life-history is exceedingly complex.



Life-history of Phylloxera (from Leunis).

A, a winged female; B, a wingless female from the root; C, under surface of a vine-leaf, showing the wart-like galls; D, an enlarged section of one of the galls, showing the eggs within it; E, upper surface of a vine-leaf, showing the openings of the galls; F, some of the roots of the vine, showing the nodosities caused by the parasites.

Let us begin with the winged females, which in Europe appear from August to October. Each lays about four parthenogenetic ova on the under surface of the vine-leaves. These ova develop in late autumn into males and females—wingless and without the characteristic piercing and sucking mouth-organs—which migrate to the stem of the vine. There each female lays a single egg under the bark. This egg lies dormant throughout the winter, and develops in April or May into a wingless but voracious 'vine-louse.' This form may pass to the leaves, on which it lays parthenogenetic eggs, and forms galls; but in Europe it attacks the roots, and lays its eggs there. From these in about eight days young develop, which become mature females in about twenty days, and lay more eggs in the roots. Half a dozen or more of these parthenogenetic generations follow in rapid succession throughout the summer. The roots become knotted and deformed; the whole plant suffers, and, though it may survive for several seasons, eventually dies. In midsummer, among the subterranean forms, a generation is born whose members, after four, instead of the usual three, moultings associated with adolescence, become the larger winged females with which we began.

The destruction of this scourge of the grape-vine, without also injuring or destroying the plants, has hitherto proved impracticable, owing to the difficulty experienced in reaching its subterranean haunts without disturbing or destroying the roots. Water, wherever it can be applied to the soil so as to saturate and keep it saturated for a time, has proved a safe and effectual destroyer, because the insect cannot live in a medium saturated with water for long. Chemical remedies, such as bisulphide of carbon, have been employed experimentally with success, but are found to be too expensive for general application on a large scale, even were the practical difficulty of conveying them into all depths of the soil and diffusing them in it surmountable. Several cases of attacks of phylloxera on vines in vineries in England have occurred since 1865.’ These attacks have been usually met by the process of ‘stamping out.’ The vines were destroyed by burning, the earth in which they grew was wholly removed, the walls of the vinery and the floor of the border on which the earth rested were thoroughly cleansed with salts or corrosives, and a fresh start was made with new earth and new vines; but while practicable to this limited extent, the remedy is obviously inapplicable to vineyards in districts collectively covering thousands of acres. In some of the French vineyards grafting the cultivated vines on certain of the native vines of America has been tried with some success. Although the insect seems to feed on the roots of these vines, the greater vigour of the American stocks appears to enable them to resist the injuries inflicted on them. Other chemicals—petroleum, tar, &c.—have been occasionally found helpful. Another method tried is the cherishing and multiplication of natural enemies of the phylloxera: these are numerous, and include *Hophlophora arctata*, *Polyxenus lagurus*, *Thrips*, *Aphidius*, &c. The extent of the disease in France is noted at France, Vol. IV. p. 774. The devastations were not serious in Austria and Portugal till 1872, in Germany till 1881; but France has suffered by far the most. Other species, including perhaps some varieties, occur on the oak, the hickory, the chestnut, and the willow.

See M. Cornu, *Études sur le Phylloxera vastatrix* (1879); J. Lichtenstein, *Histoire du Phylloxera* (1878); C. V. Riley, *Sixth Annual Report of the State Entomologist of Missouri* (1874); and L. Dreyfus, *Ueber Phylloxerinen* (1889).

Phylogeny (Gr. *phylon*, ‘race,’ and *genesis*), a biological term applied to the evolution or genealogical history of a race or tribe. It is used in contrast to ‘ontogeny’—the development or life-history of an individual; witness Haeckel's ‘biogenetic law:’ ‘Ontogeny is a recapitulation of Phylogeny.’ See Darwinian Theory, Embryology, Evolution, Heredity.

Physalia. See Portuguese Man-of-war.

Physalis. See Winter-cherry.

Physeter. See Whale.

Physicians, The Royal College of, was founded by the munificence of Thomas Linacre (q.v.), a physician and scholar. In 1518, through the influence of Cardinal Wolsey, he obtained from Henry VIII. letters-patent granting to John Chambre, himself, and Ferdinandus de Victoria, the acknowledged physicians to the king, together with Nicholas Halsewell, John Francis, Robert Yaxley, and all other men of the same faculty in London, to be incorporated as one body and perpetual community or college. They were permitted to hold assemblies, and to make statutes and ordinances for the government and correction of the College, and of all who exercised the same faculty in London and within 7 miles thereof, with an interdiction from practice to any individual unless previously licensed by the president and College. Linacre was the first president, and held the office till his death in 1524. The meetings of the College were held at his house in Knightrider Street, which he bequeathed to the College, and which until the year 1860 continued in the possession of that body. About the time of the accession of Charles I. the College, requiring more accommodation, took a house at the bottom of Amen Corner, which was subsequently purchased by Dr Baldwin Hamry, and in 1649 was given by him to his colleagues. This was the seat of the College till 1666, when it was destroyed by the great fire of London. A new College was then built in Warwick Lane, and opened in 1674 under the presidency of Harvey's friend, Sir George Ent; and here the meetings were held till 1825, when the present edifice in Pall Mall East was opened under the presidency of Sir Henry Halford.

The reason for forming the incorporation, as set forth in the original charter, is ‘to check men who profess physic rather from avarice than in good faith, to the damage of credulous people;’ and the king (following the example of other nations) founds ‘a college of the learned men who practise physic in London and within 7 miles, in the hope that the ignorant and rash practisers be restrained or punished.’ The charter further declares that ‘no one shall exercise the faculty of physic in the said city, or within 7 miles, without the College license, under a penalty of £5;’ that, in addition to the president, ‘four censors be elected annually to have correction of physicians in London and 7 miles' circuit, and of their medicines, and to punish by fine and imprisonment;’ and that ‘the president and College be exempt from serving on juries.’ Four years later, in 1522–23, an act was passed confirming the charter, and enacting that ‘the six persons beforesaid named as principals and first-named of the said commonalty and fellowship shall choose to them two men of the said commonalty from henceforward to be called and cleped Elects, and that the same elects yearly choose one of them to be president of the said commonalty;’ and further directing that, in case of a vacancy by death or otherwise, the surviving elects shall choose successors.

In 1540 an act was passed in which it was declared explicitly that ‘surgery is a part of physic, and may be practised by any of the company or fellowship of physicians’—a doctrine which in later times has been totally repudiated by the collegiate body, who, until a few years ago, would not admit to their privileges a member of the Royal College of Surgeons unless he formally resigned his surgical diploma. Other acts were passed in 1553, 1814, and 1858; the last known as the ‘Medical Act,’ providing for the granting of a new charter to the College, which was obtained in 1862. Finally, in 1860, ‘an Act to Amend the Medical Act’ was passed, which repeals the provisions of the Act of 1522–23 as to the elects, and declares that the presidency shall in future be an annual office, open to the Fellows at large, who shall also be the electing body. As at present constituted, the College consists of Fellows, Members, Licentiates, and Extra-Licentiates (in 1891, 298 Fellows 466 Members, 4037 Licentiates, and 30 Extra-Licentiates). The *Fellows* are elected from members of at least four years' standing, who have distinguished themselves in the practice of medicine, or in the pursuit of medical or general science or literature. The government of the College is vested in the president and Fellows only. The present *Members* consist of persons who had been admitted, before 16th February 1859, licentiates of the College; of extra-licentiates who have complied with certain conditions; and of persons who have attained the age of twenty-five years, and who, with rare exceptions, must be graduates in medicine of a recognised university or licentiates of the College, who do not dispense or supply medicine, and who, after being duly proposed, have satisfied the College 'touching their knowledge of medical and general science and literature.' No candidate is admissible if engaged in trade or connected with a druggist's business, or who even practises medicine in partnership with another practitioner, so long as the partnership lasts, or who refuses to publish, when required, the nature and composition of any remedy he makes use of. The *members* are alone eligible for the Fellowship. They have the use of the library and museum and the privilege of admission to all lectures; but they do not take any share in the government or attend or vote at meetings. The examiners for the membership are the president and censors. The *Licentiates* are not members of the corporation; they have access to the museum, lectures, and reading-room, but are not allowed to take books away from the library; they may compound and dispense medicines for *patients under their own care;* and in their qualifications very much resemble those who have diplomas both from the College of Surgeons and the Apothecaries' Hall. They must be twenty-one years of age, and must have been engaged in professional studies for four years before being admitted to examination. The fee for admission as a Fellow is thirty guineas, exclusive of stamp-duty; the Member's fee is also thirty guineas, and the Licentiate's fifteen guineas.

The following bylaws of the College should be generally known: (1) No Fellow of the College is entitled to sue for professional aid rendered by him. This bylaw does not extend to Members. (2) No Fellow, Member, or Licentiate of the College is entitled to assume the title of Doctor of Medicine unless he be a graduate in medicine of a university. (3) No Fellow or Member of the College shall officiously, or under colour of a benevolent purpose, offer medical aid to, or prescribe for, any patient whom he knows to be under the care of another legally qualified medical practitioner.

THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH had its rise in 1617, in an attempt to incorporate the practitioners of medicine, and raise the standard of the profession. King James I. of England looked favourably on the proposal, and granted an order for its establishment. King Charles I. also gave the matter his attention and referred it to the Privy-council, and Cromwell in like manner issued a patent in its favour; all these attempts, however, were frustrated by the religious and political dissensions of the times, and it was not until 1681 that the body became incorporated under a charter from Charles II. A new charter with many important provisions was issued in 1861. To the Physicians belongs the honour of having suggested in 1725 the plan of an infirmary in Edinburgh for the sick poor, which has developed into the present magnificent institution. From the first they undertook its medical charge gratuitously. The Royal Edinburgh Asylum for the Insane at Morningside was also first suggested by them in 1791. The College, which in 1890 had over 190 Fellows, possesses a library of upwards of 30,000 volumes, a valuable and interesting museum of materia medica, and a splendidly equipped laboratory for the purpose of aiding the prosecution of scientific research. An important arrangement was made in 1859 between this college and the Royal College of Surgeons (q.v.) of Edinburgh, making it competent for the two to combine, in order, by a joint examination, to give a double qualification, embracing medicine and surgery. In 1884 a further consolidation of the Scottish medical corporations took place, by the institution of a triple qualification, granted by the Edinburgh colleges and the Faculty of Physicians and Surgeons of Glasgow conjointly.

Physic Nut (*Curcas*), a genus of plants of the natural order Euphorbiaceæ, whose species are tropical shrubs or trees, having alternate, stalked, angled or lobed leaves, and corymbs of flowers on long stalks. The Common Physic Nut of the East Indies (*C. purgans*), now also common in the West Indies and other warm parts of the world, is a small tree or bush, with a milky juice. It is used for fences in many tropical countries, and serves the purpose well, being much branched and of rapid growth. The seeds are not unpleasant to the taste, but abound in a very acrid fixed oil, which makes them powerfully emetic and purgative, or in large doses poisonous. The expressed oil, commonly called *Jatropha-oil*, is used in medicine like croton-oil, although less powerful; it is also used in lamps. Other species are *C. multifidus* and *C. lobatus*.

Physics, or PHYSICAL SCIENCE (Gr. *physikos*, 'natural'), comprehends in its widest sense all that is classed under the various branches of mixed or applied mathematics, natural philosophy, chemistry, and natural history, which branches include the whole of our knowledge regarding the material universe. In its narrower sense it is equivalent to Natural Philosophy (q.v.), which until of late years was the term more commonly used in Great Britain, and denotes all knowledge of the properties of bodies as bodies, or the science of phenomena unaccompanied by essential change in the objects; while chemistry is concerned with the composition of bodies, and the phenomena accompanied by essential change in the objects, and natural history, in its widest sense, includes all the phenomena of the animal, vegetable, and mineral world. The use (now obsolescent) of the term *Physic* for a branch of this last—viz. the science of medicine —is not peculiar to the English language. The Old French usage recognised *physique* in the sense of medicine; while almost all languages have used some form of the word *physician* for a practitioner of the art. See SCIENCE.

Physiocratic School, a school of political economists in France headed by Quesnay and Gournay, who, in opposition to the Mercantile System (q.v.), regarded agriculture as the great source of national well-being, and sought to regulate legislation accordingly. Turgot (q.v.) was the most conspicuous member. See POLITICAL ECONOMY.

Physiognomy (from a Latin shortened form of the Gr. *physiognomōnia*), the art of judging of the character from the external appearance, especially from the countenance. The art is founded upon the belief, which has long and generally prevailed, that there is an intimate connection between the features and expression of the face and the qualities and habits of the mind; and every man is conscious of instinctively drawing conclusions in this way for himself with more or less confidence, and of acting upon them to a certain extent in the affairs of life. Yet the attempt to reach this conclusion by the application of certain rules, and thus to raise the art of reading the human countenance to the dignity of a science, although often made, has never yet been very successful. Comparisons were instituted for this purpose between the physiognomies of human beings and of species of animals noted for the possession of peculiar qualities, as the wolf, the fox, &c. The subject was prosecuted by Della Porta (died 1615), Campanella, Cardan, Ingegneri, and especially by Lavater (q.v.). Darwin's *Expression of the Emotions in Man and Animals* (1873) is regarded as the first attempt to base a rational physiognomic system on a basis of modern scientific research; Mantegazza, in *Physiognomy and Expression* (Contemp. Sc. Series, 1890), claims to have begun where Darwin left off. Piderit, in *Mimik und Physiognomik* (2d ed. 1886), proceeds on the obvious fact that the most valuable data are not to be derived from the bony framework of the countenance, but in the mobile parts which express emotion; features which constantly express the same emotion come to be stamped with permanent physiognomic characters. Pathological physiognomy is a systematised effort to diagnose mental or bodily ailments by examination of the varying facial expression. Another practical application of physiognomic study is found in what has been called *Criminology;* see Havelock Ellis, *The Criminal* (Contemp. Sc. Series, 1891).

Physiography, a term formerly used of a branch of mineralogy, was adopted by Professor Huxley as a convenient name for an exposition of the principles that underlie physical geography, and including the elements of physical science. Physiography is thus understood to involve a compendious discussion of gravitation, heat, the composition of the crust of the earth, the movements of the sea, the phenomena of the atmosphere, and many cognate subjects, treated in this work under separate heads. See Geography.

Physiologus. See Bestiary.

Physiology (Gr. *physis* and *logos*, 'discourse upon nature') is the science which treats of the behaviour of living beings, and of the functions of their parts. It is thus the sister-science to Morphology (q.v.), in which the outer form of living creatures and the structure and arrangement of their parts are considered. Both are included under the more general term Biology (q.v.). A peculiar use of the term *physis* is due to Hippocrates, who applied it to a spiritual entity which he supposed to be everywhere present, and to keep the processes of the body in order. This use of the word is still kept alive in oft-repeated phrases, as when in speaking of a sick person it is recommended that the cure be left to nature. There is an Animal Physiology, of which this article will mainly treat, and a Vegetable Physiology (q.v.); also a Comparative Physiology, which, however, is still very imperfect, for the details of the life-processes have been investigated in not more than a dozen animals. Indeed, comparative physiology consists chiefly of a series of inferences as to function from comparative morphology, and these must be often erroneous. There is a still wider science, which might be called Universal Physiology. For as all the organs of the body are mutually related, so that if one be deranged all the others will be more or less affected, so are there close relationships between the various creatures of the globe. Thus, to quote Semper, *Animal Life* (1881): 'If the American prairies were to cease to produce grass, the first result would be the utter extinction of the now numerous herds of buffaloes, and on their existence depends that of the surviving remnant of the ancient Indian population of America. If the various insectivorous birds of North America were exterminated, within a very few years beyond a doubt all the produce of the rich agricultural districts of that continent would be destroyed. If we change the mode of life of any single animal, the change will instantly have an influence on all the other animals whose healthy existence was in any way dependent on its normal function before it was altered.' The most obvious relation of this sort is that which exists between plants and animals; similar ones hold good for human beings in their relationship to other living things, and to each other. Thus we see in Political Economy,' the science which treats of the laws of human activities, a department of the science of physiology. A still wider significance might be given to the science; for in view of the fact that the intimate relations between chemical, physical, and living processes are becoming daily more evident, it would be quite consistent that morphology should deal not only with the forms of plants and animals, but also with those which the dust assumes in the crystal, pyramid, and star, while physiology would treat of the forces and chemical processes concerned.

Knowledge of the bodily functions has been gained in three ways: (1) by observing the normal states of living things; (2) by experiments upon these; (3) by studying the processes of disease. No science can advance rapidly or with certainty without experiment, and most of our precise knowledge of physiology has been gained in this way, from the time when Galen proved that the arteries during life contain blood, or when Harvey demonstrated the circulation of that blood. As an example of how we may learn from disease, we may note the discovery that the spleen produces white blood-corpuscles, following from the observation that in morbid enlargement of that organ the blood contains an increased number of these cells.

The functions of the body consist of (1) Movement, (2) Nutrition, (3) the activities associated with the Nervous System, (4) Growth and Reproduction—the latter being considered as continued growth. Movement is performed by the contraction of muscles, definitely arranged, especially with relation to the skeleton or supporting structure. Nutrition is a general term including all those processes concerned in the supply of matter and energy to the body, and the removal of waste matter. It may be considered under three headings: (1) the introduction of food into the body and its carriage to the tissues; (2) the changes of this matter within the tissues; (3) the removal of waste matters from the tissues and from the body—Excretion (q.v.). The first includes (*a*) the eating and drinking of solid and liquid food, and the intaking of oxygen, a part of Respiration (q.v.); (*b*) the Digestion (q.v.) of the food; (*c*) its absorption into the Blood (q.v.); (*d*) the circulation of the blood and its associate the Lymph (q.v.), by means of which the tissues are bathed in a stream of food, and the waste matters removed from them. The nervous system is the co-ordinator of all the processes of the body; it consists of the Brain, Spinal cord, Sympathetic system, and the associated Nerves and smaller Ganglia; in close connection with it are the sense-organs, the eyes, ears, nose, tongue, and general nerves of touch and temperature; the brain is the seat, or at all events the chief seat, of consciousness, and the 'organ' of thought and other mental processes. The functions of the body are dealt with in separate articles; here we shall give a short account of their relations to each other.

Let us first consider the life of the simplest animals. Almost invisible to unaided sight, flourishing in the stagnant water of ponds, without separate organs, they are little more than tiny masses of jelly-like Protoplasm (q.v.). Their life seems to consist in movement, nutrition, growth, and reproduction; possibly they possess the elements of consciousness. For movement a source of energy is required; this is found in their food—minute organisms, and organic particles dissolved in the water in which they live. These consist of substances of high potential energy. They are either plants which are able to utilise the energy of the sun for their growth, or remains of plants or animals which have fed upon plants (see Vegetable Physiology). Thus we see in animal protoplasm a machine for the transformation of potential energy into energy of motion. This machinery is constantly breaking down and being repaired, the protoplasmic matter is continually being replaced by new matter similarly combined. But, as the protoplasm is extremely complex, the simpler substances of the food have to be combined and recombined in a series of stuffs of increasing complexity until the complex living matter itself is formed. These combinations are supposed to be due to a ferment-like power of the protoplasm. This power it is which makes growth possible — i.e. the actual increase in amount of protoplasm. The growth of a crystal out of its solution is probably a process not utterly unlike, though much simpler. Growth of a crystal may seemingly be endless, but growth of a cell never proceeds beyond a certain point, when the process known as Cell-division occurs. The mass of protoplasm divides into two halves, and each half goes on to live as before. The necessity for cell-division arises partly from the conditions of the food-supply. Food is absorbed through the surface of the cell, but with growth the mass to be fed increases faster than surface; therefore starvation must occur at a certain stage of growth unless the cell divides. The higher animals are built up of numberless cells which have all arisen, by division, from a single cell, the ovum; but instead of becoming separated they have all kept together, joined probably by strands of protoplasm. The cells are massed into tissues and the tissues into organs, the organs having special functions. This difference in the behaviour of the cells of different parts of the body is known as Division of Labour (q.v.). We can form some idea of its origin. Imagine a cell to divide many times, but the daughter-cells to remain loosely joined together; the outer and inner cells would live under different conditions and would assume different functions. The whole story of the evolution of life, both in the origin of individual forms and in the growth of nations, is simply the process of the division and organisation of labour. For just as an organism is a collection of cells, each having its own life, yet all bound together for mutual service, so is a nation a collection of individual men and women. And as the perfection of an animal is measured by the completeness of the division of labour among its cells, so is the civilisation of a nation measured by the harmony of organisation of its labour. Further, just as there have been many species of animals which have appeared, lived for a time, and then given place to higher species, so there have been civilisations which have flourished for a time and then died away. Any fairly complex civilisation will serve as a type of the division of labour in the body of one of the higher animals. First there are the persons concerned in the getting of food, like the limbs and mouth of an animal. Then the food is prepared for use by other labourers; such are the digestive organs of the animal. The food has to be distributed to all members of the community by merchants and carriers; the blood and the blood-vessels perform this function. The whole community has to be warned of dangers, directed and governed, and made to act harmoniously by the statesmen of a nation; the same things are done by the sense-organs, brain, and nervous system of an animal.

We have already noted that the source of all the energy of an animal lies in its food. We know that this is either burned as it were within the tissues, used as fuel for the protoplasmic machinery, or used to keep that machinery in repair; in either case the food-stuffs have to be prepared before they can be used. Such preparation is called *digestion*, which consists in making the solid food-stuffs soluble. The digested food is absorbed into the blood, and all of it, except the fat, is carried direct to the liver. This organ, amongst other functions, regulates the composition of the blood; thus, it stores the sugar in its cells, and gives it out as the other tissues require. Muscular tissue is the great consumer of sugar, which is to the cells what coal is to the steam-engine. But there is another and most important food-stuff that requires no digestion. This is oxygen, which is needed by the protoplasm for its life, and also for the burning of fuel within the living machinery to get heat and energy of motion. The oxygen is held in the Blood (q.v.) by means of a special substance which greedily absorbs it from the air in the lungs, and yet gives it up readily to the protoplasm of the tissues. The blood as is well known circulates round and round the body, pumped by the heart. It is a stream of food material by which each cell of the tissues is fed. For each cell is close to a capillary, which is a very thin walled blood-vessel, through which the fluid food oozes, and thus bathes the tissues. The matter which has thus passed out of the blood-vessels is collected into another system of vessels, the lymphatics, and eventually emptied into one of the great veins. The lymph stream is also the drain into which is thrown by each cell the waste products of its activity. The carbonic acid that is formed in the tissues is carried away by the blood, and escapes out of the system from the lungs. Some of the useless water is also got rid of in the same way, and some more of it is sweated out by the glands in the skin; the rest is filtered out of the blood by the kidneys. There are many other waste matters besides carbonic acid and water. These are to a large extent prepared for excretion in the liver, and to some extent actually taken out of the blood by that organ, being poured into the intestine, mixed with other matters, dissolved in a fluid called Bile (q.v.). They are all taken out of the blood by the kidneys, and cast out of the body along with the water filtered out by the same organs, as urine.

This finishes our sketch of the labours of the inferior members of the cell community. The more skilled workmen are the cells of the sense-organs and the nervous system; these are described in other articles. As has been noted, their function is to inform the community of what is going on in the outside world, and to keep in harmony all the diverse labours of the various organs.

The function of Reproduction is treated in that article. There remains only the duration of life to consider and the fact of death. The general theory of the length of life is set forth in the article on longevity. The usual view of death is that it is inherent in living matter; that there is some cause which renders the cells of the body, after a certain period of life, and after a certain number of divisions, less and less able to nourish themselves, to continue dividing, and to keep the body in repair. Recently it has been suggested by Weismann that death has been evolved by natural selection as a preventive against the continuance in life of maimed individuals (for no one can escape slight injuries) that would be only a burden to the species.

For Comparative Physiology, see the articles on the various functions and groups of animals.

The History of Physiology, in its limited sense as the study of the life-processes of individual organisms, is the history of an ever-deepening analysis. The science begins with the study of the general habits of animals; the life-processes are then resolved into the functions of the various organs, the organs are analysed into their component tissues, the tissues into cells (see CELL), and lastly, the essential constituent of the cell is discovered in Protoplasm (q.v.). The last three stages, beginning with the analysis of organs into tissues, have been developed within the last hundred years. The history looked at from this point of view is enlarged upon in the article BIOLOGY; here we shall give a history of a more detailed nature. Preyer divides it into five periods—(1) the speculative period; (2) that associated with the name of Aristotle; (3) headed by Galen, (4) by Harvey and Haller, and (5) by Müller. The first period opens with the beginning of medical science in India, China, and Egypt. The Jews were acquainted with many laws of practical hygiene and dietetics. Then came the philosophers of Greece. Matter was supposed to consist of four elements, fire, air, earth, and water. The essence of life was referred first to one and then to another of these elements by various philosophers: by Thales to water, by Anaximenes to the air, by Xenophon to the earth, by Pythagoras to fire or heat. Hippocrates, the father of medicine, about 450 B.C., was the first to proceed in a purely rational spirit. Observing carefully the facts of disease, he strove to found the art of medicine upon the results of experience. He attributed diseases to natural causes, and not to special visitations of the gods; and as already noted, he postulated a spiritual essence universally diffused; this he called Nature, Physis, and to this he ascribed the maintenance of things in their normal state, and their restoration if disturbed. The second period is headed by Aristotle, the father of natural history, about 350 B.C. He dissected many animals, and attempted to discover the uses of the various parts. It is difficult to estimate correctly the exact value of Aristotle's work in physiology; it must be measured more by the methods of research which he initiated than by the actual results achieved. Thus, to give an example of his ideas on the subject, the heart he imagined as the seat of the 'rational soul;' the nerves he supposed to arise in the heart; of their function he was ignorant. What is perhaps more surprising is that he described the brain as an inert viscus, cold and bloodless, whose only function was to cool the heart, and not comparable in importance to the other organs of the body. Erasistratus, the grandson of Aristotle, about 300 B.C., was perhaps the first to carefully dissect the human brain. He traced the connection of nerves with it, and even noticed that the complexity of the convolutions of the gray matter was greatest in man, and that they were to some extent a measure of the intelligence. The next 400 years were barren of any useful advance; the practice of medicine reached perhaps its lowest point. The literature is occupied with discussions as to the 'animal and vital spirits,' terms used before Aristotle to express the powers of living things. The animal spirits were those that ruled over those actions of living things that were supposed to be quite different from anything that takes place in things not living, while the vital spirits were those that were concerned in those processes going on in the body which were the result of purely chemical and physical laws. We no longer discuss whether the vital spirits live in the heart and the animal in the brain, but we have not yet settled the exact relationship between the processes of the living world and those of inorganic matter.

About 150 A.D. Galen, a Roman, revived the sounder method of experimental inquiry; he is the leader of the third period. He perceived that mere dissection of dead animals gives no infallible information as to the functions of the living, and accordingly performed many experiments upon living animals. He proved that during life the arteries contain blood and not air, as was thought to be the case up to that time, by simply opening a vessel of a living animal. He also directed much of his study to the brain and nervous system. He was the first to state definitely that the brain, spinal cord, and nerves are the organs of sensation, intelligence, and the originators and guides of properly ordered voluntary movements; and he finally refuted the doctrine of Aristotle by showing that the brain was hot and not cold, and by arguing also that if it were a mere cooler of the blood it need not be elaborately organised. He pointed out that the brain was of the same substance as the nerves, but softer, 'as it should necessarily be, inasmuch as it receives all the sensations, perceives all the imaginations, and then has to comprehend all the objects of the understanding, for what is soft is more easily changed that what is hard.' He discovered also that the nerves of sensation and of motion are distinct, and thus explained the double supply of nerves to the tongue and eyes. For centuries Galen exercised an undisputed sway over the practitioners of medicine and the students of allied philosophy.

Some centuries afterwards the so-called Arabian physiology arose. Avicenna, about the year 1000, was its chief exponent. Once more, however, the discussions were about the nature and residence of the animal and vital spirits. Albertus Magnus, in the 13th century, and Paracelsus, in the 15th century, are representatives of mediæval mysticism. About the same time, during the revival of learning, the mathematicians and chemists were busy seeking to explain bodily functions in terms of mechanical, chemical, and physical laws. In the 16th century Villanovanus described correctly the action of the lungs as purifiers of the venous blood. The study of human anatomy was revived by Vesalius in Italy, and continued by Fabricius; and in the beginning of the 17th century Harvey, who had studied in Italy, made perhaps the most important of all physiological discoveries, that of the circulation of the blood.

This discovery inaugurates the fourth period of the history of physiological research; by it a sound foundation for the whole science was laid, and the development of surgery and medicine made possible. Then, after the invention of the microscope, came many active investigators; among them may be mentioned Malpighi and Leeuwenhoek; and thus the foundations of Histology (q.v.) were laid. Haller, near the end of the 18th century, gave to physiology the form that it now possesses. He attempted to discard from the science all statements of a vague and mystical character, he added many minor discoveries to the store of facts, and ranged the whole in a logical sequence.

The great leader of the fifth period, Johannes Müller, during the first half of the 19th century, gave to the science a greater width. He connected as one philosophy the truths of chemical physics, comparative anatomy and physiology, and embryology. Embryology was founded as a science by Von Baer. Cuvier developed comparative anatomy, and thus gave a foundation to the study of comparative physiology. Lamarck enunciated the laws of evolution. Berzelius placed animal chemistry upon a sound basis. The discovery of the mechanical equivalent of heat by Joule, the enunciation of the cell-theory by Schleiden and Schwann, and the discovery of protoplasm as the essential constituent of the cells by Von Mohl and Du Jardin are the great steps which have placed us in our present position. The discovery of reflex action by Marshall Hall, of inhibitory nerve action by Weber, and of the glycogenic function of the liver by Claude Bernard mark important advances. With the work of this last mentioned the physiology of Protoplasm (q.v.) begins. The conception of evolution, rendered acceptable by Darwin's work, is the great harmoniser of all science.

This history of physiology may be shortly summarised as follows. Even to early inquirers it was obvious that many of the life-processes of animals are the result of the action of a set of machines, which, as we know, were supposed to be kept in action by the 'vital spirits.' These machines were called organs, and the work performed was spoken of as their functions. The whole body was conceived of as made up of various organs, and the labours of physiologists were directed towards discovering their functions, a work which to this day is incomplete. This may be called the first phase of physiological philosophy; it lasted until the promulgation of the cell-theory and the rapidly following discovery of protoplasm. The idea of protoplasm is to natural science of nearly as much importance as the doctrines of the conservation of matter and energy are in chemistry and physics. The chief labours of physiologists for a very long time will be directed towards attaining exact conceptions of the nature of this protoplasm in terms of chemistry and physics. The old question of animal and vital spirits is still unsolved; we are not able to say whether there is any abrupt distinction between ordinary matter and that which is called living matter, and which forms 'the physical basis of life.' Is it merely that living matter is more complex and unstable than ordinary matter, and therefore far more sensitive to external impulses in the form of ethereal and molecular vibrations; or is there some special vital force at work? If we fully understand the first theory we shall probably believe that there is no such vital force. At any rate the surest path to its discovery lies in determining how far the *objective* phenomena of life are explicable in terms of ordinary chemical and physical laws. When we find any activity of living matter which we can be certain cannot be so explained, then, and not till then, may we postulate a vital force. Supposing such a discovery ever to be made, it is necessary to observe that it will merely widen our chemistry and physics. The discussion of the subjective consciousness of life is an entirely separate one. Ordinary philosophy postulates two entities, matter and spirit; Materialism holds that matter when it reaches a certain stage of complexity becomes conscious; Monism, which is becoming the fashionable scientific creed, teaches that matter in motion and consciousness are the two sides—one seen from without, the other felt from within—of a single entity.

We may fitly close by quoting Foster's statement of the present problems of physiology. He speaks of them as threefold. '(1) On the one hand, we have to search the laws according to which the complex unstable food is transmuted into the still more complex and still more unstable living flesh, and the laws according to which the living substance breaks down into the simple, stable, waste products, void, or nearly void, of energy. (2) On the other hand, we have to determine the laws according to which the vibrations of the nervous substance originate from extrinsic and intrinsic causes, the laws according to which these vibrations pass to and fro in the body, acting and reacting upon each other, and the laws according to which they finally break up and are lost, either in those larger swings of muscular contraction or in some other way. (3) And lastly, we have to attack the abstruser problems of how these neural vibrations, often mysteriously attended with changes of consciousness, as well as the less subtle vibrations of the contracting muscles, are wrought out of the explosive chemical decompositions of the nervous and muscular substances—i.e. how the energy of chemical action is transmuted into, and serves as the supply of that vital energy which appears as movement, feeling, thought.'

See, besides the articles named above and at ANATOMY, those on ANIMAL, ANIMAL CHEMISTRY, ANIMAL HEAT, DIET, FOOD, DEATH, LIFE, &c.; the elementary primer of physiology by Michael Foster; the elementary text-book by Huxley; text-books by Foster (5th ed.), Landois and Stirling, M'Kendrick; *Physiological and Pathological Chemistry*, by Bunge, trans. by Wooldridge (1890); *Chemical Physiology and Pathology*, by Halliburton (1891); *Comparative Physiology and Anatomy*, by Jeffrey Bell (1887); *Ency. Brit.* article 'Physiology,' by Foster.

Physostigma. See CALABAR BEAN, the alkaloid of which, a valuable drug, is called Eserin or Physostigmin.

Physostomi. See BONY FISHES.

Phytelephas. See IVORY (VEGETABLE).

Piacenza, a city of Northern Italy, on the right bank of the Po, a little below its confluence with the Trebbia, by rail 43 miles SE. of Milan and 35 NW. of Parma. Situated at the end of the Via Æmilia and at the last convenient crossing-place eastwards on the Po, it has always been an important city, both strategically and commercially, since its foundation (as *Placentia*) by the Romans in 219 B.C. It is defended with bastioned walls and an outer ring of forts. Its streets are broad and regular, but many of them unfrequented and grass-grown. The cathedral, in the Lombard-Romanesque style (1122–1233), has an immense crypt, a campanile 223 feet high, and paintings by L. Carracci, Guercino, and others. The church of Sant' Antonino, the original cathedral, was founded in 324, but has been several times rebuilt. The church of Santa Maria della Campagna is adorned with fine frescoes by Pordenone; and it was for San Sisto that Raphael painted the celebrated Sistine Madonna, sold in 1754 by the monks to Frederick Augustus of Saxony. Among the other buildings are the Palazzo Farnese (1558), once a sumptuous edifice, but since 1800 in use as barracks; the communal palace (1281), its lower story built of marble and the upper of brick; the palace of justice, and others. A couple of miles to the east of the city is the theological seminary founded by Cardinal Alberoni. The municipal library contains 120,000 volumes. The principal square is adorned with colossal bronze equestrian statues of Alessandro and Ranuccio Farnese. Manufactures of silks, cottons, pottery, hats, &c. are carried on. The more notable facts in the history of Piacenza have been its capture by the Gauls in 200 and by Totila in 546, the meeting here of two church councils in 1095 and 1132, its active zeal as a member of the Lombard League in the 12th century, the sacking of it by Francesco Sforza in 1447, and its union with Parma (q.v.). Pop. 38,821.—The *province* has an area of 909 sq. m. and an estimated pop. (1894) of 229,461.

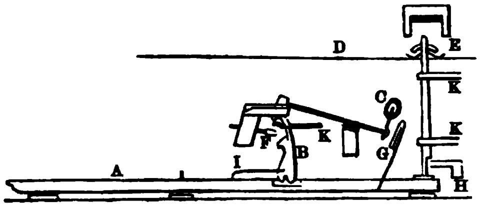
Pia Mater. See BRAIN.

Piana Dei Greci, a town of Sicily, 10 miles SW. of Palermo. It was the chief Albanian colony in Sicily in the 15th century.

Pianoforte (Ital. *piano*, 'soft,' and *forte*, 'loud'), a stringed musical instrument, played by keys, developed out of the clavichord and Harpsichord (q.v.), from which the pianoforte differs principally in the introduction of hammers, to put the strings in vibration, connected with the keys by a mechanism that enables the player to modify at will the intensity of the sounds; whence the name of the instrument. The invention of the pianoforte must be accredited to Bartolomeo Cristofali, a native of Padua, who produced his instrument in 1714. Other claimants to the honour are a German organist of the name of Schröter, and Marius, a French harpsichord maker. The first pianoforte seen in England was made at Rome by Father Wood, an English monk there. In Germany the invention met with more rapid encouragement and development than in Italy. The Silbermanns in Strasburg and Stein of Augsburg improved the discoveries of their countryman Schröter, and many Germans are found to maintain that the pianoforte is an independent invention indigenous to the Fatherland. In England the manufacture of the instrument was at first chiefly in the hands of foreigners, principally Italians. Italian pianoforte-makers opened many shops, but the English makers ultimately rivalled and surpassed them. The English pianoforte has been brought to its present state of perfection by Broadwood, Collard, Brinsmead, and others. Erard made many improvements in France; Germany has long been famous for its pianos, including those of Bechstein; and the American pianos of Steinway and Chickering are well known.

The compass of the early pianoforte was, like that of the harpsichord, four to five octaves, and has gradually increased to seven octaves, or occasionally more. The most natural of the various forms which the instrument assumes is that of the grand pianoforte, derived from the harpsichord, with the strings placed horizontally, and parallel to the keys. The strings are stretched across a compound frame of wood and metal, composed of bars, rods, and strengtheners of various kinds—appliances necessary to resist the enormous tension. This framework includes a wooden sound-board. The mechanism by which hammers are connected with the keys is called the *action* of the instrument. In the earliest pianofortes the hammer was raised from below by a button attached to an upright wire fixed on the back-end of the key. The impulse given to the hammer caused it to strike the string, after which it immediately fell back on the button, leaving the string free to vibrate. This was called the *single action*. As the hammer, when resting on the button with the key pressed down, was thus necessarily at a little distance from the string, the effectual working of this action required that a certain impetus should be communicated to the hammer to enable it to touch the string. Hence it was impossible to play very piano, and it was found that, if the hammer was adjusted so as to be too close to the string when resting on the button, it was apt not to leave the string till after the blow had been given, thereby deadening the sound. This defect was remedied by a jointed upright piece called the *hopper*, attached to the back-end of the key, in place of the wire and button. When the key was pressed down the hopper, engaging in a notch in the lower side of the hammer, lifted it so close to the hammer that the lightest possible pressure caused it to strike; and at this moment, when the key was still pressed down, the jointed part of the hopper, coming in contact with a fixed button as it rose, escaped from the notch, and let the hammer fall clear away from the string. To prevent the hammer from rebounding on the string a projection called the *check* was fixed on the end of the key, which caught the edge of the hammer as it fell, and held it firmly enough to prevent it from rising. A necessary part of the action is the *damper*, which limits the duration of each particular note, so as to cause it to cease to sound as soon as the pressure is removed from the key. It consists of a piece of leather resting on the top of the string and connected with the back-part of the key by a vertical wire. When any key is pressed down its damper is raised off the string, so as to allow the sound produced to be clear and open; but immediately on the finger being lifted off the key the damper-wire falls, and the damper again presses on the string, muffling and stopping the vibration. The pianoforte possesses two pedals, the loud and the soft. By the former the dampers are raised, the result of which is to prolong the sound of the notes and cause them to run into one another. The employment of this pedal is designated by the word *ped.* written below the treble staff, while an asterisk is used to denote its cessation. The soft pedal, on the contrary, diminishes the sound, by removing a string from the impact of each of the hammers. Its employment in the music is denoted by the words *una corda*. One further frequent and important addition to the action may be alluded to. In the mechanism above described the key must rise to its position of rest before the hopper will again engage in the notch of the hammer for another stroke; hence a note cannot be repeated until time has been allowed for the full rise of the key. The *repetition action* is a contrivance, varying in different instruments, for getting rid of this defect by holding up the hammer at a certain height while the key is returning.

Great difference of detail exists in the actions of different makers. Some are more complicated than others; but in all are to be found the same essential parts, only modified in shape and arrangement. The subjoined figure represents one of the simplest grand pianoforte actions now in use. A is the key; B, the lever which raises the hammer; C, the hammer; D, the string; and E, the damper: F is the button which catches the lever after it has struck the hammer; G, the check; H, the damper pedal-lifter; I, the spring; and K, K, K are rails and sockets. Formerly the strings of the pianoforte were all of thin wire; now the bass-strings are very thick, and coated with a fine coil of copper-wire; and the thickness, strength, and tension of the strings all diminish from the lower to the upper notes. A grand pianoforte has three strings to each of the upper and middle notes, and now, generally, only two to the lower notes, and one to the lowest octave. When the soft pedal is pressed down the hammers are shifted sideways, so as to strike only two strings instead of three, or one string instead of two.



Besides the full or concert grand, there is the semi-grand or square piano with curtailed keyboard, now superseded by the cottage piano, of which the upright grand is merely a larger form. In the cottage piano the strings run vertically from top to bottom of the instrument; and the difference in form necessitates alterations in the details of the action, but the general principle is the same. The pianette, a small form of the cottage, has also come into great favour. The pianoforte has attained a widespread popularity, owing chiefly to the fact that it can render harmony; though the violin is proving a serious rival to it in domestic circles. In England the manufacturers who have for some time past enjoyed the highest repute are Messrs Broadwood, Brinsmead, and Kirkman. Messrs Brinsmead have lately introduced a patent pianoforte called the *Sostenente*, in which, by a number of hammers playing consecutively on a string, and so closely as to cause no interruption in the sound, any note may be sustained (whence the name *sostenente*) for an indefinite length of time, and the same solemn and majestic effect may be produced upon the pianoforte which has heretofore been confined exclusively to the organ. The latest development to which the pianoforte has been carried is that introduced by an Austrian of the name of Janko. A great number of his pianos are now being made. Recognising the complete change which has passed over pianoforte music since the days when Mozart and Haydn wrote and, so to speak, created the literature of the instrument, Herr Janko has endeavoured to adapt the piano to the long stretches, chords, and difficult arpeggios which are the characteristics of modern playing, and were utterly unknown, or rather unemployed, in the days of the classical writers. Accordingly, he constructs his pianos with six keyboards, which rise in tiers above one another in the manner of an organ. The notes are so grasped that tenths and twelfths can be easily spanned by reaching a finger to a keyboard above or below that on which the hand is travelling; and, with a sweep of the wrist, which would scarcely cover more than two octaves on the old keyboard, an arpeggio can be executed through the whole compass of the piano's notes. The objections to Herr Janko's improvement come mainly not from the public but from the music publishers; for, while to a beginner on the instrument it is immaterial what system of fingering be adopted, publishers are naturally jealous of a new pianoforte which would render useless and compel complete remodelling not only of all the fingering, but perhaps of the staff.

Music for the pianoforte is written in two staves, and with the treble and bass clefs. Many of the most eminent musicians have devoted themselves to composing for the pianoforte, and some composers of note, as Hummel, Chopin, Thalberg, and Heller, have almost entirely confined themselves to that instrument. Amongst the greatest modern pianists have been Madame Schumann, Liszt, and Rubinstein. See Rimbault, *The Pianoforte* (1860); Grove's *Dictionary of Music and Musicians;* and the histories of music and of musical instruments (such as Hopkins's *Musical Instruments*, 1887).

Piarists, or 'Fathers of the Pious Schools,' a religious congregation for the education of the poor, founded at Rome in 1617 by a Spanish priest, Joseph of Calasanza, and confirmed in 1621 by Gregory XVI. They were chiefly active in Poland and Austria.

Piassava. See FIBROUS SUBSTANCES.

Piastre (Gr. and Lat. *emplastron*, 'a plaster;' in the Romance languages, anything spread out or flattened, 'a plate,' 'a coin'), an old Spanish silver coin worth about 4s. It was divided into 8 silver reals, and hence was termed a *piece of eight*, the name invariably applied to it on the Spanish Main (see DOLLAR). The Italian piastre, or *scudo*, was an imitation of the Spanish coin, and was nearly equal to it in value. The Turkish piastre is a silver coin worth about 2d. in English reckoning and 4 cents in United States currency. Usually 125 piastres = £1 sterling and 100 = 20 francs. The lira contains 100 piastres. Pieces of 1, 2, 5, 10, and 20 piastres are struck in silver.

Piastre.

Piatigorsk, a town in Russian Caucasia, at the southern foot of Mount Beshtau (4587 feet), facing Mount Elburz and the Caucasus Mountains, and 124 miles by rail NW. of Vladikavkaz, is celebrated for its sulphur-springs. Ranging from 83·7° to 117·5° F. in temperature, they are useful for abdominal and rheumatic affections. Pop. 13,665.

Piatra, a town of Moldavia, 60 miles W. by S. of Jassy, romantically situated on the Bistritza, at the (eastern) foot of the Carpathians, has a trade in timber and a pop. of 13,890.

Piazza (more fully *Piazza Armerina*), an episcopal town of Sicily, 16 miles SE. of Caltanisetta. Pop. 17,038.

Piazzi, GIUSEPPE, Italian astronomer, was born at Ponte in the Valtelline, July 16, 1746, and entered the order of the Theatins at Milan in 1764. After holding professorial chairs of Philosophy, Mathematics, and Theology at Genoa, Malta, Ravenna, and Rome, he was appointed in 1780 to the chair of Mathematics in Palermo; and there, with the aid of government, he established an observatory in 1789. The first task he set himself to was to make a catalogue of the stars, published in 1803, and again extended in 1814. On the night of the 1st January 1801 he discovered a new planet, the first of the group of planetoids between Mars and Jupiter, and named it Ceres. He died, 22d July 1826, at Naples.

Pibroch (Gaelic, *Piobaireachd*, 'a pipe tune'), a form of bagpipe music, generally of a warlike character, including marches, dirges, &c. According to Sir Walter Scott, connoisseurs in pipe-music affect to discover in a well-composed pibroch the imitative sounds of march, conflict, flight, pursuit, and all the current of a heady fight. The rhythm is very irregular and difficult for a stranger to follow, but when played by a good piper it has a very powerful effect. The earliest mention of the military music of the bagpipe is in 1594 at the battle of Glenlivet, but the various pibrochs belonging to the different clans are mostly of modern composition.

See Macdonald, *Ancient Martial Music of Caledonia* (about 1805); Mackay, *Collection of Ancient Piobaireachd, or Highland Pipe Music* (1838); and Glen's *Collection of Piobaireachd.*

Picardy (*Picardie*), an ancient province in the north of France, was bounded on the W. by the English Channel, and on the E. by Champagne. The capital of this province was Amiens. The territory now forms the department of *Somme*, and portions of the departments of *Aisne* and *Pas-de-Calais*.

Picaresque. See NOVELS.

Picayune, a name derived from the Carib language, and used in Louisiana for a small coin worth 6¼ cents, current in the United States before 1857, and known in different states by various names (fourpence, fippence, fip, sixpence, &c.).

Piccolo. See FLUTE.

Piccolo'mini, an old and distinguished family of Italy, settled at Siena, who subsequently obtained possession of the duchy of Amalfi. It produced numerous celebrated *littérateurs* and warriors, one pope (see PIUS II.), and several cardinals. One of the most illustrious members of this family was OTTAVIO, Duke of Amalfi, born in 1599. He entered the Spanish military service, and, being sent to aid the Emperor Ferdinand II., fought against the Bohemians at the battle of the Weisse-Berg (1620), then in the Netherlands, and after that in Wallenstein's army at Lützen (1632). He was one of the chief agents in effecting the fall of the all-powerful general, by betraying his secrets to the emperor. Then he greatly distinguished himself in the battle of Nördlingen (1634). In the following season he was sent to aid the Spaniards in the Netherlands, and speedily drove out the French, but had not much success against the Dutch. He was withdrawn by the emperor in 1640 to stay the Swedes, who, under Banér, were threatening the hereditary possessions of Austria. This purpose he accomplished; but, though he was successful against these northern invaders in the Palatinate, he was worsted in Silesia by Torstenson. Returning to the Spanish service in 1643, he was sent again to the Netherlands to take the command of the Spanish troops. But his success was not nearly so decisive as before, the prestige of the Spanish infantry having been destroyed by Condé at Rocroi (1643). After the signing of the peace of Westphalia (1648) Piccolomini was created a field-marshal by the emperor, and was sent as plenipotentiary to the Congress of Nuremberg (1649). He died at Vienna, 10th August 1656, leaving no children; his son Max, who figures in Schiller's *Wallenstein*, is only a poetical fiction.

Pic du Midi, a summit of the Pyrenees, 9466 feet high, in the south-east corner of the French department of Basses-Pyrénées.

Pichegru, CHARLES, French general, was born a labourer's son at Arbois in Jura, 16th February 1761, and was educated by the Minorite friars at Arbois and at the college of Brienne. He enlisted into an artillery regiment in 1783, and showed such capacity and courage on the Rhine in the fiery service of the young republic that by 1793 he was a general of division. In October of that year he was given supreme command on the Rhine, and in conjunction with Hoche and his army of the Moselle he drove back the Austrians, relieved Landau, and overran the Palatinate. Next year he continued his career of triumph in the Netherlands, and showed in three campaigns within one year consummate generalship and a fortunate audacity worthy of the great Napoleon. After by swift movements defeating the Austrians in detail, he broke their forces at Fleurus, June 27, 1794, and, continuing the struggle into the winter, crossed the Meuse and the Waal on the ice, entered Amsterdam, January 20, 1795, and soon occupied the whole of Holland. During this campaign occurred the famous capture by the French hussars of the Dutch ships frozen in the Helder. Recalled to Paris by the Thermidorians, the 'Sauveur de la Patrie' crushed an insurrection of the *faubourgs* at Paris, 1st April 1795, next proceeded to the Rhine, and took Mannheim. But at the height of his fame he turned traitor, and sold himself for vast promises to the Bourbons. With deliberate treachery he remained inactive before the enemy, and allowed Jourdan to be defeated. The Directory becoming suspicious superseded him by Moreau, and Pichegru retired to Arbois. In 1797 he took his place, first as member, next as president, of the council of Five Hundred, and continued his Bourbon intrigues, but on the 18th Fructidor (4th September) was arrested and deported to Cayenne. Escaping in the June of next year, he made his way to London, was attached to the Austro-Russian army in 1799, and thereafter lived in Germany and England until the formation of the Bourbon conspiracy of Georges Cadoudal (q.v.) for the assassination of the First Consul. The pair reached Paris secretly, but found it impossible to gain over Moreau. They were soon betrayed to the police, and Pichegru was seized in bed and carried to the Temple, February 28, 1804. Here, on the morning of the 6th April, it was found that he had anticipated justice, and ended his dishonoured life with his own hands. The traitor knew that he had justly forfeited his life to his country's laws, and there is no justification for the royalist slander that he was made away with by Napoleon.

See the Lives by Gassier (1814), Pierret (1826), Bouziers (Dôle, 1870); also the *Mémoires* by Montgaillard (1804).

Pichiciago. See CHLAMYDOPHORUS.

Pichincha ('boiling mountain'), the most populous province (187,844 in 1885) of Ecuador, embraces the Quito plateau and its slopes. Area, 8300 sq. m. The soil is fertile in the west. The province takes its name from the active volcano of Pichincha, 8 miles NW. of Quito, the chief town. It has five peaks, two of which (15,918 feet) Mr Whymper ascended in 1880. The enormous crater, nearly a mile across at the top and perhaps 1500 feet in diameter at the bottom (which is 2500 feet below), is said to be the deepest in the world.

Pichler, KAROLINE, novelist, was born 7th September 1769, at Vienna, her maiden name being Greiner; and between 1800 and her death, 9th July 1843, published novels and dramas sufficient to fill a collected edition of 60 volumes, of which the most notable are *Agathokles* (1808), *Frauenwürde* (1808), and *Die Belagerung Wiens* (1824). Her autobiographical *Denkwürdigkeiten* (1844) fill 4 vols.

Pickerel. See PIKE.

Pickering, a market-town in the North Riding of Yorkshire, 32 miles NNE. of York. It has a fine ruined castle, which was Richard II.'s first prison, and was dismantled by the Roundheads, and an interesting parish church. Pop. (1881) 3931; (1891) 3676.

Pickles, a term generally applied to vegetables preserved in vinegar, with or without spices; though pickled applies to animal food preserved in salt (see PRESERVED PROVISIONS). The vegetables most pickled in Britain are cabbage, cauliflower, gherkins or young cucumbers, French beans, onions and eschalots, walnuts, mushrooms, and nasturtiums. *Piccalilly* or Indian pickle is made of cucumber, cauliflower, mustard-seed, and flower of mustard. For the methods of preparing pickles reference must be made to a cookery-book. Capers (q.v.) are imported; also olives preserved in brine and in vinegar, and several preparations of the mango fruit. The food value of pickles as a condiment is touched on at DIET, Vol. III. p. 809; and for adulterated pickles, see ADULTERATION.

Pico. See AZORES.

Pico della Miran'dola, one of the most curious figures in the history of the Renaissance, was born in 1463, and was the son of Francesco Pico, Count of Mirandola and Concordia in the Modenese. He was a wonderfully precocious boy, and in his youth he visited the chief universities of Italy and France. In 1486 he issued a challenge to all comers to engage with him in public discussion at Rome, but the debate was forbidden by the pope on the score of the heretical tendency of certain of the nine hundred theses which Pico had offered to maintain. An *Apologia* which he issued in his defence exposed him to considerable persecution until Alexander III. in 1493 absolved him of the charge of heresy. He spent much of his life in travelling, and became known as a generous benefactor of the poor. He was an intimate friend of Politian and Lorenzo de' Medici. He died of fever in 1494, and Savonarola, who had been anxious to enrol him among the Friars Preachers, vested him after death in the habit of the order. Mirandola was the last of the schoolmen. He endeavoured to reconcile the Catholic theology with mediæval philosophy, and his works are a bewildering compound of mysticism, scholasticism, and recondite knowledge. He interpreted the Mosaic text by the Neoplatonic doctrine of the microcosm and the macrocosm, and maintained that in natural magic lay the strongest testimony to the truth of the Gospels. He appealed to the authority of the Cabbalists and Pythagoreans as well as to the Apostles; he exhibited, along with a childlike credulity, an argumentative ingenuity worthy of the subtlest schoolman. He was a humanist as well as a theologian, and was the author of various Latin epistles and elegies and of a series of florid Italian sonnets. His writings are of little value, but the magic of his personality survives. A theologian and an erotic poet, a philanthropist, a scholar, and a traveller, an adherent at once of Duns Scotus and of Politian, he was one of the most chivalrous, generous, and versatile of men; his character is as engaging as it is curious and complex.

See *G. P. della Mirandola*, his life by his nephew (trans. by Sir Thomas More; Nutt, Lond. 1890), and Pater's *Studies in the Renaissance*.

Picotee. See CARNATION.

Picquet. See PIQUET.

Picric Acid (Trinitrophenol), $C_6H_2(NO_2)_3OH$. This substance appears in the form of pale yellow crystalline scales. It is obtained by the action of nitric acid on phenolsulphonic acid. Equal parts of phenol and concentrated sulphuric acid are mixed together, and placed in a suitable vessel, which is heated till the mixture reaches 212° F. (100° C.). Nitric acid of the specific gravity 1·3 is then added. On cooling, a crystalline mass is produced which is filtered and drained. A washing with cold water follows, and then the picric acid is further purified by recrystallising it from water containing a small proportion (0·1 per cent.) of sulphuric acid. Picric acid is easily soluble in hot, but only slightly in cold water. It is also soluble in alcohol and ether. Its taste is intensely bitter, and its tinctorial power is very great, the solutions of it having a strong yellow colour (see DYEING, Vol. IV. p. 141). It has been much used for dyeing silk, wool, and leather. As it does not adhere by itself to vegetable fibre, it serves for a test to distinguish cotton from wool or silk. The presence of cotton in a mixed fabric can therefore be detected by steeping it in a hot solution of the acid, and afterwards washing it. Then, with the aid of a microscope, the difference between the wool or silk, both of which retain the dye, and the cotton, which does not, will be made clear. Picric acid is poisonous, and its ammonia salt is used as an ingredient in explosives (see MELINITE). It was formerly called Carbazotic Acid.

Picrite, one of the peridotites or olivine-rocks. It is particularly rich in olivine. The other principal minerals are augite and plagioclase. Magnetite or ilmenite, or both are generally present. Biotite occurs not infrequently, and apatite occasionally. The rock is often more or less altered into serpentine.

Pictet, ADOLPHE (1799-1875), a native of Geneva, and a writer on the Celts and the primitive Aryans. To the same Genevese family belong Marcus Auguste Pictet (1752-99), physicist; François Jules Pictet (1809-72), zoologist and palæontologist; and Raoul Pictet, chemist and physicist, known in connection with the liquefaction of oxygen.

Picton, SIR THOMAS, British general, was born in August 1758, at Poyston in Pembrokeshire, entered the army as ensign in the 12th Foot in 1772, and two years later joined his regiment at Gibraltar. In 1794 he went out to the West Indies, and was given a command under Sir John Vaughan. He took part in the conquest of several islands of the West Indies, including Trinidad, and was appointed (1797) governor of the last named, being shortly afterwards raised to the rank of general. In 1803 he was superseded, but immediately after appointed governor of Tobago. He found it necessary, however, to return to England, to take his trial on a charge of having permitted, under the old Spanish laws, a female prisoner to be tortured. He was found guilty of sanctioning unlawful torture; but on appeal he was in a new trial acquitted. He saw active service again in the Walcheren expedition (1809), and was made governor of Flushing after its capture by the English. Early in the following year he was summoned to Spain, and put in command of the 'Fighting Division,' and with it rendered brilliant service at Busaco, during the subsequent expulsion of the French from Portugal, at Fuentes de Onoro, at the sieges of Ciudad Rodrigo and Badajoz, at Vittoria and in the battles of the Pyrenees, at Orthez and before Toulouse. Napoleon's escape from Elba once more called Picton into the field; he fought at Quatre Bras and was wounded, but kept the fact hidden that he might not miss the great day he saw coming, and he fell leading his men to the charge at Waterloo, 18th June 1815. See *Memoirs of Sir T. Picton*, by H. B. Robinson (2 vols. 1835).

Picton, a port of entry on the north coast of Nova Scotia, on a large and sheltered harbour, 85 (by rail 114) miles NNE. of Halifax. The town contains several mills and factories, and coal, mined in the vicinity, is exported. Pop. (1891) 2999.

Picts. This is the name by which, for five and a half centuries (296–844 A.D.), the people that inhabited eastern Scotland from the Forth to the Pentland Firth were known. In the Irish chronicles they are generally styled Picti, Pictones, Pictores, or Piccardaig—all forms of the same root; but sometimes the native Gaelic name of Cruthnig is applied to them, and their country is called Cruithen-tuath, the equivalent of Latin Pictavia and Old Norse Pettland, which still survives in the name of the Pentland Firth. There were Cruithni or Cruthnig also in Ireland—never, however, called Picti. They formed the petty kingdom of Dálaraide (County Down and part of Antrim) and bordered on the Irish Dalriada; and, as the kinglets of both these provinces were contemporary with the whole extent of Pictish rule, much confusion is thereby caused as to what refers to Scotch and what to Irish Cruithnig in the annals. Other Irish Cruithnig appear sporadically, not to say enigmatically, in Meath and in Roscommon. There does not seem to have been any difference in language and customs between these Irish Cruithnig and the rest of the people of Ireland, at least in historic times. They were probably early invaders from Britain belonging to the Pictish race.

The Picts are first mentioned in connection with the campaigns of Constantius Chlorus in Britain in 296 and 306. Eumenius, his panegyrist, speaks of 'Caledonum aliorumque Pictorum silvas et paludes' (the Caledonians and other Picts), which implies the inclusion of the former in the latter people. Caledonia is the name given by Tacitus to Scotland north of the Firths of Forth and Clyde, and he describes the Caledonians as a noble race of barbarians, who fight in chariots as well as on foot, with long swords and short shields, and whose fair red hair and large limbs argued a German origin. Ptolemy (120) places fourteen tribes in Tacitus' Caledonia, inclusive of the Caledonians themselves, and the more easterly ten of these may be claimed as Picts. So troublesome were these northern tribes to the Roman province that in 208 the Emperor Severus came to Britain and vainly attempted their subjugation. The contemporary historians mention only two tribes north of the Forth and Clyde wall—the Mæatæ and the Caledonii—and Tacitus' noble barbarians appear in their pages but squalid savages, having no cities, knowing no agriculture, possessing wives in common, and tattooing their bodies with pictures of all kinds, to show which 'they wear no clothing,' says Herodian. Yet they have chariots and weapons as described by Tacitus, with dagger and peculiarly knobbed spear. One hundred years later the Caledonians and other Picts, as already said, are encountered by Constantius, and still fifty years later they are harassing the Roman province (360) now in company with the Scots, who are first mentioned at this date, and who appear as great sea-wanderers, starting from Ireland and Scotland both, it would seem, and attacking the whole seaboard of the province, especially Wales. The Picts and Scots are helped in this 'continual vexing' of the Britons by the Saxons and Atecotti. The Picts are represented at this time as divided into two nations called Dicalidonæ and Vecturiones, or rather Verturiones, to accept Professor Rhys's happy emendation of Ammianus' text, for this latter form may be identified with the historic Fortrenn (Strathearn and Menteith). Theodosius the elder in 369 subdued these northern foes and restored the district between the walls to Roman Britain, and the usurper Maximus signalised his assumption of power in 383 by an energetic campaign against the Picts and Scots. During the next quarter of a century the Romans were losing their hold on Britain, and their northern foes pressed on the province with great persistence. First the northern wall was rebuilt, then abandoned; and lastly the southern wall was repaired by the last legion sent. In vain did the brave Stilicho gaze on the 'figures fading on the dying Pict,' as Claudian says, for they burst on the Romanised Britons with more fury than ever, and the calling in of the Saxons against the Picts and Scots made the last state of the Britons worse than their first.

At this point the light of Roman history is withdrawn from us, and we have to depend on vague references in native writers—on Gildas of Wales (6th century), on Adamnan (704), on Bede (731), on Nennius (9th century), and on the Irish and other annalists of the middle ages, the best of whom is Tigernach (1088). There is a Pictish Chronicle, perhaps composed in the 10th century, but preserved only in a MS. four hundred years later in date. Gildas describes the Picts and Scots as 'differing somewhat in manners,' and 'shrouding their villainous faces in bushy hair rather than clothing' their lower limbs. Bede points out that the Picts are divided into a southern and a northern division by the Grampians. The southern Picts were converted to Christianity by St Ninian (*circa* 400), and the northern Picts over a century and a half later by St Columba. Bede also notes and mythically explains the system of succession among the Picts, whereby the reigning monarch was succeeded not by his son but by either his brother or his sister's son, descent being counted through the females. This curious rule is amply confirmed by the Pictish list of kings. Scotland in Bede's time, and for more than a century previously, was divided among four nations: the Saxons and Britons were south of the Firths, and north of them were the Picts east of Drumalban, and the Scots to the west with Dalriada or Argyllshire as their head centre. The annals say little of the Isles and north-west coast, whether they were held by Scots or Picts, though subsequent history makes it clear that the Scots had long colonised them, for the sons of Erc in 501 were but the last of many Scottic invaders and colonisers. That the four nations of Bede's day spoke four different languages is clear from his oft-repeated statement to that effect, and his handing down a word in this Pictish tongue (*peanfahel*). Columba, according to Adamnan, had to employ an interpreter twice in dealing with the Picts, while Cormac of Cashel mentions a word (*cartit*) belonging to the *berla cruithnech* or Pictish language.

In the ninth year of the reign of Brude MacMailchon, the year 563, Columba landed in Scotland to convert the Picts. Brude had his royal residence near Inverness, and was 'a most powerful king,' Bede says, for he represents him as granting Iona to Columba, though Tigernach says that Conall of Dalriada made the gift. But the Picts were carrying on war among the Isles at the time, as the life of St Comgall shows, and Brude had hostages from the king of the Orkneys. Brude's successor, Gartnait, seems to have fixed his capital at Abernethy, the church of which he founded. The Picts were subjugated by Oswald, king of Northumbria, and made tributary by his brother Oswiu after 654. They remained under the Anglian yoke for thirty years; but Brude, son of Bile, asserted his rule among the northern Picts, and meeting the Anglian king Ecgfrid at Dunnichen in 685 defeated and slew him, and thus ended the Anglian rule over the Picts. About 710 Naiton or Nectan, son of Derile, was king of the Picts, and, as Bede tells us, he conformed under Anglic influence to the Roman Church in regard to the celebration of Easter, going indeed so far as to expel recalcitrant Columban clerics across Drumalban. Following a custom not unfrequent at the time, Nectan resigned his throne and became a cleric. A fierce struggle ensued for the throne, during which Nectan emerged from his monastery, but eventually Angus, son of Fergus, petty king of Fortrenn, crushed all his rivals and reigned for thirty years, when this 'sanguinary tyrant' died in 761. His brother Brude died king of Fortrenn in 763, for evidently Angus' monarchy had collapsed and the provincial kings again came to the front. Unfortunately the next eighty years of Pictish and Scottish history is exceedingly difficult to unravel, for only lists of kings and a reference or two in the Annals of Ulster are all the material which is to hand. Ciniod was king after Brude, but his rights were disputed by Aed of Dalriada; and after his death in 774 there is much confusion in the Chronicles, as there must have been in the facts. Dalriadic princes struggle with Pictish princes and with one another for the throne, till Constantine of Dalriada established himself about 815 as king over both. His and his brother's reign ended in 834, and a time of confusion followed, native Pictish princes striving against Eoganan of Dalriada, and he ultimately succeeding. The year 839, which ended his reign, saw a great defeat and slaughter of the Picts by the Danes, with confusion once again, from which emerged in 844 Kenneth MacAlpin, the Scot, as king over both nations, henceforward not to be disunited. Many things contributed to the overthrow of the Pictish kingdom, such as it was, and of the Pictish language: the disunion, physical and otherwise, between northern and southern Picts; the rule of female succession which allowed Anglic, Briton, and Scottic princes to rule in right of their mothers, with the consequent degradation of marriage which matriarchy implies; and the superior culture of the Scots, Christian and literary. Nor must it be forgotten that we really do not know much about the Isles and west coast north of Argyll, nor indeed of the counties north of Inverness, from the time of Brude MacMailchon till the Norsemen came. It is quite certain that the Scots colonised these very early, and had, indeed, established themselves in Perthshire. Aidan, the son of Gubhran, makes expeditions to Orkney, and fights the Picts and defeats them on the Forth, or even farther eastward, in Mearns. This aggressive energy, combined with the other facts of the situation above enumerated, would easily enable the Scots to supersede the Picts in power and language.

The real 'Pictish question,' however, is what the language was which they spoke. This question must not be confused with another if allied one, What race did the Picts belong to? The Picts may have spoken a Celtic language though racially possessed of little Celtic blood, and may have retained non-Celtic customs as survivals of a lower culture, as indeed they did in the case of female succession. Four hypotheses have been formed in regard to the language and origin of the Picts. The first, started by Pinkerton and put by Sir Walter Scott into the mouth of the 'Antiquary,' is that they were Teutons, speaking a Gothic dialect; the second, maintained by Dr Skene, is that they were Gaelic-speaking Celts, and that they and not the Scots finally conquered in the 9th century; the third, due to Professor Rhys, is that the Picts were non-Aryans, whose language was overlaid by loans from Welsh and Irish; and the fourth, held by two of the most eminent Celtic scholars of the day, Professor Windisch and Dr Whitley Stokes, is that they were Celts, but more nearly allied to the Cymry than to the Gael.

The materials for deciding the linguistic relations of the Picts, though fairly abundant, consist almost entirely of names—those in the classical writers, in the king lists, and in the Book of Deer, and the still or lately existent place-names of ancient Pictavia. The main agreement between the Gallo-Cymric and Gaelic languages is their dropping of Aryan initial *p*; their main difference is their developing the labialised guttural *qu*—the one like the Greeks into *p*, and the other, the Gaelic, like the Latins into *q* or *c*. This fact led Professor Rhys to call them respectively P Celts and Q Celts. No native initial *p* exists in old Gaelic language. The name Picti, which was usually regarded as the Latin for 'painted men,' is now considered inseparable from Pictones or Pictavi of Gaul, now Poitou, and is therefore Celtic of the P group. An old Gaelic equivalent is supposed to exist in *cicht* ('engraver'), which leaves the old idea of 'painted or pictured men' intact. Further, the Gaelic name *cruthni* is derived from *cruth* ('form, figure'), Welsh *pryd;* and the Welsh name for Pict is actually Prydyn. The form Prettania, undoubtedly used by the best Greek writers for the Latin Britannia, makes it possible that the Cruthnig gave their name to Britain. The meaning of Bede's Pictish word *peanfahel* is practically explained by himself as Wall's Head, where *pean*, with its *p*, answers to Welsh *penn* ('head') and not to Gaelic *cenn*. Similarly *Pern* and *pant* in the king lists belong to the P group; but more striking still is the *pett* of the Book of Deer, which signifies 'a portion of land,' corresponding to Welsh *peth*, and etymologically to Gaelic *cuit* ('portion'). *Pet* or *pit* is a prefix in place-names in Pictland from Sutherlandshire to the Forth at the present day, some two hundred being easily counted, though the Gaelic *Bal* has considerably extruded it in western Pictland. It is similar to *Aber* as a place-name prefix, which is found all over Pictland. This is the Abbor or Apor of the Book of Deer and the Chronicles, and corresponds only to Welsh *Aber*, older *Aper*, 'a confluence.' Minor points in the phonetics of the Pictish names are the preservation of *st* and *nt* as in Cymric; *ch*, as in Ochil, Welsh Uchel, but Gaelic Uasal; *it*, in Naiton, for Gaelic Nectan, being Cymric; Elphin for Alpin or Albin; Bridei for Brude, where *u*, as in Welsh, changes to *i;* the Cymric forms of the prefix *ur* or *wr* for Gaelic *for* or *fer;* and others. Names like Talorg and Morcunn remind us of Gaulish Argio-talus, 'silver-brow,' and of Welsh Morgan. Modern place-names like Dee ('goddess'), Don for Divona ('goddess'), Tay, Eden, Nith or Nethy, and Ythan can hardly be paralleled outside Gallo-Cymric ground. The *sp* of Spey and Spean is evidence of non-Gaelic origin. Dr Whitley Stokes, who has brought together in a list all the extant Pictish words from Tacitus down to the mediæval annalists in his work *On the Linguistic Value of the Irish Annals*, sums up the philologic arguments with sufficient temperateness thus: 'The foregoing list of names and other words contains much that is still obscure; but on the whole it shows that Pictish, so far as regards its vocabulary, is an Indo-European and especially Celtic speech. Its phonetics, so far as we can ascertain them, resemble those of Welsh rather than of Irish.' The conclusion to which we come is that the Picts, whatever traces they show of a non-Aryan racial element, with its consequent survival of lower ideas of marriage-laws, spoke a Celtic language belonging to a branch of Celtic allied to the Cymric, but dialectically different from the Welsh of Bede's time; and that this dialect of the Gallo-Cymric stock was a wave of Celtic speech from the Continent previous to the Gaulish which held England when Cæsar entered Britain.

See Skene's *Chronicles of the Picts and Scots* (Edin. 1867), where all the post-classical material is brought together, and his *Celtic Scotland*, vol. i. (Edin. 1886); Professor Rhys's *Celtic Britain* (Lond. 1884), and his Rhind Lectures for 1889 in the *Scottish Review;* Dr Whitley Stokes's work above mentioned; Professor Windisch's article, 'Keltische Sprachen,' in Ersch and Gruber's *Encyklopädie;* Adamnan's *Columba* (Edin. 1874); Hennessy's *Annals of Ulster* (Dublin, 1887); Bede's *Ecclesiastical History* and the other documents in the *Monumenta Historica Britannica;* Father Innes' *Critical Essay* (1729; new ed. Edin. 1879); and Pinkerton's *Inquiry into the History of Scotland*.

Picts' Houses, the name popularly given in many parts of Scotland to the rude underground buildings, more commonly and accurately called Earth-houses (q.v.). The Brochs (q.v.) are also sometimes called Pictish Towers. For the Picts' Work, see CATRAIL.

Picture-restoring. See RESTORATION.

Picture-writing. See HIEROGLYPHICS.

Pidgin-English. See CHINA, Vol. III. p. 195.

Piece of Eight. See PIASTRE.

Piedmont, or PIEMONT (Fr. *pied*, 'foot,' *mont*, 'mountain'), a former Italian principality, which now forms the north-west part of the kingdom of Italy, is by the Alps separated from Switzerland on the N. and from France on the W.; on the E. lies Lombardy, and on the S. Liguria and Genoa. It included the duchy of Monferrat and part of the old duchy of Milan, and now embraces the provinces of Alessandria, Cuneo, Novara, and Turin, and covers 11,389 sq. m., with a pop. (1889) of 3,297,157. For an account of its geographical features, see ITALY. From the end of the 12th century the name Piedmont was used as a collective title for the territories ruled over by the House of Savoy on the east side of the Graian and Cottian Alps; the history of the region will be found under ITALY, SARDINIA, SAVOY, and WALDENSES. See, too, S. Butler's *Alps and Sanctuaries of Piedmont* (new ed. 1890).

Piepowder Court, in England, an ancient court held in fairs and markets to administer justice in a rough and ready way to all comers, called also the Court of Dusty Foot (Old Fr. *pied pouldré*). Its jurisdiction seems to have been confined mostly to petty vagabonds, pedlars, and other wanderers. The court has long been obsolete, its jurisdiction merged in the court of Petty Sessions (q.v.).

Pierce, FRANKLIN, fourteenth president of the United States, was born at Hillsborough, New Hampshire, November 23, 1804. His father, Benjamin Pierce, a farmer who had risen in the war of independence to the rank of major, in 1827 and 1829 became governor of New Hampshire. Franklin Pierce was educated at Bowdoin College, and was an officer in a college military company, in which his biographer, Nathaniel Hawthorne, was a private. He graduated in 1824, studied law, and was admitted to the bar in 1827. From 1829 to 1833 he was a member of the state legislature, and for two years was its speaker; he was then elected to congress, a Democrat of the school of Jackson. In 1837 he was elected to the United States senate, of which he was the youngest member. In 1842 he resigned his seat, and returned to the practice of law. He refused the Democratic nomination for governor, as well as an appointment to fill a vacancy in the senate; and he declined the office of attorney-general offered him by President Polk. He remained, however, among the leaders of his party, zealously advocated the annexation of Texas, with or without slavery, and, after his opponents, the Whigs and Free-soilers, had been victorious at the polls in 1846, volunteered as a private for the Mexican war. The president made him a brigadier-general, and in August 1847 he joined General Scott, and led his brigade in the battles of Contreras and Churubusco. In 1852, in consequence of the conflicting claims of the leaders of the Democratic party at the Baltimore Convention, he was nominated as a compromise candidate for the presidency, against General Scott, the Whig nominee, and received the votes of all but four states. President Pierce in his inaugural address defended, on constitutional grounds, slavery and the Fugitive Slave Law; and his cabinet, which was an eminently able one, included Jefferson Davis as secretary of war. Pierce's view as to slavery was that it was the price paid for the Union by the framers of the federal constitution, and that, therefore, in honesty it must be maintained. The principal events of his administration—in importance far before the treaty for reciprocity of trade with the British American colonies and the treaty with Japan, or the filibustering expeditions of Walker (q.v.) to Nicaragua and of others to Cuba, with the resultant abortive Ostend (q.v.) Manifesto—were the repeal of the Missouri Compromise (see MISSOURI) and the passing of the Kansas-Nebraska Act (see KANSAS), which kindled a flame of civil war in the new territory that ultimately set the whole Union in a blaze. Pierce, with his rigid regard for constitutional obligations, was intensely hostile to the free-state settlers and to abolitionists in general. At the close of his term of office in 1857 he spent three years in Europe; and afterwards, having no sympathy with the party which subsequently came into power, he took no part in politics. He died at Concord, 8th October 1869. As a lawyer Pierce was an eminent and eloquent pleader; as a statesman his administration would have passed for skilful and successful had it not been for the slavery storm which rose and wrecked it; while as a man he was amiable and generous, and of spotless integrity. There are Lives by Hawthorne (1852) and D. W. Bartlett (1852), and a Review of his administration by A. E. Carroll (1856).

Pieria, a coast district of ancient Macedon, at the base of the Olympus, and between the Peneus and Haliacmon. It was the fabled birthplace of the Muses and of Orpheus.

Pierre, the capital of South Dakota, is a small town in the centre of the state, on the Missouri River, at the mouth of Bad River, 781 miles by rail WNW. of Chicago Pop. (1890) 3235.

Pierson, HENRY HUGH, composer, was born at Oxford in 1816, in 1844–45 filled the chair of Music in Edinburgh, and from 1846 lived in Germany, dying at Leipzig, 28th January 1873. Among his works were the music for the second part of Goethe's *Faust*, the operas *Leila* and *Contarini*, and the oratorios *Jerusalem* and *Hezekiah*.

Piers Plowman. See LANGLAND.

Pietà (an Italian word signifying *piety*, in the sense in which that term indicates or includes affection for relatives), the name given in the language of art to representations of the Virgin Mary embracing the dead body of her son. It is a counterpart to the *Madonna* with the infant Jesus in her arms. The one affords an opportunity for the representation of the purest joy and highest motherly love; the other of the utmost pain and grief. The pietà, which forms one of the Stations of the Cross, has long been a favourite subject, not only with painters, but with sculptors.

Pietermaritzburg, or MARITZBURG, capital of Natal (q.v.), occupies a fine situation near the river Umgeni, 54 miles N. of Durban. The streets are regular, and the water-supply is abundant. It is the seat of government, headquarters of the military, and its municipal affairs are managed by a mayor and town-council. The chief buildings are government house and the office of the colonial secretary. It takes its name from its founders, the Boer leaders Pieter Retief and Gert Maritz. There is railway connection with Durban, and also to the borders of the Orange Free State and the Transvaal. The first sod of the Natal and Orange Free State railway was turned in November 1889. Pop. (1891) 17,500—two-thirds whites, the rest Kaffirs and coolies.

Pietists, a designation given at the end of the 17th century to a religious party in Germany, which, without forming a separate sect, was distinguished rather by fervour and zeal than by peculiarities of religious opinion. See CHURCH HISTORY, Vol. III. p. 240, the articles on SPENER and FRANCKE; and the Histories of Pietism by Heppe (1879) and Ritschl (1880–86).

Pietra-dura, a name given to the finest kinds of Florentine mosaic-work, in which the inlaid materials are hard stones, such as jasper, carnelian, amethyst, agate.

Piezometer (Gr. *piezō*, 'I press,' *metron*, 'a measure'), an instrument for measuring the compressibility of fluids, by observing the extent to which an air-bubble which marks the upper level of liquid in the capillary neck of a flask is depressed by the application of an external pressure acting through liquid surrounding the flask.

Pig, or HOG (*Sus*), a genus of artiodactyle ungulate mammals, of the family Suina (see BOAR, where the characteristics of the wild species are discussed, with an illustration). The term Swine is commonly applied to the genus in Britain. The body is covered more or less with bristles and hairs; the skin is very thick; the limbs short and stout; the neck, which is carried straight forward from the trunk, is very thick and strong; the face moderately prolonged and truncated, always terminating in a movable cartilaginous disc, furnished, as in the mole, with a special small bone, and employed with wonderful expedition in turning up the soil in search of roots and other food. In most of the improved varieties the face is much shorter than in the wild boar or ancient pig. There are six incisors, two canine teeth, and fourteen molars in each jaw, the lower incisors projecting forwards; the canine teeth long and strong, projecting and curved, becoming formidable tusks in wild boars, and large and powerful even in the females in a wild state. The feet have each four toes, the lateral ones small, and scarcely touching the ground, all separately hoofed. The tail is short. The stomach shows mere traces of division. The food is chiefly vegetable, but perhaps no animals may more properly be called omnivorous; and although, even in a wild state, pigs are not to be reckoned among beasts of prey, they not unfrequently, even in domestication, kill and eat small animals that come in their way, as many a housewife has had occasion to observe in respect to chickens. The Common Pig (*S. scrofa*) appears to be a native in the wild form (see BOAR) of most parts of Europe and Asia; the domestic European breeds are apparently descended from the European wild boar, crossed with domesticated Asiatic breeds. Like the other thick-skinned animals with which it is allied—the elephant, rhinoceros, hippopotamus, and tapir—the pig delights in humid and shadowy places. The pig usually grows until five years old. Its natural life ranges from fifteen to thirty years. Although the use of its flesh was prohibited to the Jews, and the prohibition has been adopted in the Mohammedan law, the pig has been a domesticated animal from a very early period, and its flesh constitutes a large part of the food of many nations. The fecundity of the pig is great; with proper treatment it will produce two litters annually, generally of four to eight pigs each, although sometimes there are as many as fourteen in a litter. Vast quantities of the flesh are consumed in various forms, as pork fresh or salted, bacon, ham, &c. Brawn (q.v.) is an esteemed luxury. The fat of the pig, which is produced in a thick layer under the skin, is an important article of commerce, and of various use under the name of Lard (q.v.). The skin of the pig is made into leather, which is particularly esteemed for saddles. The bristles, especially of the wild boar, are much used for brushmaking. Indeed, there is no food-producing animal which is of greater benefit to mankind than the pig.

There are numerous varieties of the domestic pig. Some have erect and some pendant ears, and those are most esteemed which exhibit the greatest departure from the wild type, notably in shorter and less powerful limbs, less muscular and more rounded forms, wider ribs and greater wealth of flesh. The *Chinese* breed and the *Neapolitan* have been of great use in the crossing and improving of the breeds commonly reared in Britain, giving rise to the improved white and black breeds respectively. The Chinese breed is renowned for its fertility, as well as for the rapidity with which, without materially increasing in offal or bone, it lays on flesh. Its head is short and thick, ears erect, legs very short, chine high and broad, and jowl wide, belly hanging very near to the ground. As a rule it carries a small quantity of hair. The skin is usually dark, but the flesh is delicate and white. These valuable characteristics distinguish the improved Yorkshire pigs which are now so much esteemed all over the British Isles as well as in several foreign countries. The Neapolitan breed is entirely black, with little hair, moderately short in the face, ears small and erect, short in the leg, moderately long and thick in the body, remarkably easy to fatten, but scarcely so robust in constitution or so prolific as the Chinese pig.

Improved Yorkshire Pigs.

Besides many local varieties of recognised merit, there are at least six improved breeds of swine reared extensively in the British Isles. The White Yorkshire are divided into the three sub-varieties known as the Large, Middle, and Small White Breeds. Then there are the black Berkshire, the Suffolk breed (some black and others white), and the red Tamworth. The black Suffolk pigs are sometimes spoken of as the Small Black breed. The Tamworth is a large-sized pig, rather stronger in the bone than the other sorts, with a long face. It is noted for a high proportion of lean meat. The Large White is the most widely distributed variety. It is being used extensively and with excellent results in the improvement of the pigs in Ireland, Scotland, and on the continent of Europe. The pigs of America are descended mainly from the Berkshire, Poland-China (a breed developed in 1816–38), white Suffolk, Chester, Cheshire, Essex, Jersey red, and Victoria (a breed originating at Saratoga about 1855). The first swine seem to have been introduced into Hayti by Columbus in 1493, and into Florida by De Soto in 1538; within a century pigs bred in Virginia, Canada, and Nova Scotia. The extent of the pork-packing business in America may be estimated from the figures given at CHICAGO. See also PORK. It used to be said that pigs were indigenous in the Polynesian area, but most likely they were introduced by the earliest navigators. Allowed to run wild, they multiply rapidly under favourable conditions; thus in New Zealand they became at one time a nuisance, and in Nelson province three men killed 25,000 pigs in twenty months.

Pigs are profitably kept wherever there is much vegetable refuse on which to feed them, as by cottagers having gardens, farmers, millers, brewers, &c. They are often allowed to roam over fallow ground, which they grub up for roots, and over stubble-fields, which they glean very thoroughly. It was an ancient practice to allow pigs to feed in woods, where they consumed acorns, beechmast, and the like. When they are fed, as is sometimes the case, chiefly on animal garbage, their flesh is less palatable and less wholesome. The pig has a reputation, which it does not deserve, of peculiar filthiness of habits. It is true that it wallows in the mire, as the other pachydermata also do, to cool itself and to provide itself with a protection against insects, and it searches for food in any puddle; but its sleeping-place is, if possible, kept scrupulously clean. The too common filthiness of pigsties is rather the fault of their owners than of their occupants; and a clean and dry sleeping-place is of great importance to the profitable keeping of pigs.

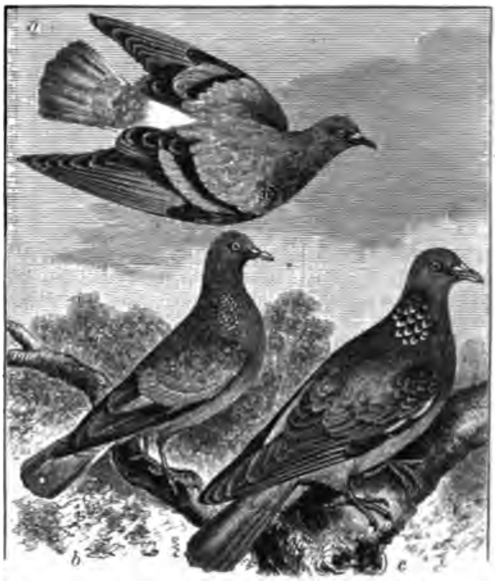
The Hog Cholera or Swine Plague, due to the presence of a bacterium, caused terrible havoc in the United States in 1870–80, though hardly known twenty years before. As in the splenic fever of sheep, due also to bacteria, attempts have been made to ward off the more violent form of the disease by inoculating animals with a milder type.

The pig is not inferior to other quadrupeds generally in intelligence, but it excels most of them in obstinacy. It can be easily rendered very tame and familiar. Its acuteness of scent has been turned to account in making it search for truffles; and a tale is told of a pig having been successfully used as a pointer. The pig has sometimes served as a beast of draught.

The *Bosch Vark*, or Bush Hog of South Africa (*Choiropotamus africanus*), is about 2 feet 6 inches high, covered with long bristles; it has projecting tusks, a large callous protuberance on each cheek, and long, sharp, tufted ears. It is gregarious, subsists chiefly on vegetable food, and makes destructive inroads on cultivated fields. The forests of the island of New Guinea produce a species or variety of pig (*S. papuensis*) more widely different from the common pig than its breeds are from one another. It is 18 or 20 inches high, with short ears, and very short tail. The Babiroussa (q.v.) is another species of pig; see also WART-HOG.

See Coburn, *Swine Husbandry* (New York, 1877); Gilbert, *Pig-keeping for Amateurs* (1882); Long, *Book of the Pig* (2d ed. 1889).

Pigeon (Ital. *pigione*, *piccione*, or *pipione*, from *pipiare*, Lat. *pipire*, 'to peep or cheep'), a name sometimes applied, like Dove (q.v.), to all the species of Columbidæ, and sometimes almost restricted to those still included by ornithologists in the genus Columba; having a bill of moderate length, hard, and a little arched at the point, the base of the upper mandible covered with a soft thick skin, in which the nostrils are pierced; the feet with toes divided to the base, and formed both for walking and perching; the wings rather large and pointed; the tail of moderate length, and generally square at the end. The species of this group are very numerous, there being nearly 150 different kinds, and they are found in all parts of the world. Some of them build their nests in trees, and others in rocks. They invariably lay only two eggs at a time, but breed several times in the year, both the male and the female taking part in the process of incubation, as also in that of feeding the young birds. The origin of all the domesticated varieties of the pigeon is the Blue Rock-pigeon (*C. livia*), the *Biset* of the French, a bird of extensive geographical range, being found as far north as the Faroe Islands, and in nearly all parts of the eastern hemisphere. It is found in large numbers on the British coast, particularly on the Orkney Islands and the Hebrides, and also in the Mediterranean. Its food consists partly of molluscs and other small animals, and partly of grain and seeds; and it often pays unwelcome visits to the cornfields within its radius. In a wild state the blue rock-pigeon exhibits great uniformity both of size and plumage; it is not quite 12 inches in length from the tip of the bill to the end of the tail; the prevailing colour is bluish gray, in some parts with green and purple reflections, and having two broad and distinct black bars across the closed wings; the lower part of the back is whitish; the tail is a deep gray with a black bar at the end; the bill is dark brown; the legs and feet reddish orange. There are also the Stock-dove or Smaller Wood-pigeon (*C. œnas*), found all over southern and mid Europe, a species found in woods; and the Ring-dove, Wood-pigeon, or Cushat (*C. palumbus*), very common in all parts of Europe and Asia and in northern Africa, and the largest of the British species. These are all the British species of pigeon. In addition we may mention the Ring-tail Pigeon (*C. caribbea*), a West Indian species; the Bald-pate or White-headed Pigeon (*C. leucocephala*), also found in the West Indies and Florida; the Double-crested Pigeon (*C. dilopha*), found in the northern parts of Australia, and having, as its name indicates, a double crest, one half on the back part of the head, and the other springing from the forehead. There are other varieties, too numerous for mention.



a, Rock-dove (*Columba livia*); *b*, Stock-dove (*C. œnas*); *c*, Ring-dove (*C. palumbus*).

As already stated, only the blue rock-pigeon has been domesticated, but this species lends itself very readily to the restrictions of civilised life. The changes brought about in it are very varied and remarkable; and the description of his experiments upon the pigeon by Darwin are of the deepest interest. For many centuries and in all lands pigeon-breeding has been a favourite pursuit with all classes of society. In India several of the native rulers have very extensive establishments for the breeding of pigeons. In Persia and in Asia Minor the pigeon is very largely and carefully bred; and in the latter country especially many of our most beautiful varieties have been produced. From North Africa we have also received at least one fine breed. Throughout Europe this pursuit is followed with a great amount of enthusiasm, more especially in Italy, Germany, France, and Belgium, as well as the United Kingdom. In Belgium the sport of pigeon-flying or racing is the national sport engaged in by all sections of the community; and to that country we owe the variety known as the Homing Pigeon (see CARRIER PIGEON). In the United Kingdom, as in America, there are enormous numbers of breeders who devote themselves to what are known as 'fancy pigeons,' by which term are known those bred for their special points or characteristics. Of these there is a great and ever-increasing variety, which it is impossible to describe in detail, as there are in all some two hundred breeds, many of which have several distinct colours. The following are some of the most prominent: *Carrier* (q.v.).—This is not, as is commonly supposed, a member of the homing family, though undoubtedly it was at one time used to carry messages. It is much longer in feather than the blue rock, and is specially characterised by having an abnormal development of the beak and eye wattles, the former of which is like a round fleshy ball pierced by the beak. *Dragon.*—Of a similar type, rather lighter in body, and with less heavy wattles. *Barb.*—A heavy-wattled pigeon; but in this case the eye-wattle is the chief point, and it is bred so that the head has the appearance of a bobbin or reel. These three varieties make up the *Wattled Pigeons;* and they are all very valuable when bred to perfection. *Pouters.*—The Pouting Pigeon is equally high class, the name arising from the great development of the crop, which has a globular form, and stands out from the neck. Of these the best known is the English Pouter; and there is also the Norwich Cropper; the former a large bird, and the latter a smaller one. The smallest of this family is the diminutive Pigmy Pigeon. In these the head, which is at the back of the crop, is often almost buried by it. *Jacobin.*—A breed in which the head and neck feathers are largely developed, the former in the shape of a hood, so that the head is often buried within it, and the latter falling on to the shoulders, leaving a round space between, known as the rose. *Fantail.*—In this the characteristic which gives the variety its name is that the tail-feathers spread themselves out transversely to the body in the shape of a fan, and in good specimens evenly so. The head is thrown back, often touching the tail, with a nervous motion, the body poised on short legs, and the bird looking as if it were falling backwards. *Tumblers.*—In these the name is derived from the tumbling or turning motion when flying in the air, and good well-trained birds have been known to remain on the wing for many hours without cessation. They are divided into two sections—viz. Flying Tumblers—i.e. those which are bred for this quality, and Fancy Tumblers, in which the propensity is lost or suspended through disuse. A very valuable breed is the Short and Long Faced Tumbler, of which there are several varieties, notably the Almond, so called from its rich coloured plumage. The Nun and the Magpie are supposed to be descended from the same family. Allied to the flying tumblers are the Rollers and the Tipplers. *Frilled Pigeons.*—These include a very large variety, the greater portion of which originated in the Orient. They are thus called because the throat or chest is decorated with a frill of curled feathers, more or less perfect. Some have in addition a crest on the head, and there is an almost endless variety of colour and of markings, the richest—those known as Oriental Frills—being of much later introduction than the Owls and Turbits. One, the White African Owl, is the smallest of all domestic pigeons, and comes from Tunis. *Antwerps.*—A very massive-built bird in which there is a considerable admixture of homer blood. Of the other prominent varieties the homer has already been referred to; the Russian Trumpeter has a large crest and very profuse leg-feathering; the Runt is the largest of all pigeons, and on the continent of Europe is extensively bred for the table. The system of exhibitions which has grown up of late years has done much to stimulate the breeding of fancy pigeons, and very high prices are paid for the best specimens. On numerous occasions £100 has been given for a single pigeon, and £50 is quite a common price.

For the keeping of pigeons different forms of houses may be adopted. When they are permitted to fly about they may have either small cotes for, say, four pairs, mounted on tall poles—and these can be made very attractive—or they may be accommodated in larger houses. Fancy pigeons are usually restrained by what are called flights or aviaries, which consist of a large space attached to the house, the sides and top made of wire-netting, so that the birds cannot get away. It would be too great a risk to permit valuable birds to fly. Whether in confinement or at liberty each pair of pigeons must be supplied with a nest of their own, which is better if double, as often they are sitting on eggs and feeding young pigeons at the same time. In the nest-boxes pans are placed of the usual construction for this purpose. Pigeons are prolific breeders, and will lay several nests during the year, each time a couple of eggs. The male and female, if permitted to do so, continue faithful to each other from year to year, a circumstance noted by Pliny and others of the ancients.

See DOVECOT, and books on pigeons and pigeon-keeping by Tegetmeier (1868), Piper (1871), Foulton (1876), Brent (1878), Wright (1879), Lucas (1886), Ure (2d ed. 1889), Lyell (1889), and the present writer (1891).

Pigeon-shooting. In the days of the Red House, at Battersea, the members met four times a week in their enclosure on the banks of the Thames for the purpose of pigeon-shooting. The traps mostly in use at that time were what were known as 'H' and 'T.' Betting was frequently heavy when men like Lord Huntingfield, Lord Winchelsea, Lord Kennedy, Sir Richard Sutton, Sir Charles Kent, Captain Ross, and Mr George Osbaldeston were present. Captain Ross in 1828 killed at 30 yards rise, from five traps, seventy-six birds out of eighty; three of the other four settled on the fence, and the fourth bird was hard hit, although the shooter's first barrel missed fire. The shooter handled a 12-bore gun by William Moore, charge of powder and shot unlimited. Captain Ross won the Red House Club Cup, value 200 guineas, both in 1828 and 1829; and in 1841, in a match at Edinburgh with Lord Macdonald, he at 35 yards rise killed fifty-two birds out of fifty-three. When the Red House Club was closed in 1850, trap-shooting was for some years out of fashion, until it occurred to Mr Frank Heathcote that a system of handicapping might be advantageously adopted in order to place good and bad shooters on something like an equality. Many successful meetings were now held under Mr Heathcote's management at the Old Hornsey Wood House, until the ground was wanted for building and other purposes. Mr Heathcote in 1867 rented for £700 a year the Hurlingham estate at Fulham (q.v.); and a club being formed, the property was subsequently purchased for £20,000. After the appointment of Captain the Hon. D. J. Monson to the post of manager, the club flourished to such an extent that for several years prior to 1891 it had its full complement of 1500 members, under the presidency of the Prince of Wales. As regards the shooting members there are not more than 200, and fully half of these never fire at a pigeon. This can easily be accounted for, as a gentleman can get himself elected almost immediately as a shooting member, whereas in the ordinary ballot for members he might have to wait two or three years. In 1891 over 200 candidates were down for election. The entrance-fee is 15 guineas, with an annual subscription of 5 guineas. The polo-ground is the best in the country, and during the height of the London season it is nothing unusual to see three or four thousand of the élite of London society in the park and grounds.

Pigeon-English. See CHINA, Vol. III. p. 195.

Pigments used in artistic work vary much in permanence; not a few of the pictures painted by distinguished artists during the 18th and the first half of the 19th century are already more or less faded by the action of light or otherwise injured by impurities in the atmosphere of rooms. It is imprudent to expose any kind of artistic work in colours to direct sunlight or even, it would seem, to the light of electric arc lamps. The following refers to the durability of pigments employed in oil-painting, when continuously exposed to fairly strong daylight. Among blue colours, ultramarine, both real and artificial, is permanent; while Prussian blue is liable to some change, and indigo is fugitive. Among red colours, vermilion and the red ochres are perfectly durable; while the madder reds and purples can hardly be so thoroughly relied upon, and the carmine and crimson lakes, from cochineal, quickly give way. Among the yellows, raw sienna, yellow ochre, as well as the cadmium and Naples yellows, are quite stable; while Indian, chrome, and lemon yellows, and also aureolin, although less so, are yet fairly durable, but gamboge and yellow lake are not. Among greens, oxide of chromium undergoes no change, terre verte is practically permanent, and so also is emerald green, but it is blackened by contact with cadmium yellow. Among browns, burnt sienna, raw and burnt umber, cappagh brown, and Caledonian brown do not at all fade; but hardly as much can be said of madder brown, Cologne earth, and Vandyke brown, although these are fairly durable. Asphaltum or bitumen has a tendency to move on the canvas unless very carefully prepared, and its rich brown colour is not altogether permanent. Lampblack, ivory black, and charcoal black are quite durable, so also are flake white, zinc white, and baryta white. It is generally the case that a colour produced by a mixture of permanent pigments is also permanent, and it may be added here that flake white (white lead), so much used to mix with other colours for light tints, is liable to discolour when exposed to sulphuretted hydrogen (an occasional impurity in coal-gas), and this colour has also a tendency to tarnish when kept in the dark.

The above remarks on colours made up with oil apply equally to water-colour pigments, with a few exceptions. These are vermilion, especially if artificial, Naples yellow, chrome yellow, and madder brown, the permanency of which cannot be relied upon in Water-colours, under which head some further remarks on this subject will be found.

Fuller information about the pigments named above, as well as others, will be found under the heads ASPHALT, BLACK, BLUE, GREEN PIGMENTS, LAKES, OCHRES, PURPLE COLOURS, RED COLOURS, and YELLOW PIGMENTS. The oils and varnishes used as media for pigments, as well as the nature of the prepared canvas or paper used for painting upon, have all a bearing on the preservation of the colours of a picture. See the *Chemistry of Paints and Painting*, by A. H. Church (1890). The history of the introduction of the principal pigments is given at PAINTING, Vol. VII. p. 702.

Pigments of Animals. That animals are often brightly coloured is evident. Some of the simplest, such as many Radiolarians, are brilliant; sponges are often suffused with pigment; sea-anemones and corals are justly compared to flowers; many marine worms have an iridescent sheen; the Echinoderms are almost always bright; many crustaceans have a jewel-like radiance; myriads of insects are lustrous; the shells of molluscs are rich in beauty; the fishes gleam in silver and gold and many hues; even the amphibians are sometimes gaily pigmented; some lizards and snakes seem like flashes of colour; birds are often brilliantly decorated; and mammals have a subdued but often rich colouring in their fur. But all the colours of animals are not due to pigments, for air-spaces in hairs and feathers make these structures white; crystals of guanin or lime often produce a silvery glimmer; striation and other physical peculiarities of the surface cause iridescence.

The most important Pigments.—(*a*) Pigments called lipochromes are among the commonest, occurring in the skin of crustaceans, molluscs, fishes, and birds, in yolk of egg, in the vascular fluid of invertebrates, and also in flowers. Carotin, lutein, tetronerythrin, yellowish chlorophanes, and rosy rhodophanes are representative examples. The reddish pigment conspicuous on many crustaceans is probably a rhodophane, and into this or analogous lipochromes the bluish and greenish pigments of some lobsters and crabs seem to be converted when the animals are boiled or preserved in alcohol or treated with acids. (*b*) Melanoid and lipochromoid pigments, usually of a dark colour, sometimes derivable from (*a*) or from the substances which give rise to (*a*), occur, for instance, in Gorgonid corals, shells of molluscs, the ink of Sepia, the eyes of vertebrates, and in tumours. (*c*) Uranidin pigments of a yellow colour, becoming brown or dark-violet in association with ferments, occur in Tunicates, Gastropods, insects, and sponges. (*d*) Hæmoglobin and its derivatives, of pre-eminent importance in connection with respiration, are of wide occurrence. Hæmoglobin itself, the red pigment of the blood which enters easily into a loose union with oxygen, is present in all vertebrates except Tunicates, Amphioxus, and two or three (perhaps anæmic) fishes. Among invertebrates it is known in some molluscs, crustaceans, and 'worms,' in the larva of the dipterous insect Chironomus, and in a few Echinoderms. It is not known to occur in any cœlenterate, sponge, protozoon, or plant. Among the important derivates of hæmoglobin are hæmatoporphyrin in the oviduct of birds, giving some of the colour to the egg-shells, bilirubin in the bile, and biliverdin, another bile-pigment, which also occurs in the shells of some snails. As respiratory pigments ought also to be reckoned the hæmocyanin in the vascular fluid of molluscs and Arthropods, various violet and purple floridine pigments from sponges and from the Polyzoon Bugula, and, according to Sorby, the aphidein of aphides. (*e*) Chlorophyll, the almost constant colouring matter of plants, apparently consisting of a mixture of two pigments (chlorophyll-green and chlorophyll-yellow), perhaps occurs in a few animals, green infusorians, the fresh-water sponge, the green hydra. It is not quite certain, however, that the green pigment of these animals is identical with that of plant-green; it may be a closely analogous substance. Chlorophyll-yellow is a lipochrome and occurs in many animals. (*f*) Indigo pigments are said to occur in the urine of mammals, and in the purple secretion of the whelk Purpura. The secretion of Murex, which turns violet in the light, has not been sufficiently investigated.

Physiology of Pigments.—Within recent years many of the pigments of animals have been analysed, and some facts about their relationships have been discovered. But in regard to the conditions of their formation, and the purposes which they may serve within the body, comparatively little is known. As the soil may influence the colouring of flowers, so the food given to birds may affect the brightness of their plumage. There are several facts of a similar nature. Cold seems to be one of the conditions which induce a winter change of colouring in a few birds and mammals, and in the butterflies *Araschnia levana* and *A. prorsa*, which seem to be diversely coloured varieties of one species. Light, which is so important a factor in the development of chlorophyll in plants, has also an influence on the pigmentation of animals. Thus, apart from the effects of keeping animals in darkness, it has been shown by E. B.

Poulton that surrounding colours modify those of some caterpillars, and J. T. Cunningham has demonstrated that young flat-fishes when illumined on the normally shaded and unpigmented side develop pigment-cells on that surface.

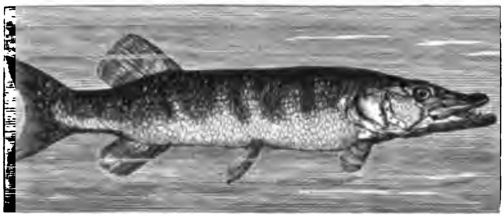
But in regard to the internal conditions of the formation of pigment we are more ignorant. Their relation to the general metabolism of the body is one of the unsolved problems of comparative physiology. Some seem to be of the nature of waste-products, a few are perhaps reserve substances, many may be called by-products of metabolism. On the other hand it is well known that many pigments are auxiliary to some of the important functions of the body. Thus, hæmoglobin and analogous substances are important in connection with respiration; the chlorophyll of plants is essentially associated with assimilation; the pigments found in the eyes of animals seem to aid in the visual function.

External Utility of Colouring.—In many different ways the colouring of animals is of importance to their well-being in the struggle for existence. Thus, the green insects and reptiles which live in the grass or on trees, the sandy-coloured beasts which are hardly to be detected against a background of similar colour, the white animals which are almost invisible among the snow illustrate protective colouring. This colour-resemblance between animals and their surroundings is sometimes marvellously exact, and doubtless of great advantage. Moreover, not a few animals, among crustaceans, fishes, amphibians, and reptiles, have the power of changing their colour, for the pigment-cells expand or contract under nervous stimulus, and this is in some cases advantageously protective. The conspicuous colours of some unpalatable or noxious animals may be an expression of their constitution, while, according to a theory of another order, they warn off possible molesters. It may also be that colours are sometimes useful in assisting mutual recognition between individuals, or in indicating attitudes and movements. Finally, in many animals the sexes differ markedly in colour, the males being almost always brighter than their mates. According to some, this depends on the constitutional peculiarities of maleness and femaleness, while Darwin has emphasised that the brightness of males has been enhanced by the selective taste of the females, and Wallace has urged that natural selection has retarded female butterflies and birds from attaining a brightness which would expose them during the weakness or preoccupation of the reproductive period to the hungry eyes of their enemies. But our recognition of the way in which variations of colouring are fostered or eliminated in the course of natural selection must not lead us to forget the primary problems of the origin of the pigments, and of the physiological conditions which determine their distribution.

See Bile, Blood, Caterpillars, Chlorophyll, Environment, Flower, Mimicry, Sex, and Sexual Selection. C. Fr. W. Krukenberg in his *Grundzüge einer vergleichenden Physiologie der Farbstoffe und der Farben* (Heidelberg, 1884) has given an admirable account of the animal pigments, with a bibliography of important researches, such as those of Kühne, MacMunn, Moseley, and Sorby. See also M'Kendrick, *Text-book of Physiology* (1888); Halliburton, *Physiological and Pathological Chemistry* (1891). For the relation between colour and the external conditions of life, see Semper's *Animal Life* (Inter. Sc. Series, 1881); and for the importance of colour in the external life of animals, Poulton's *Colours of Animals* (Inter. Sc. Series, 1890).

Pigott, Richard. See Parnell.

Pike (*Esox lucius*), a well-known fresh-water fish abundant in the temperate parts of Europe, Asia, and America. The body is long and covered with small cycloid scales; the dorsal fin is near the tail; the mouth is large, with strong, sharp teeth; the lips have no barbels; the stomach is without the usual pyloric appendages; the open (physostomatous) air-bladder is simple; the gill-aperture is very wide. The fish is olive-gray above, silvery white on the belly, and is mottled with pale spots; in length it may measure from 2 to 4 feet; and it may attain a weight of 10 to 20 lb., or in rare cases, it is said, about 60. The genus includes besides four or five other species, notably the *Muskallunge* of the North American lakes, a 'grand game fish,' often 6 feet long, in habit a dauntless marauder. Another of smaller size (*Esox reticulatus*) is the common *Pickerel* of the eastern states. All three are valuable food-fishes.



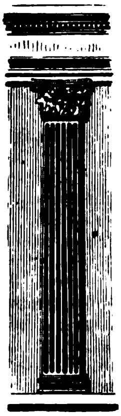
Pike (*Esox lucius*).

The common pike or *Jack* (Scotch *Gedd*) is said to spawn when three years old. The ova are usually laid in March, but the spawning is protracted. There is great mortality among the young, which take about a week to hatch. Growth is at first rapid, and continues more slowly for years. The longevity of the fish is great, but the records of pike which have attained to 250 years are as unsatisfactory as the evidence for longevity usually is. There is no doubt, however, that they may outlive their keepers; and it is also true that they sometimes venture ashore, and that they sometimes lie in a torpid slumber in the pools. But the most characteristic quality of pikes is voracity. Feeding for the most part on frogs and small fishes, they are often prompted by hunger to bid for higher game, such as ducks, geese, water-hens, and water-rats. Thoreau describes the pike as the 'swiftest, coarsest, and most ravenous of fishes, which Josselyn calls the river-wolf. It is a solemn, stately, ruminant fish, lurking under the shadow of a lily-pad at noon, with still, circumspect, voracious eyes; motionless as a jewel set in water, or moving slowly along to take up its position; darting from time to time at such unlucky fish or frog or insect as comes within its range, and swallowing it at a gulp. Sometimes a striped snake, bound for greener meadows across the stream, ends its undulatory progress in the same receptacle.' The Bony Pike (Lepidosteus) is a Ganoid, and the name is sometimes applied to the marine Gar-pike (Belone) and to some American perches. See Bony Pike, Gar-pike.

See the articles Angling and Pisciculture; Pennell's *Book of the Pike* (3d ed. 1884); and Bickerdyke's *Angling for Pike* (1888).

Pike, a word loosely used for almost any kind of lance or Spear (q.v.), whether larger or smaller headed, as used by infantry troops, and now superseded by the bayonet. The naval boarding-pike is a lance about the length of a man. The short pike, called *half-pike* or *spontoon*, long carried by some classes of infantry officers in most European armies, was a kind of Halbert (q.v.) with a smaller but ornamented head, and was rather an emblem of dignity than a fighting weapon. In 1804, when a French invasion was threatened, pikes were distributed by government through the country; and the secret manufacture of iron pike-heads was one of the most disquieting features of the Radical reform agitation in 1819 and during the Chartist troubles.

Pike's Peak, a peak of the Rocky Mountains, in Colorado, 65 miles S. of Denver, discovered by Captain Pike, U.S.A., in 1806. It is situated in 38° 50′ N. lat. and 105° 2′ W. long., and rises to a height of 14,134 feet. On its summit is one of the highest meteorological stations in the world; while at the base, at Colorado Springs, there is a low-level station. A railway to the top, 9 miles long (4½ miles of curves), with a maximum gradient of 1 in 4, has been constructed.



Pilaster.

Pilaster, in Classical Architecture, a square pillar, sometimes standing free, but usually attached to a wall, from which it projects ⅙th, ¼th, or other definite proportion of its breadth. Greek pilasters, or antæ, were of the same breadth from top to bottom, and had different capitals and bases from those of the orders with which they were associated. The Romans gave them a taper like the columns, and the same capitals and bases.

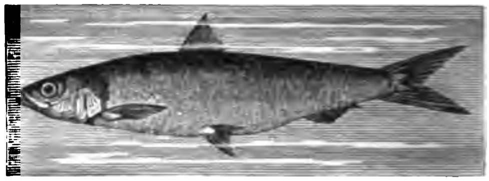
Pilate, Pontius, the fifth Roman procurator of Judæa and Samaria, from 26 to 36 A.D. He was personally convinced of the innocence of Jesus, and tried to save him, yet sent him to be crucified to appease the raving mob of Jerusalem, washing his hands before the people to show that he took no responsibility for his death. His rapacity and cruelties caused many outbreaks, which were sternly suppressed, and at length culminated in the murder of a number of Samaritans on Mount Gerizim, which caused such loud complaints that Vitellius sent him to Rome to answer to Cæsar (36 A.D.). Eusebius tells us that Pilate made away with himself; others say that he was banished to Vienna Allobrogum (*Vienne*), or beheaded under Nero. In the Eastern Church there is a persistent tradition that he eventually embraced Christianity like his wife, and indeed in the Ethiopic Church Pilate is commemorated as a saint, his day falling on June 25. Pilate is said by Justin Martyr, Tertullian, and Eusebius to have forwarded to Tiberius for his own justification an account of the judgment of Jesus, but the so-called *Report*, and *Acts of Pilate*, as well as the two letters of Pilate to Tiberius, have no claim to authenticity.

Many legends have clustered round the sinister figure of Pontius Pilate. One relates how his body was flung into the Tiber, and caused the river to overflow, and how it was next thrown into the Rhone near Vienne, but (according to the latest form of the mediæval legend) again caused so great a storm that it was carried to Mount Pilatus near Lucerne, and there sunk securely in the deep pool on its top. But here again it made storms arise, and every year to this day on Good Friday the devil lifts him out of the pool and sets him on a judgment-seat, where he washes his hands anew.—Pilate's wife, traditionally called Procla or Claudia Procula, from her solemn warning to her husband against putting Jesus to death, has been regarded as a Christian by Origen, Chrysostom, and Hilary. In the Greek Church she is a saint, her day falling on October 27. See R. A. Lipsius, *Die Pilatus-Acten* (Kiel, 1871).

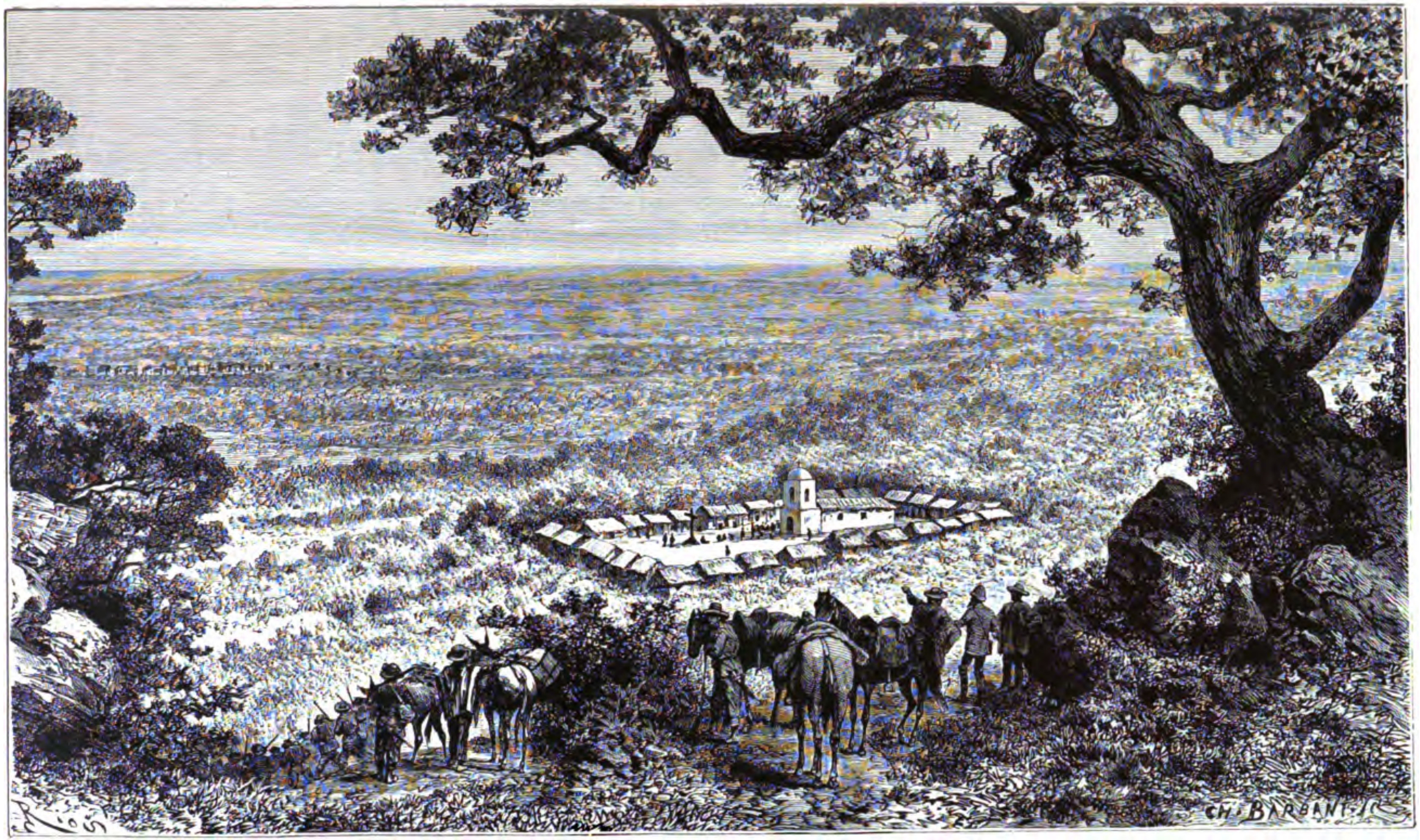
Pilatus, Mount (Lat. *Mons Pileatus*, 'the hooded peak,' from its top being frequently enveloped in cloud; the legends connecting Pilate (q.v.) with the place have presumably grown out of the altered name), an isolated mountain at the western end of the Lake of Lucerne, rising opposite the Rigi. The lower half is clothed with wood and meadow, where in summer over 4000 head of cattle are pastured; the upper portion is a mass of bare and jagged peaks, rising in the Tomlishorn to 6998 feet. Below the summit lies Lake Pilatus (see preceding article). On two of the peaks there are hotels; and since 1889 there has been a tooth-and-rack railway from Alpnach to the top, whence there is a splendid view of the Bernese Alps. In 1891 a steel tower was undertaken, to be 300 feet in diameter at its base and 840 feet high, and so pierce any enveloping cloud.

Pilau, or Pillaf, a dish common in Turkey, Egypt, Syria, and India, consists generally of rice, thoroughly boiled, drained, and gently stirred with butter, pepper, and finely-chopped onions. For the tables of the wealthy, fowls, lamb, mutton, shreds of ham or bacon, variously cooked, but always much boiled or roasted, are placed on the top of the rice, and served up with it.

Pilchard (*Clupea pilchardus*, or *Alosa sardina*), an important fish of the family Clupeidæ. The pilchard is nearly equal in size to the herring, but rather thicker, and the lines of the back and belly are straighter; the scales are also larger and fewer; and the dorsal fin is rather farther forward. The mouth is small, and in the adult fish destitute of teeth; the under-jaw is longer than the upper. The upper part of the body is bluish green, the sides and belly silvery white, the cheeks and gill-covers tinged with golden yellow, and marked with radiating striæ, the dorsal fin and tail dusky. The pilchard is an inhabitant of more southern seas than the herring. In British seas it is abundant off the coasts of Devon and Cornwall, and the south and south-west coasts of Ireland; towards the east end of the English Channel it becomes scarce, and off the more northern coasts of the British Isles it is only taken occasionally in small numbers. It extends in abundance throughout the Bay of Biscay, along the west coast of Portugal, and the shores of the Mediterranean; its southern limit is Madeira. In France this fish is known as *la sardine*. It is true that the sardines in oil imported into Great Britain are smaller than the majority of English pilchards, but they are of the same species. The English pilchard is usually about 10 inches long. The French sardine is said by Moreau to be from 12 to 20 cm. in length—i.e. 5 to 8 inches—sometimes reaching 25 cm. or 10 inches. The fish used for preserving in France are certainly young and not full grown. Pilchards are now prepared in oil in the same way as French sardines, at Mevagissey in Cornwall, and have an extensive sale; so are Sprats (q.v.) at Deal. The fish are captured both by drift-nets and seines; the former method is pursued along the south coast of Devon and Cornwall, while the principal seat of the seine-fishery is St Ives. The drift-net fishing begins in August and continues with fluctuations until the following April, the largest number being landed in November, December, and January. The drift-nets are each 120 yards in length, and a fleet consists of twelve to fifteen, fastened together, and extending to nearly a mile. They



Pilchard (*Clupea pilchardus*).


CH. BARBANT. SC.

A MISSION ON THE PILCOMAYO.

Vol. VIII., page 177.

are 6 fathoms in depth, and the meshes are usually thirty-six to thirty-eight to the yard. The mesh of the nets used on the French coast is much smaller, not exceeding $\frac{3}{8}$ths of an inch square. The smallest seines used at St Ives are 160 fathoms long, with a depth of 8 fathoms at the centre, and 6 fathoms at the wings; the meshes are $\frac{3}{4}$ths of an inch square. In the seine the fish are not meshed: if they were they would cause the net to sink. There are only six 'stations' or places fit for hauling the seine at St Ives, and over two hundred seines. The nets are therefore divided into groups, and each net has to await its turn at the station to which it belongs. The regulations of the fishery are contained in the Sea-fisheries Act, 1868, 31 and 32 Vict. chap. 45, sect. 68. The seine-fishery is carried on principally between August and Christmas. Most of the pilchards landed in Devon and Cornwall are salted for the Mediterranean market, especially Italy. They were formerly cured dry, the fish being piled in heaps with salt on a floor, and the brine and oil draining away from them constantly. After remaining thus about a month the fish were sifted from the salt, washed, packed in barrels, and subjected to pressure which forced more oil from them. But at present the salting is carried out in watertight vats, so that the brine formed rises over the fish, and they are kept steeped in the liquid for several weeks or months. They are then washed, packed, and pressed as before, the oil being collected and sold principally for the use of leather-dressers. This wet process produces much cleaner and brighter-looking fish than the old dry process. Twelve thousand to fifteen thousand hogsheads of these cured pilchards are annually exported to the Mediterranean, each hogshead containing from 2500 to 3000 fish, and weighing 476 lb. gross. A large number of pilchards are also used as bait for long-line and hand-line fishing, and a good many are eaten fresh locally or in distant markets.

Unlike herrings, the pilchards which are captured are not in breeding condition, but are fat, with small reproductive organs. In fact the habits of the pilchard are the direct converse of those of the herring. The pilchard is found feeding near shore in more or less abundance for nine months of the year, but in June, July, and August, when as a rule none are being caught near shore, spawning pilchards are found at some distance, 10 to 50 miles or more, from the land. At this season a few are occasionally taken in mackerel nets, in which the largest ones are meshed in consequence of their swollen condition. The ova, unlike those of the herring, are quite transparent, and buoyant like those of the cod and mackerel; they pass through their development while suspended separately in the sea-water. Like the herring, the pilchard feeds upon minute crustacea and other animals, some adult, some larval, which swarm in the sea.

The principal foreign fisheries are at Concarneau and other places in the Bay of Biscay, the mouth of the Tagus in Portugal, and Marseilles, Nice, and other ports in the Mediterranean. In Scotland the pilchard is known as the *Gypsy Herring*, *Garvie Herring* (the sprat being *Garvie*), or *Crue Herring*.

Pilcomayo, a river of South America, which takes its rise in two branches in the Bolivian Andes, in the department of Potosí, flows in a very winding course south-east through the Gran Chaco, separating Paraguay and Argentina, and finally joins the Rio Paraguay a little below Asuncion. Its length is said to be 1700 miles, but this is mere guess-work, as no one yet has explored its entire course, and what is known of it is too tortuous for a basis on which to estimate the whole. The volume of water brought down is comparatively insignificant, much being spent in lagunes on its way; at the mouth there is scarcely any perceptible current, and the breadth is not 60 yards, while within the first 200 miles it narrows more than once to less than 20 yards, and moreover divides into branches, among some of which explorers, like Captain Page, have lost their way. There have been many attempts, all fruitless, made to open the river route between Argentina and Bolivia; since 1556 a score of expeditions have been sent out, and many of the explorers have perished. Some have obtained 6-feet soundings for 255 miles from the mouth, but then came rapids, where the river was not more than 2 feet deep; the upper stream, too, is rendered impassable by numerous rapids, and long canals would be required to open the river to navigation. In its upper course its sands are auriferous and the banks fertile; lower down the valley is swampy. The river's water is rendered like brine by the great salt lakes of the Chaco—in which part the river is buried for hundreds of leagues in a great forest of fan-palms.

Piles are usually squared logs of wood used in engineering operations, such as dams, bridges, and roads (see COFFERDAM, &c.) They are sharpened at the point, and, if necessary, protected with iron points, to enable them to cut through the strata they encounter as they are driven into the ground. Piles are also used for permanent works, when they are driven through loose soil till they reach a firm bottom, and thus form a foundation on which buildings, roads, &c. may be placed. Cast-iron is also used for piles, which are cast hollow. Common piles are driven in by machines called *pile-drivers.* In these a heavy weight (or monkey) is raised to a considerable height between two guides, and then let fall on the head of the pile. The application of steam to these drivers has made them very powerful engines—Nasmyth's steam-hammer being a well-known instance. See also LAKE-DWELLINGS.

Piles, or HÆMORRHOIDS, are small tumours situated either within or on the verge of the anus. The first step in their development is the dilatation of one or more veins in this region. They consist of folds of skin or mucous membrane, with the subjacent tissues in an inflamed, infiltrated, or permanently thickened condition, and usually contain enlarged veins, though these sometimes become obliterated. There are several varieties of these tumours. Sometimes the pile is mainly composed of a little knot of varicose veins; in this case it is readily emptied by pressure of the fluid blood contained in it, which, however, returns when the pressure is removed. Sometimes the blood coagulates, either in a dilated vein, or, if this has given way, around it, forming a solid tumour surrounded by tissues thickened in consequence of inflammation; or the tumour may consist of a kind of erectile tissue formed by an abnormal condition of the vessels of the mucous membrane; this variety is especially liable to bleed. These tumours are divided into *bleeding* and *blind* piles, according as they are or are not accompanied with hæmorrhage; and into *internal* and *external* piles, according as they are within or without the sphincter muscle of the anus.

The following are the general symptoms of this affection. The patient, after having experienced for a varying time a feeling of heat, fullness, and dull pain about the lower part of the bowel, becomes conscious of a sensation as if there were a foreign body in the anus, and on examination after an evacuation discovers a small tumour, usually about the size of a grape, which either remains outside or is retracted, according as it originated without or within the sphincter. This tumour gradually increases, and others form around it, until a mass at length results as large as a pigeon's egg, or larger. In its ordinary *indolent* state the tumour has little sensibility, and occasions comparatively little annoyance; but when it is *inflamed* (from strangulation by the sphincter muscle, or from any other cause) it is exquisitely tender to the touch, and is the seat of burning and stinging sensations, rendering the evacuation of the bowels (and sometimes of the bladder also) difficult and painful. In women an inflamed pile may cause pain in the back, irritation of the womb, with mucous discharge, and many other anomalous symptoms. In severe cases the patient can neither stand nor sit with comfort, and only finds relief in the horizontal position. In internal piles the most important symptom, sometimes the first to be noticed, is hæmorrhage, which may be so profuse or so often repeated as to threaten the patient's life.

Piles may be caused by any circumstances which cause congestion in the lower bowel, such as luxurious and sedentary habits of life, pregnancy, and such diseases of the liver as tend to check the return of blood from the veins of the rectum. Moreover, anything that causes irritation of the rectum, such as excessive use of purgatives, dysentery, inflammation of the prostate gland, &c., may cause piles. But of all causes constipation is probably the most frequent; it operates in producing them partly by the pressure of the accumulated and hardened fæces upon the veins carrying the blood away from the rectum, and partly by the straining and irritation such fæces occasion during their evacuation.

In the treatment of piles it is expedient to relieve the congested state of the lower bowel by one or two doses of sulphate of magnesia, and a cooling vegetable diet, after which the continued use of mild laxatives should be resorted to. A teaspoonful of an electuary, consisting of an ounce of confection of senna, half an ounce of cream of tartar, and half an ounce of sulphur, if taken in the middle of the day, usually acts gently about bedtime, which is far the best time for the bowels of patients of this kind to act, as the parts irritated by the passage of the evacuation become quieted during the night. In long-standing cases, in which there is general relaxation of the mucous membrane, the confection of pepper in doses of a drachm may be given thrice daily with advantage, or a scruple of common pitch may be taken at bedtime in the form of pills or in capsules. Preparations of witch-hazel (*Hamamelis virginica*) are also useful. Amongst the milder forms of local treatment must be mentioned (1) the injection of the rectum with cold water both before and after the motion; (2) washing the anus with yellow soap and water after each evacuation—this should never be omitted by any one who suffers from piles; (3) the application of gall ointment or of other astringents; and (4) the injection of astringent lotions, as, for instance, of sulphate of iron, in the proportion of a grain to an ounce of water. When the piles are inflamed, leeches to the anus (but not applied directly to the tumours) are sometimes required; but the inflammation generally subsides under the influence of rest in the horizontal position, fomentations, poultices, and low diet. In severe and prolonged cases operative interference becomes necessary. For external piles removal with scissors is usually employed. In certain forms of internal piles the application of caustics, especially nitric acid, sometimes suffices. Where their removal is required it may be effected either by ligature or by cauterisation.

The treatment of the hæmorrhage that frequently accompanies piles requires a few words. If the bleeding is moderate in quantity, and has continued for some time without inducing weakness or any other bad symptom, it is not expedient to interfere with it. When, however, it obviously requires checking, the effect of cold water injected into the rectum, as already recommended, should be tried, and, in case of its failing, astringent injections should be had recourse to. At the same time the patient should remain in the horizontal position, and take the medicines usually prescribed for internal hæmorrhage, amongst which may be especially mentioned witch-hazel, oil of turpentine, in doses of twenty drops three or four times a day, or ergot of rye in divided doses to the extent of a drachm daily. In rare cases it is necessary to tie a vessel, or to touch it with a red-hot wire (through the speculum), or to plug the anus.

Pileus (Lat., 'a hat'), the upper expanded portion of many Fungi (q.v.).

Pilewort. See Ranunculus.

Pilgrim (Ital. *pellegrino*, Lat. *peregrinus*, 'a visitor of foreign lands'). A pilgrim is one who visits, with religious intent, some place reputed to possess especial holiness. The early Christians, like the Jews and the pagan Gentiles, regarded certain places with special religious interest; above all, the Holy Land, and particularly the scenes of the Passion of our Lord at Jerusalem. St Jerome refers the practice of visiting Jerusalem to the discovery of the Holy Cross by St Helena. He himself was a zealous pilgrim; and throughout the 4th, 5th, and 6th centuries pilgrims habitually undertook the long and perilous journey to the Holy Land from almost every part of the West. Other sacred places, too, were held to be fit objects of the same visits of religious veneration. The tombs of the apostles Peter and Paul, and of the martyrs in the catacombs at Rome, are so described by St Jerome. St Basil speaks in the same terms of the tomb of the Forty Martyrs; and the historian Theodoret tells of not only visiting such sanctuaries, but of hanging up therein, as offerings, gold and silver ornaments, and even models of hands, feet, eyes, &c., in commemoration of the cures of diseases supernaturally obtained as the fruit of these pious visits. The Pilgrimage, however, pre-eminently so called, was that of the Holy Land; and, even after Jerusalem had been occupied by the Saracens, the liberty of pilgrimage, on payment of a tax, was formally secured by treaty; and it was from the necessity of protecting pilgrims from outrage that the well-known Military Orders had their origin. The Crusades may be regarded as a pilgrimage on a great scale; the direct object being to secure for the Latin Christians immunity of pilgrimage. On the other hand, the final abandonment of the Crusades led to a great extension of what may be called domestic pilgrimage, and drew into religious notice and veneration many shrines in Europe, which, after the lapse of time, became celebrated places of pious resort. The chief places of pilgrimage in the West were, in Italy—Rome, Loretto (q.v.), Assisi; in Spain—Compostella, Guadalupe, Montserrat; in France—Fourvières at Lyons (q.v.), St Denis; in Germany—Maria Zell, Cologne, Trèves; in Switzerland—Einsiedeln; in England—Walsingham, Canterbury, and many others of minor note; in Scotland, Whithorn, Whitekirk (near North Berwick), Loretto (near Musselburgh), Scone, Dundee, Paisley, and Melrose; in Ireland, Lough Derg (q.v.), and many places connected with the life or death of the early Irish saints. The pilgrim commonly bound himself only by a temporary vow (differing in this from the palmer), which terminated with the actual visit to the place of pilgrimage, or at least with the return home, and by which he was bound for the time to chastity and to certain other ascetic observances. The costume consisted of a black or gray gabardine, girt with a cincture, from which a shell and scrip were suspended, a broad hat, ornamented with scallop-shells, and a long staff. Many abuses arose out of these pilgrimages, the popular notions regarding which may be gathered—although, probably, with a dash of caricature—from Chaucer's *Canterbury Tales*, and from Erasmus' account of the pilgrimage to Walsingham (*Peregrinatio religionis ergo*). Pilgrimages have gone much into disuse in France since the Revolution. In late years, however, pilgrims have resorted in large numbers, not only to the ancient sanctuaries of Fourvières, Puy, &c., but also to La Salette, Paray-le-Monial, and since 1858 to Lourdes. There were special pilgrimages by English Catholics to Pontigny (1874), Holy Island (1887), and Iona (1888). Knock (q.v.) has become since 1880 a resort of Irish Catholics. Positivists also visit the places connected with the lives of selected great men. Benares is one of the great places of pilgrimage for Hindus; and the Hajj to Mecca is the goal of every true Moslem's ambition. See Jusserand's *English Wayfaring Life in the Middle Ages* (Eng. trans. 1888).

Pilgrimage of Grace, the name given to a rising of the rural population in the counties of Lincolnshire and Yorkshire in the end of 1536. When the commissioners charged with the suppression of the minor monasteries arrived in Lincolnshire, reports were spread abroad among the people that all the church jewels and plate were to be taken away, that most of the churches were to be pulled down, that new taxes were to be levied, and that the rights of the commons were in other ways to be vexatiously interfered with. The rising began at Louth on 1st October; 20,000 men soon gathered at Lincoln, under the leadership of Dr Mackerel, Abbot of Barlings, a shoemaker named Melton, better known as Captain Cobbler, and some of the dispossessed monks and gentry. But the approach of the Duke of Suffolk from the south, and a proclamation by the Earl of Shrewsbury, who was drawing near from the west, stating that what had been done was with the consent of parliament, and promising a free pardon to the rebels, caused them to disband and go away home (October 13). In the meantime a similar rising for precisely similar causes had taken place in Yorkshire; it began on 9th October in the East Riding, the chief leader in the movement being a lawyer named Robert Aske. The rebels, 40,000 in number, took York and Pontefract, capturing in this last town Lord Darcy and the Archbishop of York (not unwilling to be captured). The king sent against them the Earl of Shrewsbury and the Duke of Norfolk, and on the reading of a similar proclamation to that in Lincolnshire they dispersed to their homes. In the following year Aske, Sir Robert Constable (who had been associated with Aske in the leadership), Lord Hussey (suspected of complicity in the Lincolnshire movement), Mackerel, and others, about twenty in all, were executed. See Gairdner's Preface to *Calendar of State Papers, Foreign and Domestic: Henry VIII.*, vol. xi. (1888).

Pilgrim Fathers, the first English colony which settled in Massachusetts (q.v.). The company, numbering one hundred men, women, and children, set sail from Plymouth in the *Mayflower* on 6th September 1620, bound for the banks of the Hudson; but after a long and stormy voyage they were driven to the bleak and desolate shores of Cape Cod, and finally landed on 21st December. Their settlement they called Plymouth; and there a noble monument has been erected to their memory. See chap. iii. of Deverell's *Pilgrims and the Anglican Church* (1887), and works there cited; also Goodwin's *Pilgrim Republic* (Boston, 1888).

Pilibhit, a town in the North-west Provinces of India, 30 miles NE. of Bareilly by rail. Pop. (1881) 29,721; (1891) 33,799.

Pillar, a detached support like a column; but its section may be of any shape, whereas the column is always round. Pillars have been used in all styles of architecture, and their forms and ornaments are usually amongst the most characteristic features of the style. The Greek and Roman pillars (or columns) are the distinguishing elements in the various orders. In Gothic architecture, also, the pillars or piers are of different forms at the various epochs of that style. In the Norman period we have plain massive pillars, square, circular, and octagonal, frequently ornamented with zigzag ornaments, spiral bands, &c. on the surface (fig. 1). As vaulting progressed, the system of breaking the plain surface of the pier, and giving to each portion of the vaulting a separate little column or shaft to support it, was introduced. This was done either by attaching shafts to the pillars, or by cutting nooks in the pillars and setting little shafts in them, thus: *a*, *b*, fig. 2. In the Early Pointed style a plain circular or octagonal pillar, with a number of small shafts attached around it, is a favourite arrangement, thus: *c*, *d*, fig. 2. In this style the attached shafts are very frequently banded to the main pillar at different heights, and they are sometimes made of a finer material, such as Purbeck marble. In the Decorated style the pillar is of a lozenge form, and not so much ornamented with detached shafts as with mouldings; plain, circular, or octagonal pillars, however, are used in this, as in all the styles. The mouldings and shafts are usually filleted; and some of the mouldings run up into the arch without any cap. In Perpendicular the same idea is further carried out; the mouldings become thinner, and are more frequently run up into the arch without caps. See FLAMBOYANT.

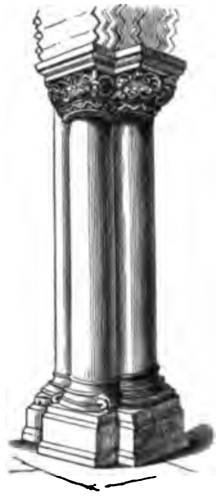


Fig. 1.
Norman Clustered Pillar.

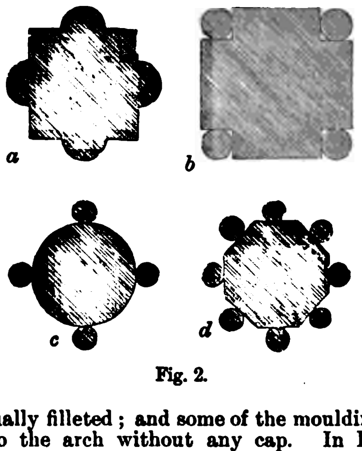


Fig. 2.

Pillar-saints, an English rendering of the Greek *stylitai*, the name of a class of hermit-ascetics, chiefly Syrian, who crucified the flesh by living on the summit of pillars in the open air. The most noted was Simeon called Stylites (q.v.).

Pillau, a Prussian town and fortress of the third rank on a spit of land at the entrance of the Frisches Haff, 30 miles W. of Königsberg by rail. Pop. 3434.

Pillnitz, the ordinary summer residence of the royal family of Saxony, in a beautiful situation on the Elbe, 5 miles SE. of Dresden. The palace embraces three main buildings or 'castles,' and is surrounded with beautiful parks and gardens. Here, in August 1791, the Declaration of Pillnitz was framed, according to which Austria and Prussia agreed to take common action on behalf of the royal family of France against the Republicans.

Pillory, an engine for the public punishment of criminals, disused in Britain since 1837, but previous to that time commonly employed, as it also was in France and Germany. It consisted of a stout plank fixed like a signboard on the top of a pole, the pole being supported on a wooden platform elevated above the ground. Above, and parallel to this plank, another of like dimensions was placed in a similar position with respect to the pole, and fixed to the former by a hinge, being thus capable of being moved upwards from it, or closed upon it, when necessary. A large circular hole was cut, with its centre in the line of junction of the two planks, and two corresponding holes of smaller size were formed, one on each side of it; the large hole was for receiving the neck, and the two smaller the wrists. When a criminal was to be placed in the pillory he was made to mount and stand upon the platform; the upper of the two hinged planks was raised to allow the culprit's neck and wrists to be inserted in their proper grooves, and then brought down into its place, and fastened by a padlock, or in some other way. The pillory seems to have existed in England before the Conquest, in the form of the *stretch-neck* (an instrument by which the neck only was confined), and was originally intended, according to the 'Statute of the Pillory' (51 Hen. III. chap. 6), for persons guilty of forestalling and regrating, using deceitful weights and measures, perjury, &c. Its use was exclusively confined to this class of offenders till 1637, when restrictions were put upon the press, and all who printed books without a license were put in the pillory. From this time it became the favourite mode of punishing libellers against the government, and many eminent men were accordingly from this time pilloried, among them Leighton, Lilburn and Warton the printers, Prynne, Dr Bastwick, and Daniel Defoe. These sufferers were popular favourites, and the encouragement, applause, and sympathy of the crowd around converted the intended punishment into a triumph; but such men as Titus Oates, and the class of offenders including perjurers, swindlers, polygamists, &c., who were objects of popular hatred and disgust, were pelted with rotten eggs, garbage, mud, sometimes even with more dangerous missiles. In 1797 the preacher Thomas Evans was pilloried for singing a seditious Welsh song; so too, in May 1812 was Eaton, the publisher of Paine's *Age of Reason;* and in 1814 the celebrated naval hero Lord Cochrane, afterwards Earl of Dundonald, was sentenced to stand an hour in the pillory, but in the latter case the government did not dare to carry the sentence into effect. The punishment was abolished for all offences save perjury in 1815; and the perjurer Peter James Bossy was the last to stand in the London pillory, in the Old Bailey, for one hour, on 22d June 1830. In France the pillory was anciently called *pilori* (a word of unknown origin), and in recent times *carcan*, from the iron collar by which the criminal's neck was attached to the post; and even so late as 1840 a woman who had poisoned her husband was at least sentenced to the pillory at Tulle as part of her punishment.

See Douce's *Illustrations of Shakespeare*, Griffith's *Chronicles of Newgate*, Andrews' *Punishments in the Olden Times*, and Jewitt in the *Reliquary* for April 1861. See also JOUGS, CANG, and STOCKS.

Pills are the most generally convenient and popular of all forms of medicine. They are formed from masses of a consistence sufficient to preserve the globular shape, and yet not so hard as to be of too difficult solution in the stomach and intestines. This form is especially suitable for (1) all remedies which operate in small doses, as metallic salts; (2) those which are designed to act slowly and gradually, as certain alteratives; (3) those which are too readily soluble when exhibited in other forms; (4) substances whose operation it is desirable to retard until they have reached the lower intestines, as in certain pills for habitual costiveness; (5) bodies whose specific gravities are too inconsiderable to allow their suspension in aqueous vehicles; and (6) fetid substances: while it is unsuitable for (1) medicines which require to be given in large doses; (2) deliquescent salts; (3) fluid or semi-fluid substances, such as oils, balsams, &c., which require a very large proportion of some dry powder to render them sufficiently tenacious to form into a mass; (4) substances so insoluble that when exhibited in solid form they pass through the intestinal canal unaltered, as extract of logwood. Many substances, such as vegetable extracts, may be at once formed into pills without any addition; but most substances require the addition of a material termed an excipient for converting it into a pill-mass. The excipients in most common use are bread-crumbs, hard soap, extract of liquorice, mucilage, syrup, treacle, honey, castor-oil, and conserve of roses. From the property of preserving pills for a long time in a properly soft state the most valuable excipient is the conserve of red roses; and, perhaps, next to it treacle is the most valuable excipient, as it does not undergo any change by time, but maintains a proper consistence, and preserves the properties of vegetable powders unimpaired for years. It is common to place pills in some fine powder to prevent them from adhering to each other, and to conceal their taste. For this purpose liquorice powder, wheat-flour, starch, and magnesia are generally used in Britain, and lycopodium on the Continent. Pills retain their moisture and activity far longer in small bottles than in the ordinary pasteboard boxes. The ordinary weight of a pill is five grains; if it much exceeds that weight it is too bulky to swallow conveniently if consisting of vegetable matter. It is very common to meet with patients who express their inability to take this form of medicine. If, however, they practise with a small globular mass towards which they feel no repugnance, as a pellet of bread or a currant, placing it on the back of the tongue and gulping it down with water, they will soon get over the difficulty.

To many people the taste of pills is a great deterrent, and various methods of coating the pills are resorted to for their benefit. Formerly coating with gold or silver leaf or with a little tolu resin dissolved in chloroform were the only methods; but more recently gelatine-coated, sugar-coated, and pearl-coated pills have been prepared in vast quantities and have become very popular. There is, however, always a risk of the deterioration of such pills, owing to the length of time which they may be kept before being sold. See also QUACK DOCTORS.

Pilocarpine. See JABORANDI.

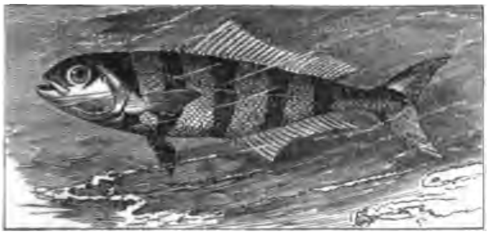
Pilot is a person specially deputed to take charge of a ship while passing through a particular sea, reach, or dangerous channel, or from or into a port. Pilots are of three classes—(1) those licensed to act in districts where the pilotage is compulsory; (2) those licensed to act where the pilotage is not compulsory; (3) unlicensed pilots. British pilots are licensed by the Trinity Houses of London, Hull, Newcastle-on-Tyne, and Leith, and by Pilotage Commissioners in other ports. The British pilotage laws were consolidated by 6 Geo. IV. chap. 125 and in 1853, but extensive changes were made by the Merchant Shipping Act of 1855, part v., and minor changes in 1862, 1872, 1874, and 1889. By the last of these acts the monopoly of employment claimed by licensed pilots has been strengthened. The scale of pilotage fees paid by the ship depends upon the distance piloted and the ship's draught of water. The fees earned are sometimes retained by the pilot earning them, less deductions for collection, superannuation, sick, or widows' funds, and sometimes they are thrown into a joint stock.

In the United States the several states make their own pilotage laws, which generally provide for the appointment of commissioners with power to make all needful rules and regulations.

A British pilot-boat must have conspicuously painted upon it its number, owner's name, and the port to which it belongs, and must show a large flag of two horizontal stripes, the upper white and the lower red. At night a pilot-vessel on its station shows a white light, and in addition shows a flare at intervals not exceeding fifteen minutes. Shipmasters or mates are often licensed to act as pilots for their own vessels.

By British law no owner or master of any ship is answerable to any person whatever for any loss or damage occasioned by the fault of any qualified—i.e. licensed—pilot acting in charge of such ship, within any district where the employment of such pilot is compulsory by law, but this law is not international nor universal. In general, foreign nations are more stringent than Britain in excluding aliens from their pilotage services for military reasons.

Pilot-fish (*Naucrates ductor*), a well-known fish which accompanies sharks and follows ships. It usually keeps to the open sea, and is very widely distributed in tropical and temperate regions. From the Mediterranean it sometimes follows ships to British coasts. In length it is about a foot, in shape like a mackerel, in colour variable, though generally grayish blue with five transverse dark blue bands. The first dorsal fin is represented by a few spines. Its zoological position is beside the horse-mackerels in the family Carangidæ.



Pilot-fish (*Naucrates ductor*).

Many wonderful stories are told about the pilot-fish, which seems to be the *Pompilus* of the ancients. It is said to guide the shark to its prey—nay, more, to show sailors their desired course. It certainly is a very frequent companion of the shark, especially if that fish be swimming alone, but the precise nature of the association is doubtful. The pilot-fish probably follows the shark as it follows a ship for the sake of scraps of food, and perhaps eats the parasitic crustaceans, &c., with which the skin of the shark is often infested. Moreover, companionship with the shark probably protects the pilot-fish from its enemies.

Piloty, Karl von, head of the new Munich school of painters, was born in that city on 1st October 1826, studied at its academy, and sat at the feet of Schnorr and Schorn and the modern French and Belgian masters of colour. In 1856 he was appointed professor of Painting at the Munich Academy, and in 1874 succeeded Kaulbach as director of the same. He died in his native city on 21st July 1886. All his best pictures belong to the class of historical genre; several of them adorn the sumptuous palaces of art built by the Bavarian kings at their capital, as the Maximilianeum and the New Pinakothek. Piloty was a pronounced realist; he strove to reproduce nature exactly, even to the minutest details, but did not steer clear of the dangers that beset the endeavour to carry out these principles to their most rigorous conclusions. He distorts the relative importance of essentials and subordinate details, and, in spite of his skill as a portraitist, his pictures frequently have a theatrical air. His drawing was strictly objective; but he allowed his personal tastes all the more freedom in the choice of subject and in the employment of colour. Most of his pictures have melancholy subjects and a pathetic effect or sad background; amongst the best of them may be quoted 'Seni beside the Body of Wallenstein,' 'Nero amid the Ruins of Rome,' 'Wallenstein's March upon Eger,' 'Galilei in Prison,' 'Columbus,' 'Death of Cæsar,' 'Announcement of the Sentence of Death to Mary Stuart,' 'Thusnelda in the Triumph of Germanicus,' and 'Death of Alexander the Great.' Piloty was an excellent teacher, his principal endeavour being to develop the individual genius of his pupils, amongst whom were Makart, Defregger, Lenbach, Max, Dietz, and others. See the *Art Journal* for 1865; Mrs Howitt-Watts' *Art-student in Munich* (2d ed. 1879); and Rosenberg, *Die Münchener Malerschule* (1887).

Pilpay. See Bidpai.

Pilsen, the second town of Bohemia, situated in a fertile and beautiful valley, 67 miles by rail SW. of Prague. There are numerous active industries, producing building materials, machinery, metal-work, porcelain, spirits, liqueurs, leather, &c. In the neighbourhood are mines of iron, alum, vitriol, coal, and sulphuric acid. But the town is most widely known from giving its name to the most approved kind of Bohemian beer, which is brewed to the extent of 9 million gallons a year, and (whether made there or elsewhere) is now largely imported into Britain. The town was stormed by Zizka in the Hussite war and by Count Mansfeld in the Thirty Years' War (1618); it was Wallenstein's headquarters in 1633–34. Pop. (1880) 38,883; (1890) 50,693.

Pimento, also called Allspice or Jamaica Pepper, a well-known spice, the dried fruit of *Eugenia Pimenta*, a small West Indian tree chiefly confined to Jamaica, which grows to the height of 20 or 30 feet, and has oblong or oval leaves about 4 inches long, of a deep shining green, and numerous axillary and terminal trichotomous panicles of white flowers, followed by small dark purple berries. The pimento-tree is cultivated in some of the West Indian Islands. It is a very beautiful tree, with straight white trunk and much-branching head; about the month of April it is covered with an exuberance of flowers, which diffuse a rich aromatic odour. The leaves and bark partake of the aromatic property for which the fruit is valued. The fruit, when ripe, is filled with a sweet pulp, and the aromatic property which so strongly characterises it in an unripe state has in a great measure disappeared. The gathering of the berries, therefore, takes place as soon as they have reached their full size, which is about that of peppercorns. They are gathered by the hand, and dried in the sun on terraced floors, during which process great care is taken, by turning and winnowing, to prevent them from being injured by moisture. Their colour changes in drying from green to reddish brown. When dry they are packed in bags for the market. Some planters kiln-dry them. The name *Allspice* was given to pimento from a supposed resemblance in flavour to a mixture of cinnamon, nutmeg, and cloves. Pimento is much employed in cookery, and is also used in medicine as a carminative and stimulant to prevent the griping of purgatives, and to disguise the taste of nauseous drugs. It depends for its properties chiefly on a volatile oil, *Oil of Pimento*, which is obtained from it by distillation with water, and is sometimes used to relieve toothache. The leaves are used for tanning, and a large trade is carried on in young shoots of the tree. From 3000 to 4000 bundles (500 to 800 in each bundle) are shipped annually from Jamaica for sticks for umbrellas. The crop of pimento in Jamaica, which alone furnishes the spice to commerce, varies. In 1888 it was 69,559 cwt., and in 1889, 46,179 cwt. The average receipts of the spice in England are about 4,000,000 lb.

Pimpernel (*Anagallis*), a genus of plants of the natural order Primulaceæ, having a wheel-shaped corolla, and the capsule opening by division round the middle. The species are elegant little annual and perennial plants, natives chiefly of temperate climates. The flowers are not large, but very beautiful. The Scarlet Pimpernel (*A. arvensis*) is a common plant in Britain, occurring as a weed in fields and gardens; it is common also in most parts of Europe and in many parts of Asia. The flowers are of a fine scarlet colour, with a purple circle at the eye. There is a common belief in England, mentioned by Lord Bacon, that when this plant opens its flowers in the morning a fine day may be expected; and they certainly close very readily on the approach of rain; hence the popular names it bears in some places—Poor Man's Weather-glass and Shepherd's Barometer. They usually open about eight in the morning, and close about noon. The Blue Pimpernel (*A. cœrulea*) is far less common in Britain, but very abundant in some parts of Europe. The Bog Pimpernel (*A. tenella*), frequent in bogs in England, but rare in Scotland, is an exquisitely beautiful plant. Several species are cultivated in flower-gardens. Acrid properties prevail in this genus, and *A. arvensis* has been used medicinally in epilepsy, dropsy, and mania. The name Water Pimpernel is given to *Samolus valerandi*, also called *Brookweed*, another British plant of the same order, with racemes of small white flowers, growing in watery gravelly places. It is supposed to be the Samolus which Pliny says the Druids gathered fasting, with the left hand, and without looking at it, ascribing to it magical virtues in the cure and prevention of diseases in cattle. Its geographic distribution extends over almost all the world.

Pimples. See PAPULES, ACNE, PUSTULES.

Pin. See PINS.

Pina Cloth, a beautiful fabric made of the fibres of the leaves of the pine-apple plant. See FIBROUS SUBSTANCES, BROMELIACEÆ.

Pinchbeck is an alloy of zinc and copper, in which the proportions slightly differ from those of ordinary brass, which has 2 parts of copper to 1 of zinc; but 4 of the former to 1 of the latter constitute pinchbeck, which has a reddish-yellow colour, and was at the beginning of the 19th century much employed in making watch-cases and other small articles in imitation of gold. It was named after its inventor, Christopher Pinchbeck, a London clockmaker, who died in 1732. The term is now but little used.

Pinckney, CHARLES COTESWORTH, an American statesman, was born at Charleston, South Carolina, 25th February 1746, was sent to England and educated at Westminster and at Christ Church, Oxford, read law at the Middle Temple, and studied for a while at the military academy in Caen. He afterwards settled as a barrister at Charleston. He was Washington's aide-de-camp at the battles of Brandywine and Germantown, and afterwards, as colonel, saw much active service, until 1780, when he was taken prisoner at the surrender of Charleston, and detained till the close of the war. A member of the convention that framed the constitution of the United States (1787), he introduced the clause forbidding religious tests as a qualification for office. He declined the secretaryship of war in 1794, and of state in 1795; in 1796 he was sent as minister to France, but the Directory refused to receive him, and he had to quit the country. It was while on this mission that, when it was intimated that peace might be granted in return for a money payment, he made the reply, 'Millions for defence, but not a cent for tribute.' In 1800–8 he was thrice an unsuccessful Federalist candidate for the presidency. He died 16th August 1825.

Pindar (Gr. *Pindaros*), the chief lyric poet of Greece, was born about 522 B.C. of Theban family at Cynoscephalæ, near Thebes, the capital of Bœotia, a district in which music and poetry were widely cultivated. His family, the Ægeidæ, was an old and illustrious one, often mentioned in the heroic legends. His father or his uncle was a flute-player, and Pindar inherited the musical talent of his family. He made music and poetry his profession, and was placed under the tuition of Lasus, a well-known musician and poet, at Athens. Though Thebes was the bitter foe of that city, Pindar often speaks of Athens with love and veneration. But Pindar seems, as a poet, to have been influenced far more deeply by Corinna and Myrtis, two poetesses then famous, with whom he competed for the prize at public contests. Corinna five times gained the victory over him. She assisted the young poet with her advice, judiciously as it would seem. It is said that she urged him to introduce mythical subjects into his poems, and then, when he had composed an ode introducing almost the whole Theban mythology in the first six verses, she smiled and said: 'We ought to sow with the hand, and not with the whole sack.' He commenced his career as a composer of choral odes for special occasions at the early age of twenty with a song of victory which still remains (*Pyth.* X., composed in 502). He soon reached the highest rank in his profession, and composed odes for persons in all parts of the Greek world. He was employed by the Sicilian rulers, Hiero of Syracuse and Thero of Agrigentum, by Arcesilaus of Cyrene and Amyntas of Macedon, as well as by the free cities of Greece. Wherever he went, he was honoured and loved for his own sake as well as for his art. States vied with one another in doing him honour; great cities like Athens created him their public guest. Though a frequenter of princely houses and king's palaces, he never lost his independence. In his poems he gives advice and reproof as well as praise to his patrons. He warns the great Hiero to avoid flatterers, and cautions Arcesilaus of Cyrene against undue severity. He resided four years at the court of Hiero. He died about the age of eighty in 443 B.C. Two conquerors—Pausanias, king of Sparta during the Peloponnesian war, and later Alexander the Great, who left no other dwelling in Thebes standing—spared the house of Pindar.

Pindar was in the prime of life when Salamis and Thermopylæ were fought, when Greek energy and enterprise were at their highest, and Greek poetry and philosophy were opening into their richest blossom. But his poetry belongs to the old rather than the new period of literature. In spite of his admiration for Athens, which he calls 'the pillar of Greece,' the spirit of Athens did not lay hold of him. Intellectually, he stands nearer to the age of Homer than to that of his contemporary Æschylus. Pindar's language is Epic, tinged with Doric. He wrote an immense number of poems, including hymns to the gods, pæans, dithyrambs, odes for processions (*prosodia*), mimic dancing songs (*hyporchemata*), choral songs of maidens (*partheneia*), convivial songs (*skolia*), dirges (*threnoi*), and odes in praise of princes (*encomia*). Of all these poems we possess fragments only, often very beautiful, but his *Epinikia* or Triumphal Odes have come down to us entire. They are divided into four books, celebrating the victories won respectively in the Olympian, Pythian, Nemean, and Isthmian games. The special occasion for which these odes were composed explains their character. A victory won either in the chariot-race, for prowess in wrestling or other exercises, or for skill in music was held to confer honour not only on the winner and his family, but also on his city, and received a solemn celebration. It began with a procession to the temple, where sacrifice was offered, followed by a banquet, and concluding with a boisterous revel (*comus*). Thus the festival was partly religious, partly convivial and joyous. For the occasion an ode was composed, and was sung by a chorus either during the procession or, more frequently, at the comus. An intense enthusiasm for athletic sports was one of the most distinctive features of the Greek, as of the English national character. The performance of a triumphal ode by a trained chorus to the music of lyre and flute, amid an enthusiastic concourse of the victor's townsmen, must have been one of the most stirring events of Greek civic life. Pindar treats the victory not as a mere incident, but as connected with the victor's whole life and history. He loves to dwell on the *moral* side of it, not merely on the bodily prowess which gained it, but on the temperance, love to parents, or piety which secured the favour of the gods who granted success. And this is to him no mere poetic fiction, for he has the sincerest faith in the divine superintendence. But it is too much to say, as Paley does (Trans. Pref. p. viii.), that Pindar shows 'unquestioning credulity in the wildest legends.' Of myths relating things unworthy of the gods he says with emphasis: 'I cannot think this way of divine beings!' (as of the myth of Pelops, *Ol.* i., and another regarding Hercules, *Ol.* ix.). The plan of his poetry is intricate, and the connection of the different parts is often very hard to see. Pindar takes up various trains of thought, either relating to the victor, his ancestors, the history of his city, or else moral reflection; he breaks off each of these before the application is seen, and it is not till the end of the poem that he weaves the different threads together and explains the allusions. Thus, says Müller, 'the curiosity of the reader is kept on the stretch throughout the entire ode.' The great merit of Pindar's poetry is its vividness and picturesque power, seen even in single epithets, as when he calls the mountain-mass of Etna, overtowering all heights in the island, 'the forehead of fertile Sicily.' It is this vigour and vividness which suggest Mrs Browning's picture of 'bold, electric Pindar . . . with race-dust on his cheeks,' and eyes that seem to see 'the chariot rounding its last goal.' The description of the happy lot of the good after the final judgment in the Islands of the Blessed (*Ol.* ii.), the voyage of the Argonauts (*Pyth.* iv.), and the vivid picture of the eruption of Etna in the First Pythian illustrate this power. To us his poems are specially interesting because they show as in a mirror the intense admiration of the Greeks for bodily prowess, strength, endurance, and beauty. Such gifts rouse in him a feeling of religious veneration; they come from the gods and are sacred. The groundwork of Pindar's poems consists in those legends which form the Greek religious literature. It will be seen that his life was intimately associated with the observances of Greek religion. In connection with the worship at Delphi he received unique honours. The belief in his devoutness as a worshipper of the gods shows itself in the legend, which apparently sprang up during his life, that the god Pan was seen and heard in a glade between Cithæron and Helicon singing one of Pindar's hymns. When once asked what sacrifice he intended to offer at Delphi, he answered 'a pæan,' a reply not presumptuous, for his odes are full of religious feeling, not formal but real. His protest against myths dishonouring to the gods shows a truly reverent nature and an enlightened belief. Both in its strength and in its deficiencies his poetry reminds us of his claim on his own behalf: 'That man is wise *who knows much by natural genius;*' but the poets, his rivals, '*those who have learned*, the versatile talkers, are but as crows vainly chattering against the divine bird of Zeus.' Thus the distinction between genius and talent is as old as Pindar's time. This high faith in his own poetic inspiration must not be mistaken for self-confidence; but it almost verges on a contempt for art which seems responsible for the frequent intricacy and obscurity of his poetry.

See Böckh (1811-21); Dissen (1830; re-edited by Schneidewin, 1840-47—commentary excellent, but, owing to Schneidewin's death, incomplete); Fennell (1879-83); Bury, *Nemean Odes*, 1891; translations by Cary in verse (1833), Paley (occasionally powerful, but arbitrary; 1869), E. Myers (2d ed. 1883). K. O. Müller's chapter (Müller and Donaldson's *History of Greek Literature*) is full of excellent criticism.

Pindar, PETER. See WOLCOT.

Pindaris, or PINDARREES, bands of freebooters or mercenary soldiers who, after the overthrow of the Mogul empire of India, grew (1804-17) to be a formidable power in the Central Provinces, their headquarters being at Malwa. Hastings, to put an end to their depredations, gathered two armies (120,000 men in all) in 1817 and crushed them.

Pind Dadan Khan, a town in the Punjab, stands one mile N. of the Jhelum and 110 miles NW. of Lahore. The people (16,724) make brass and copper utensils, pottery, whips, boats, and woollens, and carry on a large trade.

Pindus. See GREECE, Vol. V. p. 384.

Pine (*Pinus*), a genus of trees of the natural order Coniferæ (q.v.). Pinus is distinguished by monœcious flowers, and woody cones with numerous two-seeded scales, the scales having an angular truncated apex. The leaves are linear and very narrow, growing in clusters or in pairs, and surrounded by scarious scales at the base. To this genus belong many noble and useful trees. They mostly grow in mountainous or other exposed situations, and their narrow leaves are admirably adapted to evade the force of winds, which produce in the tops of pines a peculiar sound, much noticed by the ancient poets, more soft and continuous than in trees of richer foliage. Most of the pines are more or less social, one kind often covering a considerable tract; some of them clothing the sides and even the summits of mountains with magnificent but sombre forests; some growing in lower situations, on otherwise unproductive sandy grounds, as the *Pine Barrens* of North America. The pines growing in the most barren soils, or in the coldest climates and most exposed situations, are often very small, and, although very unlike any other shrubs or bushes, are scarcely to be called trees. Pines are widely diffused over the northern hemisphere, being found on mountains within and near the tropics, and in the colder temperate and the arctic regions descending to the level of the sea.

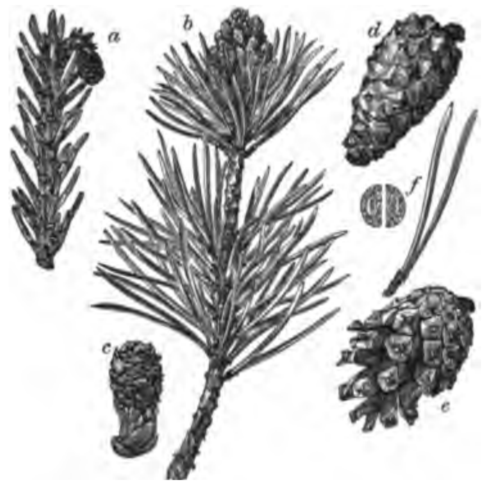


Fig. 1.—Scotch Pine (*Pinus sylvestris*):
a, young shoot with female flower; *b*, twig with male flower; *c*, female flower; *d*, ripe cone; *e*, the same, opened; *f*, pair of needles with section.

The Scotch Pine, commonly but erroneously known as the Scotch Fir (*P. sylvestris*), is the only species indigenous to Britain. It has leaves in pairs, about an inch and a half long, the cones about the same length, obtuse, and with unarmed scales. On very poor soils and at great elevations it is reduced to a kind of shrub, but in favourable situations it becomes a lofty tree. A plank five feet and a half in diameter has been obtained from a Scottish forest. The Scotch pine is of quick growth, but has been known to attain the age of 400 years. Its head is somewhat conical or rounded, and the lower branches die off as the tree grows, leaving the older trees bare of branches for the greater part of their height; but it is more apt to send off large branches than most of the Coniferæ. There are still native forests of Scotch pine at Braemar and elsewhere in the Highlands of Scotland; and even in the south of Scotland noble trees are to be seen which, probably, were not planted by man. The Scotch pine is not indigenous to the south of England, but, having been introduced, is spreading rapidly and spontaneously, along with the Pinaster, in some of the heaths and other unfertile tracts. Immense forests of it exist in some countries of Europe, in some of which it is mingled with the Spruce Fir. In the middle and north of Europe and of Asia it is found even in plains near the level of the sea, especially where the soil is somewhat sandy; in the south of Europe it grows only on mountains. Its timber is highly valuable, being very resinous and durable, and is the *Red Deal* or *Red Pine* used in house and ship carpentry. There is very great difference, however, in the timber of Scotch pine growing in different soils and situations, rich soils and sheltered situations being unfavourable to the quality of the timber, which becomes white, soft, and comparatively worthless; and there exist several varieties of Scotch pine, some of which yield timber very superior to others. Many plantations in Britain have, unfortunately, been made of inferior kinds. One of the best varieties is that which forms the northern Scottish forests, often designated *Braemar Pine* by nurserymen. It is remarkable for its very horizontal branches, and is therefore sometimes called *P. horizontalis*. The Scotch pine is not only valuable for its timber, which is available for some purpose at every stage of its growth, but on account of other products. Common Turpentine is obtained from it, and much Tar, Pitch, Resin, and Lampblack (see these heads). Oil of turpentine is sometimes distilled from the cones, and even from the leaves; the leaves have also been used for the manufacture of Pine-wool (see FIBROUS SUBSTANCES, Vol. IV. p. 606). The resinous roots are dug out of the ground in many parts of the Highlands of Scotland, and, being divided into small splinters, are used to give light in cottages instead of candles. Fishermen, in some places, make ropes of the inner bark, which is applied to a very different use, when most soft and succulent in spring, by the Kamchatdales and Laplanders, being dried, ground, steeped in water to remove the resinous taste, and used for making a coarse kind of bread.

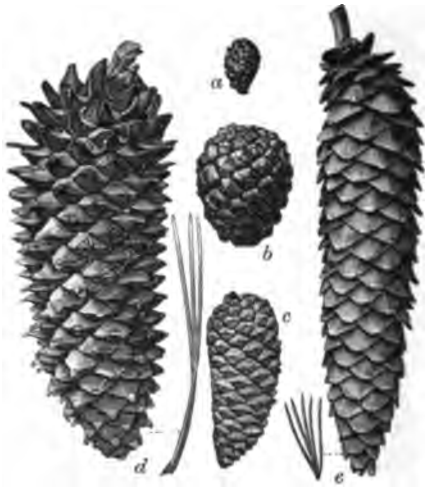


Fig. 2.
Cones of (*a*) *Pinus montana*; (*b*) *P. pinea*; and (*c*) *P. Pinaster*. Cones and needles of (*d*) *P. coulteri*; and (*e*) *P. Lambertiana*. All about ¼ natural size.

The Dwarf Pine (*P. Pumilio*) is found on the Alps and Pyrenees, its trunk often lying on the ground, although sometimes it appears as a bush or low tree. The leaves are in pairs, very like those of the Scotch pine, but a little longer; the cones are also similar. From the young shoots an oil resembling oil of turpentine is obtained by distillation, which is a kind of universal medicine among the peasantry of Hungary, as is also the resin spontaneously exuding from the tree, which is known as *Hungarian Balsam*. The Black or Austrian Pine, or Black Fir (*P. nigricans*, or *P. austriaca*), is another species closely allied to the Scotch pine, but remarkable for its very long leaves. It is a native of Austria. It abounds in resin more than any other European tree. To the same group of pines belongs the Seaside or Taurian Pine (*P. Pallasiana*, *maritima*, or *taurica*), which also affords resin in great quantity, and of a very pleasant odour. It is found in many parts of the south of Europe. Its timber is of little value; but great part of the turpentine of the Landes and other maritime districts of France is obtained from it. It yields also part of the *Burgundy Pitch* of the apothecaries' shops. The Aleppo Pine (*P. halepensis*), a native of the south of Europe, Syria, &c., is a very graceful tree of moderate size, with leaves in pairs and slender. It yields a liquid resin or turpentine, which is extracted from it in Provence and elsewhere, and sold as *Venice Turpentine*. The wood is extensively used in the Levant for shipbuilding. The Laricio (*P. Laricio*) has leaves in pairs, lax, and 4 to 8 inches long, cones 2 to 4 inches long, with the scales slightly pointed. It is often called the Corsican Pine. It grows on the shores of the Mediterranean Sea, and is valuable both for its timber and for its resinous products. In the island of Corsica it frequently attains the height of 140 feet. It grows well in sandy soils, and has been made particularly useful for preventing the drifting of the sand, and turning to account the otherwise useless tracts between the mouths of the Garonne and the Adour in France, thus also preserving valuable lands which the sand threatened to overwhelm. The Pinaster or Cluster Pine (*P. Pinaster*) is another of the most important European species. It has cones in whorls of 3, 4, or even 8 together, 4 to 6 inches long, leaves in pairs, and very long. It is found on the shores of the Mediterranean, and also in the Himalayas and in China. It has been used in France to a great extent, in the same way as the Laricio, for covering waste sandy tracts. The timber is of inferior quality, but great quantities of resin are procured from it. It yields *Bordeaux Turpentine*. The Pyrenean Pine (*P. pyrenaica*) is a majestic tree, a native of the Pyrenees, and producing very fine timber. The Calabrian Pine (*P. bruttia*) somewhat resembles the Pinaster. The Stone Pine (*P. pinea*), a tree with a broad umbrella-shaped head, a form often seen also in the Scotch fir, forms a characteristic feature of the scenery of the Mediterranean. It is the *Pinie* of the Germans, the *Pignon* of the French. The leaves are in pairs, 4 to 5 inches long, the cones very large, ovate, and obtuse. The seeds, which do not ripen till the fourth year, are large, abound in a fixed oil, and when fresh, have a sweet taste resembling that of almonds. They are used in Italy and other countries in the same way as almonds and pistachio nuts for the dessert, in various dishes, also in emulsions, &c., under the names of *pinies*, *piniolee*, and *pignons*. The use of them, however, is almost entirely confined to the countries in which they are produced, as they very soon become rancid. They are sometimes imported into London in the cone, in which way they can be kept longer, but the cost of importation is much increased. The wood of this tree is very useful and beautiful. It yields resinous products only in small quantity. The Cembra Pine, or Swiss Stone Pine, which grows in the central parts of Europe and the south of Siberia—a stately tree, with the lower branches more persistent than they are in most pines, and rigid leaves in groups of three to five—also produces eatable seeds (*Cembra Nuts*). The Cembra Pine yields a pellucid, whitish oil, resembling oil of turpentine, and known as *Carpathian Balsam*.

North America produces many species of pine, some of them very beautiful and very valuable. Besides those long known, and which are found in the states and colonies near the Atlantic, a number of the noblest species of this genus have, since the commencement of the 19th century, been discovered in California and the north-western parts of America. The Red Canadian Pine (*P. resinosa*) is found from Canada to the Pacific, but does not reach far south in the United States. It is the Yellow Pine of Canada and Nova Scotia. It delights in dry and sandy soils, and attains a height of 70 to 80 feet, with a diameter of 2 feet at the base, the trunk continuing of uniform diameter for two-thirds of its length. The leaves are in pairs, and are congregated towards the extremities of the branches. The timber is highly esteemed for strength and durability, and furnishes excellent planks for shipbuilding. It is also used for masts. Somewhat resembling this in botanical characters is the Scrub Pine, or Gray Pine (*P. Banksiana*), generally only 3 to 10 feet high, which begins to appear in the northern parts of the United States upon high mountains, and is interesting as an arctic species, extending farther north than any other. The Yellow Pine (*P. variabilis*, or *P. mitis*) abounds in the Atlantic states from New Jersey to Virginia. It is a tree 50 to 60 feet high, 15 to 18 inches in diameter at the base, with leaves 4 to 5 inches long, usually in pairs, but sometimes in threes upon the younger shoots. The timber is very extensively used for shipbuilding, and is largely exported to Great Britain. At Liverpool it is known as New York Pine. The Jersey Pine, or Scrub Pine (*P. niops*), abounds in the lower parts of New Jersey, and thence to the south-west. The leaves are in pairs, 1 to 2 inches long, the cones armed with strong spines. The tree is rarely 30 or 40 feet high. Great quantities of tar are made from it in Kentucky. The Pitch Pine (*P. rigida*) is a native of the northern and middle parts of the United States, often growing in great miry swamps, and attaining a height of 70 to 80 feet, and a diameter of 2 feet at the base. The leaves are in threes, varying much in length, as the cones do in size. Immense quantities of it are used for fuel. Tar and lampblack are sometimes made from it. The Loblolly or Old Field Pine (*P. tæda*) grows in dry and sandy soils in the lower parts of the southern states, often occupying lands exhausted by cultivation. Vast tracts never cultivated in the southern states are *Pine Barrens*, in great part covered with this species of pine. It attains a height of 80 feet and upwards, and has a wide-spreading crown. The leaves are 6 inches long, in threes, sometimes in fours on young branches; the cones 4 inches high, with strong spines. The timber is not of much value. The Long-leaved Pine, or Southern Pine (*P. palustris*, or *P. australis*), is perhaps the most important of North American forest trees. It furnishes the greater part of the tar, resin, pitch, and turpentine used in the United States. The timber is also very valuable, and is much used for shipbuilding. In England and the West Indies it is known as Georgia Pitch Pine. The tree attains a height of 60 to 70 feet, and a diameter of about 16 to 18 inches; the leaves are in threes, and about a foot long, the cones 7 to 8 inches long, and 4 inches in diameter, with small spines. The seeds are sometimes eaten. The White Pine (*P. strobus*), called in Britain the Weymouth Pine, from its having been largely planted by Lord Weymouth, attains a height of 150 feet, and a diameter of 5 feet and upwards. It has lax sub-triangular leaves in groups of five, and pendulous cones 4 to 5 inches long, with thin smooth scales. It is frequently planted in Britain and on the continent of Europe for its beauty. In its native country it abounds chiefly from lat. 47°

to lat. 43°, and southward to the Alleghanies. The timber is not strong, but easily wrought and durable. Of the species belonging to the north-western parts of America one of the most magnificent is *P. Lambertiana*, which is found on the Rocky Mountains between lat. 40° and lat. 43°, chiefly on sandy soils. It attains a height of 150 to 200 feet, and a diameter of 7 feet and upwards, almost to 20 feet. The trunk is remarkably straight, and destitute of branches for two-thirds of its height; the leaves in fives, the cones upwards of a foot long. The timber is white, soft, and light; and the tree produces great quantities of a pure amber-coloured resin, which, when the wood is partly burned, is changed into a somewhat saccharine substance, used by the Indians as a substitute for sugar. The seeds are eaten either roasted or pounded into coarse cakes. *P. flexilis* is found on the Rocky Mountains, near the head-waters of the Arkansas, and occurs almost to the limit of perpetual snow. It has a dense crown formed of numerous and remarkably flexile branches. The leaves are in fives. The seeds are used as food by hunters and Indians. *P. ponderosa*, another native of the Rocky Mountains, is a magnificent tree, remarkable for the heaviness of its timber, which almost sinks in water. The leaves are in threes, and 9 to 14 inches long. *P. Sabiniana*, *P. Coulteri*, and *P. insignis* are also noble species from the west of North America.

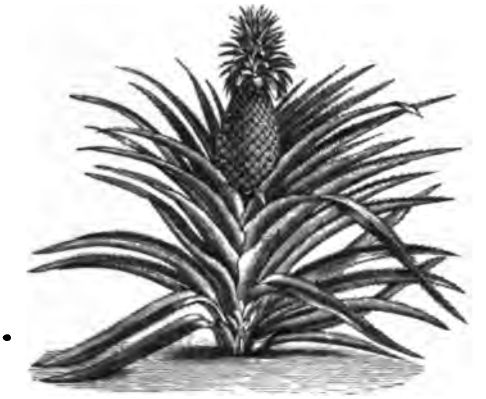
The Himalayas abound in pines, some of which rival in magnificence those of North-west America. The Bhutan Pine (*P. excelsa*), much resembling the Weymouth Pine in its botanical characters, and attaining a height of 90 to 120 feet, abounds in Bhutan, although it is not found in the neighbouring countries of Sikkim and Nepal. The wood is highly valuable, being durable, close-grained, and so resinous as to be used for flambeaux and candles. The Cheer Pine (*P. longifolia*) of India is a tree of remarkable and most graceful appearance, with leaves in threes, very long, very slender, and generally pendulous. It is abundant on the crests of hills in the lower Himalayas, growing at a lower elevation than the other pines. It is cultivated in some parts of India as an ornamental tree. It is much valued for its resin. The wood is used in India as a substitute for European deal. The Khasia Pine (*P. khasiana*) is peculiar to the Khasia Mountains, and has very much the general appearance of the Scotch pine. *P. Gerardiana*, a species with leaves in threes, is a large tree, a native of Nepal. The seeds are eatable. The mountains of India and the north-western parts of America produce numerous other species; Mexico has a number of very fine ones peculiar to itself; the mountains of St Domingo have one; the Canary Islands have one; China and Japan also have some. Most of those which have been named, and a number of others, are now readily to be procured in nurseries in Britain, although some of them only at prices which prevent any attempt at extensive plantation. Some wealthy noblemen and gentlemen devote a portion of their grounds to a collection of different kinds of pine, called a *Pinetum*. A few foreign species have become pretty common in plantations. Most of the pines are quite hardy in Britain, but this is not the case with the Cheer Pine and some of the Mexican species. The name pine is often popularly extended, and even in scientific works, to other Coniferæ; many trees called pine being properly treated at Fir.

PINE-TIMBER.—This term is in general use for the timber of the pine-tribe (see CONIFERÆ), and is not confined to that of the genus Pinus, but embraces the wood of species of Abies, Larix, Araucaria, Dammara, &c. From the Baltic ports come red wood and white wood. The former is yielded by the Scotch Fir (*Pinus sylvestris*), and the latter by the Spruce Fir (*Abies excelsa*). These two, with the Larch (*Larix europæa*), yield the greatest part of the pine-timber of Europe. Next in importance to these is the pine-timber of the British North American colonies, which is chiefly yielded by the Weymouth Pine (*Pinus strobus*). This wood is best known in America as white pine, but in Great Britain and in commerce generally it is called yellow pine. Commercially it is the most important timber of Canada and the eastern states of America. The yellow pine of this part of America is the *Pinus mitis*, also a valuable timber-tree. Red pine, usually called northern red pine (*Pinus resinosa*), is found from Canada to Pennsylvania; it is intermediate for durability between white pine and pitch pine. The celebrated pitch pine of the eastern states of America is the product of *Pinus rigida*. It is used for ships' masts and yards, and for purposes requiring great strength and durability, in both of which qualities it excels most others of its kind. The kinds above mentioned are those which constitute the greater part of the pine-timber used in ship and house building, carpentry, &c. in Great Britain and the eastern side of America. In France the timber of the Corsican Pine (*Pinus Laricio*) and the Seaside Pine (*Pinus Pinaster*) are greatly used. In Central and Southern Italy the pine-timber is chiefly yielded by the Stone Pine (*P. pinea*) and the Calabrian Pine (*P. bruttia*); that of Spain is from the Pyrenean Pine (*P. pyrenaica*). In Germany, and especially in Austria, the Black Pine (*P. austriaca*) furnishes the greater portion; but the fine-grained, soft white pine, or deal, so much used for sounding-boards of musical instruments, is the wood of the Silver Fir (see FIR). The trade in this timber is very great, for not only do the Germans use it almost exclusively in their vast toy manufactories and for lucifer matches, but considerable quantities are exported. The finest is cut in the forests of Bohemia, where large establishments are formed for dressing and preparing the wood for various purposes.

Several other kinds of pine-timber are imported into Europe, but those mentioned form the great staples of the timber-trade. The chief value of this class of timber-woods is in the combination of lightness and strength with softness of texture and ease in working with ordinary tools; they constitute, in fact, the principal materials of European and American builders, and are more used than all other kinds of wood together. Much confusion prevails as to their common designations, for in Britain alone *fir*, *pine*, and *deal* are terms applied to all and each of them, according to the caprice of the individual. The first two names are used because the material is derived from one or other of those genera; but the last is a misnomer altogether, as the term deal belongs only to pieces of fir or pine timber cut to particular sizes: they are 3 inches in thickness, 9 inches broad, and of variable length; if of less width, they are called *battens*. See TIMBER.

Pineal Gland, a rounded body about the size of a pea, of a slightly yellowish colour, situated upon the anterior pair of corpora quadrigemina, and connected with the optic thalami by two strands of nerve-fibres termed its peduncles (see BRAIN). It contains small cavities in its interior. The function of the gland has long been matter of speculation. It was regarded by Descartes as the seat of the soul. It has been recently discovered to be a developmental remnant of a third eye, the elements of which can still be distinctly traced in some of the lower vertebrata.

Pine-apple, or ANANAS (*Ananassa sativa*), a plant of the natural order Bromeliaceæ, highly esteemed, and much cultivated for its fruit. The fruit is a *sorosis*, formed by the calyces and bracts of a close spike of flowers, becoming succulent and combined. This is the distinctive character of the genus Ananassa. The pine-apple has a number of long, serrated or smooth-edged, sharp-pointed, rigid leaves, springing from the root, in the midst of which a short flower-stem is thrown up, bearing a single spike of flowers, and therefore a single fruit. From the summit of the fruit springs a crown or tuft of small leaves, capable of becoming a new plant; the pine-apple, in cultivation, being propagated entirely by crowns and suckers, as, in a state of high cultivation, perfect seed is almost never produced. The pine-apple is a native of tropical America; it is found wild in sandy maritime districts in the north-east of South America, but it has been very much changed by cultivation. It has also been gradually diffused over tropical and subtropical countries, and not only as a cultivated plant, for it is fully naturalised in many parts both of Asia and Africa. It delights in a moist climate, and consequently does not succeed well in the dry climate of the south of Italy, although the warmth is sufficient. The first particular account of the pine-apple was given by Oviedo in 1535. It was in Holland that it first began to be cultivated in hothouses; but it was introduced into England from that country in 1690, and first cultivated by Mr Bentinck, ancestor to the ducal family of Portland; and its cultivation rapidly became general in the gardens of the wealthy. It is only since the peace of 1815 that it has received similar attention in continental Europe. Great care is requisite in the cultivation of the pine-apple, which without it is generally fibrous and coarse, with little sweetness or flavour, and with it one of the most delicate and richly flavoured of fruits. Its size, too, very much depends on cultivation, but there is also considerable difference in the size of the fruit in different varieties, the largest not being always the most luscious and superior in flavour. The size varies from 2¼ lb. to 12 lb. in weight. The pine-apples grown in British hothouses are generally much superior to those of the West Indies, because the latter grow almost or altogether without cultivation: but the importation of pine-apples from the West Indies has now been carried on to a considerable extent, and, as it promises to add to the sources of wealth for these colonies, this has led to greater care in cultivation there, and consequent improvement of quality.



Pine-apple (*Ananassa sativa*).

Formerly the culture of the pine-apple in Britain was a costly and extremely tedious process. Since very early after its introduction it has always been cultivated in hothouses specially appropriated to it called pine-stoves, which were heated with smoke-flues, with tanners' bark or oak-leaves and dung for bottom heat. But by the universal adoption of hot water in horticultural heating the labour and cost attendant on those clumsy expedients have been much reduced and better results attained. Along with this there has been brought about a more rational treatment of the plants. Instead of high tropical ground and atmospheric heat being maintained in winter, which resulted in destroying the roots of the plants in the preliminary stages of their growth, and so retarded or deferred their fruiting period, the skilful pine-grower now finds that success is best assured by adopting a minimum of 60° of air-warmth and 75° of bottom-heat at that season. By these and other improvements in treatment superior fruit is obtained in half the time formerly considered necessary. The pine-apple is cultivated in pots or planted out in beds. It is more completely under control in pots than planted out, hence the results are always more certain when it is grown in that way. It is propagated by suckers and by the crowns that surmount the fruit; but, except in the case of varieties which produce the former too sparingly for the requirements of stock, the latter are usually rejected because they do not make so good plants nor fruit so quickly as a rule. The varieties of the pine-apple that are worthy of being cultivated in Britain are few. For producing superior fruit in winter the Smooth Cayenne and Black Jamaica are two of the best and most reliable, and the Queen, of which there are several sub-varieties, is the most highly esteemed for summer fruiting. Turfy, fibrous, sandy loam that has lain in a stack for nine or twelve months is an excellent soil for the pine-apple. A spirituous liquor (*Pine-apple Rum*) is made from the pine-apple in some warm countries. The use of the fibre of the pine-apple is noticed in the articles BROMELIACEÆ, FIBROUS SUBSTANCES. For Pine-apple Oil, see BUTYRIC ETHER.

Pine-beetle. See BARK-BEETLES.

Pine Bluff, capital of Jefferson county, Arkansas, is built on a high bluff on the south bank of the Arkansas River, about 120 miles from its mouth, and 43 miles by rail SSE. of Little Rock. It contains large ironworks, ships a good deal of cotton, and manufactures cotton-seed oil, flour, lumber, bricks, &c. Pop. (1890) 9952.

Pinel, PHILIPPE, a Parisian physician (1745–1826) who gained for himself undying fame by his reformation of the old barbarous methods of treating the insane. See INSANITY.

Pinero, ARTHUR WING, born in London in 1855, studied law, but in 1874 made his début on the stage at Edinburgh, and in 1875 joined the Lyceum company. He is best known as the author of a number of successful plays, including *The Squire* (1881), *The Rocket* (1883), *Sweet Lavender* (1888), *The Second Mrs Tanqueray* (1893), and *The Notorious Mrs Ebbsmith* (1895).

Pinerolo, or PIGNEROL, a town of North Italy, at the east foot of the Alps, 23 miles by rail SW. of Turin. Originally a town of Savoy, it was regarded as the key of Italy. In its strong citadel, the Man with the Iron Mask, Lauzun, and Fouquet were imprisoned. This fortress was in French hands from 1536 to 1574, again from 1630 to 1696, from 1704 to 1706, and from 1801 to 1814. The town contains a cathedral and a technical school. Cloth, paper, leather, cotton, and silk are manufactured. Pop. 12,003.

Pine-tree Money, silver money coined at Boston, Massachusetts, in the 17th century (from 1652), and so called from the coins' bearing the rude figure of a pine-tree on one side.

Pine-wool. See FIBROUS SUBSTANCES.

Pink (*Dianthus*), a genus of plants of the natural order Caryophyllaceæ, of which there are many (some 230) species, annuals and perennials, with beautiful and often fragrant flowers, chiefly natives of Europe and the temperate parts of Asia. The calyx is tubular, 5-toothed, with two or four scales at the base; there are five petals suddenly contracted at the throat of the corolla into a linear claw. There are ten stamens, and one ovary with two styles. The capsule is cylindrical and one-celled. The exquisite beauty of the flowers has attracted admiration in all ages; and some of the species have long been much cultivated in gardens, particularly the Garden Pink and Carnation (q.v.), which are often referred to one original, the Clove Pink (*D. caryophyllus*), a native of the south of Europe, growing wild on rocks and old walls, and naturalised in some places in the south of England; whilst some botanists refer the garden pinks with more probability in part to the Maiden Pink (*D. deltoides*), a pretty common British species, and those called Pheasant-eye pinks to the Feather Pink (*D. plumarius*), a native of some parts of continental Europe. The varieties of the garden pink and the pheasant-eye pink, which are usually designated the florists' pink, are of much less antiquity than the carnation as garden ornaments. Gerard scarcely mentions them, while in Parkinson's time they appear only to have been cultivated as other hardy perennials and annuals were, without any special care. Their capabilities as choice florists' flowers were recognised about 1810, and the number of varieties has since then greatly increased. Nearly allied to them is *D. superbus*, found in moist places in some parts of Europe, and not unfrequently to be seen in flower-borders. It has very fragrant flowers. Both single and double pinks are generally propagated by *pipings*, which are short cuttings of the younger shoots. They are also sometimes propagated by layers. A rich loamy soil is the best for pinks. The Maiden Pink is a small, much-branched plant, growing in grassy places, on gravelly and sandy soils; it has rose-coloured flowers spotted with white, and a white eye encircled by a deep purple ring. The Deptford Pink (*D. armeria*) and the Clustered Pink, or Childing Pink (*D. prolifer*), also natives of England, differ from these in being annuals, and in having clustered flowers. The Bearded Pink, or Sweet William (*D. barbatus*), a native of the middle of Europe and the south of France, with lanceolate leaves, flowers crowded in dense clusters at the top of the stem, acuminated bracts, and bearded petals, has long been a favourite garden-flower, still retaining its place alike in palace and cottage gardens. Although perennial, it is sown annually by florists, to secure fine flowers, and there are many varieties, single and double, exhibiting much diversity of colour. The Mule Pink, or Fielding's Pink, a choice kind, is supposed to be a hybrid between the Sweet William and the Picotee. The Indian Pink, or China Pink (*D. chinensis*), is now also common in flower-gardens. The Clove Pink was formerly regarded as possessing medicinal properties, and was used in nervous maladies. See F. N. Williams, *The Pink of Central Europe* (1890).—*Sea-pink* is a common name of Thrift (q.v.).

Pinkerton, JOHN, an acrid little book-maker, was born at Edinburgh, 17th February 1758, and after six years' schooling at Lanark, and five years' irksome apprenticeship to a W.S., in 1780 settled in London as a man of letters, in 1802 in Paris, where he died in indigent circumstances, 10th May 1826. His twenty-four works and compilations include some pseudo-archaic 'rimes,' ballads, &c.; *Essay on Medals* (1784); *Letters on Literature* (1785), marked chiefly by a novel system of inflection and orthography, but were the means of introducing him to Walpole and Gibbon; *Ancient Scottish Poems from the MS. Collections of Sir Richard Maitland of Lethington* (1786); *Dissertation on the Origin and Progress of the Scythians or Goths* (1787), in which he first fell foul of the whole Celtic race; *Inquiry into the History of Scotland preceding the Reign of Malcolm III.* (1790); *Iconographia Scotica* (1795–97); *History of Scotland from the Accession of the Stuarts to that of Mary* (1797); *Walpoliana* (1799); *Modern Geography* (1802–1807); *Voyages and Travels* (16 vols. 1808–13); *New Modern Atlas* (1809–15); and *Petrálogy, or a Treatise on Rocks* (1811). See his *Literary Correspondence* (2 vols. 1830).

Pink-eye is a name commonly given to an epizootic disease which prevails among horses, and is called by veterinarians *Epizootic Cellulites;* also Rheumatic Influenza, or sometimes *Muco Enteritis.* The disease, which of late years has assumed a more virulent form, prevails during a continuance of wet weather, especially when it is also cold, and attacks a number of animals in various parts of a town or district almost simultaneously, thus proving its atmospheric origin; but, although it thus breaks out spontaneously, there is no doubt of its being an infectious disease. The primary symptoms are loss of appetite, dullness, perhaps rigors, with fever, manifested by elevation of the temperature, varying from about 104° to 107°, or, in very severe cases, even 108° F., and acceleration of the pulse. In slight cases the pulse may be 65, in very severe ones over 100 beats per minute. These symptoms are succeeded—but not always—by swelling of the eyelids and redness of the eye—hence the term pink-eye—pain in and stiffness of the limbs, with tumefaction, particularly around the joints. The swellings are at first limited, but soon extend upwards and downwards from the joints affected, and their occurrence gives relief to the pain. The digestive organs are disordered; there is generally constipation at first, the fæces are covered with much mucus, and in many instances there is some degree of colicky or intestinal pain. Some horses have a loud, hoarse cough, at first dry, but often becoming moist; but lung complications are not very common. In some instances the pulse gradually becomes very feeble, though the animal presents no other bad symptom, the pain having left the limbs, the appetite returning, the swellings diminishing, and the secretions regaining the normal condition; whilst an ordinary observer is confident of a rapid recovery, the animal suddenly dies, and a post-mortem examination reveals the presence of ante-mortem clots of blood in the cavities of the heart, and perhaps in the great pulmonary blood-vessels. To the veterinarian the apparently convalescent stage is a most critical condition, and he must endeavour, by rousing the heart's action, to prevent the formation of these coagula.

As a rule the disease runs its course favourably in from four to ten days, leaving the animal with more or less loss of condition and strength, but both are soon restored by good nursing and gentle exercise. The treatment which has proved most successful is based on the conclusion that the disease runs a definite course, and that all attempts to check this are calculated to do more harm than good. It is most important that all who have the care of horses should know that it is most dangerous to work a horse when this disease prevails after he has manifested the slightest loss of appetite; many horses turned out to work after failure of appetite have been brought back a few hours after in a dying condition. The medicines made use of are those which moderate pain if excessive, keep the contents of the stomach and bowels from undergoing putrefactive fermentation, and act as very slight aperients; and, when the heart's action threatens the condition above described, cardiac stimulants, such as the bicarbonate of ammonia given in a ball. Alcoholic stimulants, in virtue of their irritating properties and their effect on the nervous system, are very injurious, and should not be administered in this nor in any other disease where the so-called fibrinous state of the blood is one of the conditions.

Pinkie, a battle fought on 10th September 1547 near Musselburgh in Midlothian between 14,000 English under the Protector Somerset and twice that number of Scots. The latter were utterly defeated, more than 10,000, it is said, being killed on the field and in the pursuit, whilst the English loss was barely 200.

Pink Root. See Spigelia.

Pinna, a genus of bivalves, not far removed from mussels (Mytilidæ). The shell is acutely triangular, beautifully translucent, and in some species measures two feet in length. The attaching byssus, especially of the Mediterranean species (*P. nobilis*), is very long and silky, and admits of being woven into fabrics. So the ancients occasionally used it, and, to gratify the curious, byssus-gloves, &c. are still made at Taranto and elsewhere. The animal is sometimes eaten. It lives from low-water to sixty fathoms.

Pinnace. See Boat.

Pinnipedia. See Seal.

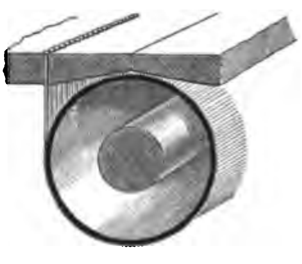
Pinnock, William (1781-1843), who is famous in the educational world as the originator of the formerly well-known catechisms which bear his name. To Samuel Maunder (q.v.), his brother-in-law, he was chiefly indebted for the production of these catechisms, which finally extended to 12 volumes, or 83 separate parts. Histories of England, Greece, and Rome ran through more than a hundred editions. The well-known Analyses of Scripture history, of Old Testament and New Testament history, and of church history were the compilations of William Henry Pinnock, LL.D.

Pinos, Isla de, a Spanish island in the West Indies, south of Cuba, of which it is the largest dependency. It was discovered by Columbus in 1494, has an area of 1200 sq. m., part low and swampy, and part hilly (1500 feet), and is clothed with fine meadows and woods, and produces silver, quicksilver, and iron. It was once notorious as the resort of pirates. Pop. 2200.

Pins. The earliest kinds of pins, or of spikes serving the same purpose as pins, were probably thorns or the small bones of fish and other animals. Among the remains found on the sites of the prehistoric lake-dwellings of Europe there are numbers of bone pins, some of a rude and others of an elegant form. The great majority of the pins in these 'finds' are, however, of bronze; but a few of copper and one of iron have also been discovered. It is estimated that 10,000 pins have been collected at the lacustrine stations of Switzerland alone. They seem to have been chiefly used as hair-pins, though no doubt they were also employed to fasten the dress, and for other purposes. The forms of these ancient pins are extremely varied, and in the numerous cases where they have ornamented heads the patterns are often curious and beautiful. A few have double stems like modern hair-pins, and three found at Peschiera are exactly the same in form as the 'safety pins' which have come largely into use in recent years. Many of the single stemmed ones are baluster shaped—i.e. they are thicker at some places than at others. A good many both of bone and of bronze have a head formed of a loose ring in an eye. Some have bulbous heads (these occasionally being of amber) very like the scarf-pins of the present time. For numerous illustrations of these ancient pins, see Munro's *Lake-dwellings of Europe* (1890).

Among ancient articles for the toilet found in Egypt some pins with gold heads occur, and ancient Roman bronze pins and bone hair-pins, with ornamental heads, have been found at Pompeii. As regards modern pins, it was about 1840 that the solid-headed kind now in common use took the place of the older form of pin, which had a globular head of fine twisted wire made separately and secured to the shank by compression from a falling block and die. These old pins had the disadvantage of frequently losing their heads. They were made by manual labour in such a way that each pin passed through the hands of fourteen different persons (see Division of Labour).

Solid-headed pins are made by an improved form of a machine which was patented in England by an American, named L. W. Wright, in 1824. But before this machine was perfected enough to do its work properly many thousands of pounds were expended upon it. Pins are made by the modern machine in this way: Pincers draw from a reel of wire a length sufficient to make a pin, which is at the same time straightened by passing between fixed studs. The pin length is seized by lateral jaws, from which a portion of the wire is left projecting. A snap head die next advances to partially shape the head; the jaws or grippers then release it, and the pin is pushed forward again about a twentieth of an inch, when the head gets another squeeze of the die. These movements of the machine are repeated once more to finish the head, and the wire is then cut to the length of a pin. The headed blanks drop into a receptacle and arrange themselves in the line of a slot formed by two inclined and bevel-edged bars. The opening between the bars is just wide enough to let the shank of the pin fall through, so that by the action of the machine the blanks become suspended by the head in a row along the slot. When the blanks reach the lower end of the inclined bars they are caught, still hanging downwards, between two parts of the machine (one of which has a suitable movement), and passed along, rotating as they move, in front of a cylindrical cutter, with sharp grooves on its surface, so that it acts like a file, and points the pins. The annexed figure from the *Engineer* of June 3, 1887, shows this part of the machine, which makes pins at the rate of 160 per minute.



Ordinary pins are made of brass wire, and when these are finished by the machine they are cleaned of grease and other matters by boiling them in weak beer. The pins are next coated with tin, or 'coloured,' as it is called. In this process alternate layers of pins and grain-tin are placed in a copper pan, to which water is added, along with some argol or crude tartar (bitartrate of potash). When heat is applied a solution of tin is produced from which the metal is deposited on the surface of the pins, giving them their silvery white colour. The tin surface is afterwards brightened by shaking them in a bag or barrel with bran or sawdust. Pins are 'papered' by a self-acting machine not less ingenious than the one by which they are made.

For mourning pins iron wire is used, and these are either 'blued' by heating them in a muffle till the proper tint is obtained, or made black by coating them with a suitable varnish, which is afterwards hardened by stoving the pins. The finest and most costly pins are those made of hair-like wire for insect collectors. 'Blanket' pins are about 3½ inches long, and various sizes between 1½ inch and ⅜ths of an inch in length are made for domestic use. Safety pins with the point resting in a loop, now so much used in the nursery and for other purposes, were, as already stated, made in prehistoric times; at least pins of exactly the same form were. The manufacture of pins is largely carried on at Birmingham, and to a less extent at London, Warrington, Stroud, and Dublin. They are also extensively manufactured in the United States—chiefly in Connecticut.

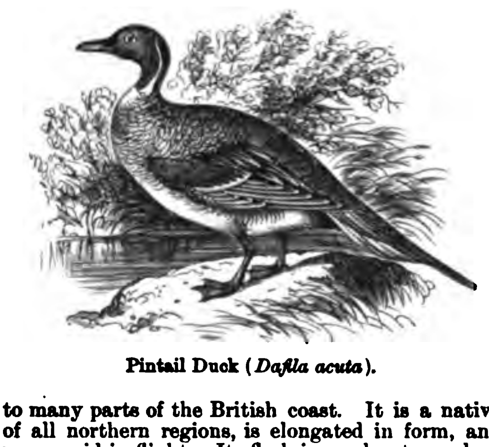
Pinsk, a town of west Russia, stands in the midst of what were formerly vast marshes (in large part drained since 1875), on a branch of the Pripet, 98 miles by rail E. of Brest-Litovsk, manufactures leather, and has a large transit trade. Pop. 32,408, two-thirds being Jews.

Pinsuti, CIRO, musical composer, was born at Sinalunga, near Siena, on 9th May 1829. He studied music at Bologna (1845), and was a special pupil of Rossini. From 1848 to 1885 he lived in England as teacher of singing, chiefly at London and Newcastle. From 1856 he taught singing at the Royal Academy of Music. As a composer he wrote charming music for songs (more than 300 in all). In celebration of the union of Tuscany with Italy in 1859 he composed a Te Deum, but was not successful as a writer of larger musical compositions. He died at Florence, 10th March 1888.

Pint, a measure of capacity used both for liquids and dry goods, and equivalent to the eighth part of a Gallon (q.v.), or 34·65925 cubic inches. The Scotch pint, superseded as a legal measure by the imperial pint, was equivalent to 3·0065 imperial pints.

Pintado. See GUINEA FOWL.

Pintail (*Dafila*), a genus of ducks, one handsome species of which (*D. acuta*) is a winter visitor to many parts of the British coast. It is a native of all northern regions, is elongated in form, and very rapid in flight. Its flesh is much esteemed.



Pintail Duck (*Dafila acuta*).

Pinto, FERNAM MENDEZ, Portuguese adventurer, born at Montemor-o-Velho, near Coimbra, about 1510. When twenty-seven years of age he made his way out to India, and remained twenty-one years in the south and south-east of Asia, leading the life of an adventurous seaman, fighting pirates at one time, trading at another, and again being employed on special missions to Japan or elsewhere, his fortune often fluctuating between great wealth and poverty. He returned home to Portugal in 1558, spent much time in writing an account of his adventures, adding to them many exaggerations and gross fictions, and died at Almada near Lisbon, probably in 1583. His travels—*Peregrinaçam*—were not published until 1614, but have since then been translated into several European languages—into English by F. Cogan in 1663. See a new abridged edition of those travels, with an introduction by A. Vambéry (1891).

Pinturicchio, whose proper name was BERNARDINO DI BETTI, was a painter, born at Perugia, in 1454. An assistant to Perugino, he helped him with the frescoes in the Sistine Chapel at Rome, and then spent the best part of eight years (1484–92) in painting frescoes on the walls of the chapels of Santa Maria del Popolo in Rome. After executing two pieces in the cathedral at Orvieto he decorated the walls of what is now the Vatican library with a series of six frescoes; this occupied him six years (till 1498). On the walls of Sta Maria in Ara Cœli he illustrated the life of St Bernardino of Siena. Other frescoes by his brush adorned two churches in Spello, the Petrucci Palace at Siena, and the cathedral library in the same city, this last series illustrating the life of Pope Pius II. All these works are admirable examples of decorative art. Pinturicchio painted a few panel pictures of high merit, as Christ bearing the Cross, two Madonnas enthroned (at Perugia), Coronation of the Virgin (in the Vatican), and others at Siena, Florence, and Spello. He died at Siena, 11th December 1513.

See Life by Vermiglioli (Perugia, 1837), two monographs by Schmarsow (Stutt. 1880 and 1882), and Milanesi's ed. (Florence, 1878) of Vasari, vol. iii.

Pinzon, the discoverer of Brazil (q.v.).

Piombi, the notorious roof-cells (*sotto piombi*, 'under the leads') of the state-prisons of Venice (q.v.), in which Casanova and many other notable prisoners were confined. The heat in summer and the cold in winter are said to have been intense, rendering the *piombi* worse than even the *pozzi*, or cellars of the prisons; but within recent times it has been asserted that they must have been comparatively pleasant abodes, and a few have actually been converted into dwelling apartments.

Piombino, a former principality of Italy, lies along the coast opposite the island of Elba, the greater part of which belonged to it. Its extent was 139 sq. m.; and its population, previous to its incorporation with Italy in 1860, about 25,000. Piombino, originally a fief of the empire, came in the 14th century into the possession of the Appiani, who, after ruling it for nearly 200 years, made way for the Buoncompagni, who were expelled by Napoleon in 1801; but after the Congress of Vienna the principality was put under the suzerainty of Tuscany. The town of Piombino (pop. 4000), on a promontory 50 miles S. of Leghorn, has iron-rolling mills.

Piombo. See SEBASTIANO DEL PIOMBO.

Pioneer, in the British infantry, is a military artisan employed during peace in such work as painting and repairing barrack-rooms, &c., and in war marching at the head of each battalion to clear a passage for it through woods or other obstructions, improve roads, make bridges, and generally to do any minor engineering or constructive work that may be necessary. One is selected from each company. Instead of a rifle each carries a saw-backed sword, an axe, and two gun-spikes, other necessary tools being distributed among them.

Cavalry Pioneers, one from each troop, are instructed at the School of Military Engineering, Chatham, in the best method of rapidly destroying railways, telegraph lines, &c., and carry gun-cotton and the tools necessary for this purpose.

Piotrkow (Ger. *Petrikau*), a town of Russian Poland, 87 miles by rail SW. of Warsaw. Cotton and wool spinning is largely prosecuted. It is one of the oldest Polish towns; here in the 15th and 16th centuries diets were held and the kings elected. Pop. 24,866.—The *government* has an area of 4730 sq. m. and a population of (1891) 1,200,197, and is a centre of the cotton and woollen industries, of brandy-distilling, and of corn-milling.

Piozzi, MRS, more famous as MRS THRALE, and by that name to be remembered until Dr Samuel Johnson is forgotten. Her maiden name was Hester Lynch Salusbury, and she was born of a good Welsh family at Bodvel in Carnarvonshire, January 27, 1741. She early gave promise of quick parts and lively disposition, and received an education that extended even to Latin as well as French, Spanish, and Italian. Early introduced into the fashionable world of London, in October 1763 she married Henry Thrale, a prosperous Southwark brewer, thirteen years her senior. He was an honest man, and made an indulgent, if somewhat indifferent, husband; but he was uncommunicative and phlegmatic in temperament. Mrs Thrale made Johnson's acquaintance through the kind offices of Murphy in January 1765, and one of the most interesting friendships in the history of letters at once began. The sage quickly conceived an extraordinary affection for his 'mistress,' was domesticated in her house at Streatham Place for over sixteen years, and for her sake learned to soften many of the eccentricities of his speech, dress, and behaviour. Of all his friendships this was the one most valuable to him, for Mrs Thrale's warm woman's heart and constant cheerfulness henceforward brightened many a gloomy hour in a life that had known but little happiness. Thrale also had a solid esteem for Johnson, carried him with the family to Brighton, to Wales in 1774, and to France in 1775, and left him £200 as one of his four executors. He was returned for Southwark at a by-election in the end of 1765, and sat continuously until the election of 1780. Boswell first visited Streatham in October 1769, Fanny Burney in August 1778. In 1772 Thrale's affairs became embarrassed, but his wife's tact and energy and the timely advances of friends enabled him to tide over the crisis. Thrale died in April 1781, and three years later the brewery was sold for £135,000. Mrs Thrale had borne him twelve children, but her only son died in 1776, and she had but five daughters living at her husband's death. Dr Johnson's health was now declining, and he soon began to feel himself slighted as the widow's affection for the Italian musician Piozzi began to occupy her heart. Their acquaintance had begun only in 1780, though they had met three years before. The proposed match met with the strongest opposition from Mrs Thrale's daughters and from Johnson, whose disapproval, in spite of slandering tongues, was in nowise due to personal disappointment. She left Streatham for Bath in October 1782, and a few letters on the subject of the marriage passed betwixt Johnson and herself in which it must be confessed that the woman shows to more advantage than the sage. But where Johnson loved he loved deeply, and that with a love that could bear no rival near the throne. 'A friendship of twenty years,' he writes, 'is interwoven with the texture of life. A friend may be often found and lost, but an old friend never can be found, and nature has provided that he cannot easily be lost.' The marriage, for some time postponed, actually took place at Bath, 25th July 1784, and the pair next travelled through France, Italy, Germany, and Belgium, returning to England early in 1787. Piozzi proved an inoffensive husband, managed their finances with prudence, and her daughters were at length reconciled—the eldest, Dr Johnson's 'Queenie,' married Lord Keith in 1808. Mrs Piozzi returned to Streatham in 1790, but soon after built Brynbella on the banks of the Clwyd. Here Piozzi died in 1809, and here his widow remained till 1814, living thereafter at Bath, Clifton, and Penzance. When past seventy she formed a sentimental attachment for William Augustus Conway, a handsome young actor, who drowned himself crossing the Atlantic in 1828. Fourteen years after his death seven letters from Mrs Piozzi to him were published. Their genuineness is doubtful, but, as Hayward points out, even taken as they stand, they do not amount to very much, while the change of two or three sentences would alter their entire tenor. In May 1821 Mrs Piozzi broke her leg while travelling from Penzance to Clifton, and died after ten days of suffering. She was buried beside Piozzi in the little church of Dymerchion in Flintshire.

Mrs Thrale was vivacious, frank, witty, thoroughly feminine, and charming, if somewhat wanting in refinement. She was pretty, if hardly beautiful—her face gave Hogarth his model in 'The Lady's Last Stake,' but the best portrait is that by Sir Joshua Reynolds. Baretti, Boswell, Peter Pindar, and Horace Walpole all abused her; but she lives secure of immortality in the love of Samuel Johnson, and in the happiness she brought into nearly twenty years of a life 'radically wretched.'

Mrs Piozzi had a fatal facility in composition, but two of her books at least live through their subject, and indeed are only less interesting than Boswell himself: *Anecdotes of Dr Samuel Johnson during the last Twenty Years of his Life* (1786; reprinted in Mrs Napier's *Johnsoniana*, 1884), and *Letters to and from Dr Samuel Johnson* (2 vols. 1788). Her *Observations and Reflections made in a Journey through France, Italy, and Germany* (2 vols. 1789), *British Synonymy* (2 vols. 1794), and *Retrospection, or a Review of the most striking and important Events, &c.* (2 vols. 1801) are long forgotten. Of her poems the 'Three Warnings' survives—it was first printed in the *Miscellanies* of Miss Williams (1766), a volume containing a prose-tale of Johnson's, 'The Fountains,' the heroine of which, Floretta, was a study of Mrs Thrale. Her notes to Wraxall's *Historical Memoirs* were reprinted in the 1884 edition of that work, as well as in Hayward; her *Autobiography, Letters, and Literary Remains*, by Abraham Hayward, in 1861 (2 vols.). See the Rev. Ed. Mangin's *Piozziana* (1833), Boswell's *Life of Johnson*, Madame D'Arblay's *Diary*, Mr Hayward's Introduction, and L. B. Seeley's *Mrs Thrale* (1891).

Pip is the name by which various diseases in both fowls and pheasants were once known, but since the affections of birds have been studied, and more accurate knowledge arrived at, this term is no longer in use. See ROUP.

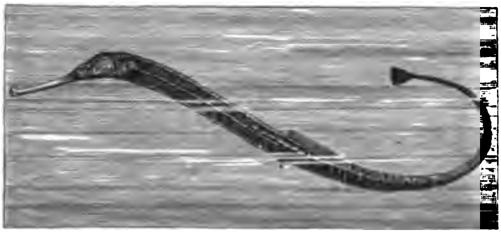
Pipa, a genus of amphibians, of which the best known is the Surinam toad. See AMPHIBIA.

Pipal, a species of fig. See PEEPUL.

Pipe, a measure of quantity commonly employed in Portugal, Spain, France, England, and in some other countries, used almost exclusively for wine and oil. In England it is also called a butt, and is equal to two hogsheads. But the capacity varies with the locality as well as with the description of wine the cask contains: a pipe of port is 137 imperial gallons; of sherry, 130 imperial gallons; that of Madeira, 110 imperial gallons; while the common English pipe contains 126 wine gallons, or nearly 105 imperial gallons.

Pipeclay, a fine white plastic clay, very like kaolin, but containing a larger percentage of silica. For the manufacture of tobacco-pipes the most desirable clay contains only small traces of limonite and alkaline earths. Clays of this nature are met with in Cornwall, Devon, and Dorset, but the purer varieties of clay used for pottery-making are also employed in the manufacture. Such clays, however, have siliceous materials added to them artificially. Pipeclay is used by soldiers for whitening belts, &c.

Pipe-fish, a family of remarkable fishes in the same (Lophobranch) order as the Sea-horses. The body is elongated like a thin pipe; the jaws are prolonged in a tubular toothless snout; the muscular development is slight; the skin is covered with an armature of hard plates; the gills are in the form of tufts, and the branchial aperture is very small. The eggs are carried about and hatched by the male, usually within a capacious pouch formed from two folds of skin on the ventral surface of the tail-region. One of the commonest British species is the Great Pipe-fish (*Syngnathus acus*), which is sometimes found in deep water, and sometimes at low tide among the seaweed in rock-pools. The specimens commonly seen are from 1 foot to 18 inches in length. It may be seen slowly moving about, with curious contortions, poking its long snout into every crevice in search of food, and sometimes assuming a vertical position with the head downwards, boring into or stirring the sand.



Pipe-fish (*Syngnathus acus*).

One of the commonest American pipe-fish is *Siphonostoma peckii*, which lives among the eel-grass of the coast.

The name Pipe-fish is sometimes given also to the fishes forming the family Fistularidæ, or Flute-mouths, of which one of the most remarkable is the Tobacco-pipe-fish (*Fistularia tabaccaria*). But these are large marine sticklebacks, and have only a superficial resemblance to the true pipe-fish.

Piperaceæ, a natural order of exogenous plants, natives almost exclusively of the hottest parts of the globe, particularly of Asia and America. About 600 species are known, to most of which the name Pepper (q.v.) is sometimes given, although some are also known by other names, particularly those of which the fruit is not used as a spice, but of which some part is employed for some other purpose, as Betel, Cubebs, Matico, and Ava.

Piperine, an Alkaloid (q.v.) found in pepper.

Pipe-rolls. See RECORDS.

Pipes are made of various materials and for various purposes. Thus, we have draining-pipes for agricultural and sanitary purposes, made of earthenware, wood, and metal (see DRAINAGE, SEWAGE), pipes of various kinds of metals for a great variety of purposes, and Tobacco-pipes (q.v.) of various materials. Earthenware pipes are now made of almost every size, from an inch or two in diameter up to the enormous size of 54 inches. They are usually made of fireclay, and are glazed like common Pottery (q.v.). Caoutchouc vulcanised and gutta-percha are also extensively used for making pipes. Leathern pipes are used chiefly for the conveyance of water temporarily, as in the case of fire-engines (see FIRE). Metal pipes are made of iron, lead, tin, or an alloy of tin and lead, copper, brass, &c. Iron pipes, as for water and gas, are usually cast, and the manufacture is one of enormous extent. See WATER-SUPPLY.

Pipes of ductile metal, such as brass, copper, and tin, are made by first casting an ingot into the shape shown in fig. 1, with a hole through its length of the same diameter as the bore of the pipe is intended to have. Into this is placed an iron rod, called the mandrel (*a*, fig. 2), which exactly fits, and which projects slightly at the tapered end (*b*, fig. 2). It is then brought to the drawing-table, and here the small end with its projecting mandrel is put into a funnel-shaped hole, drilled through a steel post (*a*, fig. 3), so as to allow the point to be gripped on the other side by a pair of pincers, at the end of a strong chain; the machine-power is then applied to the other end of the chain, and the soft metal and its mandrel are drawn through, the former being extended equally over the surface of the latter, which is then removed, and the length of pipe is complete. Some metals require repeated drawing through holes, getting gradually smaller, and have to be softened or annealed at intervals, as the metal hardens under repeated drawing. In this way brass, copper, tin, and pewter pipes are made; and a patent has also been taken out for making steel pipes; but lead pipes are made of great lengths by squeezing the soft metal through a hole in a steel plate in which there is a fixed core or mandrel projecting, which forms and regulates the size of the bore of the pipe. Pipes are also made from copper, brass, and malleable iron by rolling out narrow strips of metal, and then passing them successively through rollers, which are deeply grooved, and which turn up the edges (fig. 4). A mandrel is then laid in it, as in fig. 5, and it is next passed through double-grooved rollers, which turn the edges in, and thus form a complete tube round the mandrel. The edges, however, require hard soldering—i.e. soldering with a fusible brass alloy, or welding, if of iron. All boiler-tubes used to be made in this way; but the method of drawing has lately been so much improved that copper and brass pipes, or tubes, as they are frequently called, are now drawn of considerable thickness and diameter.

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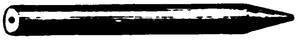

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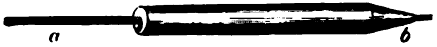

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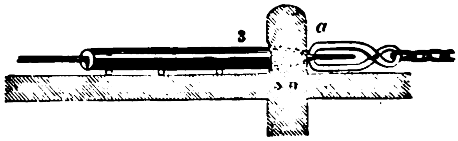

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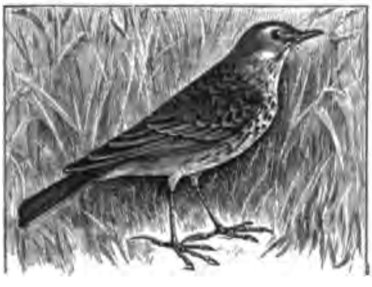
Pipi, the name given to the ripe pods of *Cæsalpinia Papai* (see CÆSALPINIA), which are used in tanning, and are not unfrequently imported along with Dividivi (q.v.).

Piping Crow, a name somewhat loosely applied in Australia to any bird of the genus Gymnorhina or Barita (q.v.). Another modification of the name is Piping Crow Shrike or Piping Roller; the bird is also called *Caruck.*

Pipit (*Anthus*), a genus of small birds forming with the wagtails the family Motacillidæ. The pipits have a strong resemblance to the larks in external appearance, and even in many of their habits, such as singing while on the wing; but they moult twice a year, while larks moult only once. With the wagtails they agree in all respects except in colour, and like them they are chiefly terrestrial in habit, running along the ground, working in and out among grass or heather in search of the insects, worms and slugs which form their food. The Meadow-pipit (*A. pratensis*), also known as the Titlark or Moss-cheeper, is the species most abundant in Britain. It breeds early in spring, nesting in a hollow on the ground or under a bank, and rears two broods in a season. The Tree-pipit (*A. trivialis*), though only a summer visitor, is common in many districts, and breeds freely in the south and west of Scotland. The Rock-pipit (*A. obscurus*) frequents rocky shores and feeds on molluscs and small crustaceans.



Meadow-pipit (*Anthus pratensis*).

Pippi. See GIULIO ROMANO.

Pippin. See PEPIN.

Pippin, a name given to many varieties of apple, among which are some of the finest in cultivation, as the *Golden Pippin, Ribston Pippin,* &c.

Piqua, a city of Ohio, on the Miami River (here crossed by two bridges), 28 miles by rail N. of Dayton. It has foundries, oil-refineries, and manufactories of flour, furniture, mattresses, &c. Pop. (1890) 9090.

Piquet, a game at cards for two players, played with thirty-two cards, the sixes, fives, fours, threes, and twos being rejected. The game was formerly played a hundred up, a *partie* being the best of five games; but about 1880 the rubicon game superseded piquet *au cent.* At the rubicon game six hands are played, each player dealing alternately. The one whose aggregate score is the higher wins the partie. He deducts the loser's score, and adds a hundred to the difference. If the loser fails to score a hundred in the six hands, he is *rubiconed,* and the scores are added instead of being deducted. For a description of the mode of play, handbooks should be consulted.

The earliest known mention of piquet is by Rabelais in the Gargantuan list of games (1530–45). Hence it has been concluded that piquet is of French origin. But it is more probable that a similar game, called *ronfa,* was played in Italy at an earlier date, and that this game, with modifications, travelled from Italy to Spain, where it was re-named *cientos,* and to France, where it was re-named *piquet.* Piquet seldom, if ever, occurs in English books of the Shakespearian period, but *cent* (*cientos*) frequently does. From this it may be concluded that piquet, under the name of cent, was played in England until about the middle of the 17th century, when the word 'cent' went out of use, and was replaced by the word 'piquet.' It may be noticed in this connection that from the time of the marriage of Mary to Philip of Spain (1554) the English equivalent of the Spanish name of the game was in vogue, and that contemporaneously with the marriage of Charles I. to the daughter of Henry IV. of France (1625) the French name *piquet* was substituted.

The etymology of piquet has been much speculated on; no satisfactory settlement has been arrived at. In 1651 was published *The Royall and Delightfull Game of Picquet,* translated from the earliest known French book on the subject. This was followed by several others, more or less resembling it, *Wit's Interpreter* (1671), Cotton's *Compleat Gamester* (1674), and Seymour's *Court Gamester* (1719), all containing piquet. The next original work was Hoyle's *Short Treatise on the Game of Piquet* (1744). This included the laws which were the authority until 1873, when the Portland Club issued a code. The general adoption of the rubicon game, shortly afterwards, necessitated a fresh revision; and in 1881 the Portland and Turf Clubs agreed to the code of laws which now governs the game. These laws were published in 1882, together with a treatise on the game, by 'Cavendish.'

Piracy (Lat. *pirata;* Gr. *peiratēs,* 'an adventurer,' 'a pirate'), robbery on the high sea, was apparently very much mixed up with early maritime adventure, the sea-rover being frequently pirate as much as trader: thus, the Phœnicians often combined piracy with more legitimate seafaring enterprise. In Homeric times piracy was accounted a reputable or even dignified calling; and the Greeks, especially the Phocæans, long displayed a natural genius for piracy. This aptitude was cherished by the constant warfare between small states, it being difficult sometimes to decide what was public and what was private war. Cilicia was long the headquarters of Mediterranean piracy, until in 67 B.C. Pompey made his memorable expedition against the pirates with great naval and military forces. From the 8th to the 11th century the Norse vikings were the terror of western coasts and waters (see NORTHMEN). The Hanseatic League (q.v.) had its origin in the desire for mutual defence against Baltic and other pirates. At a later date the Moslem rovers scourged the Mediterranean, commingling naval war on the large scale with peddling, thievery, and the abduction of slaves: Algiers was a piratical stronghold till well into the 19th century (see CORSAIR); and in the 17th century the English Channel swarmed with Algerine pirates, who snapped up in one prize £500 worth of linen belonging to the Lord Deputy of Ireland, and blockaded him, the king's representative, for weeks in an English port while he waited for a ship-of-war to convey him across the Irish Sea. In 1635 they actually entered Cork harbour, and carried off a boat with eight fishermen, to be sold as slaves in Algiers. The Buccaneers (q.v.) preyed mainly on the Spanish commerce with the Spanish American colonies. Lundy Island (q.v.) was long a nest of pirates, English and other. Captain Kidd (q.v.) is in the popular mind the chief representative of the picturesque type of pirates, whose career of reckless bloodshed and rapine under their 'Jolly Roger' or black flag, alternating with luxurious debauchery, has come to be surrounded with a halo of romance, reflected in E. A. Poe's *Gold Bug* and R. L. Stevenson's *Treasure Island*. The prototype of Scott's *Pirate* was John Gow, who in January 1725 boldly anchored in Orcadian waters, and entered into friendly relations with the islanders, till, recognised as an atrocious villain, he was with his crew captured and carried to London to be tried. He and eleven of his comrades were condemned a month or two after, and the pirate captain and nine of his men were executed together. In 1864 five men were hanged in London for murder and piracy. National prejudices tend to obscure the distinction between privateering (see PRIVATEER) and piracy: Paul Jones was called a pirate in England, and the commanders of the Confederate ships *Alabama*, *Shenandoah*, and *Florida*, which preyed on northern commerce, were in northern eyes practically pirates. Of late the pirates tried by admiralty courts are rather naval mutineers than pirates in the old sense. The African slave-trade was not considered piracy by the law of nations; but the municipal laws of the United Kingdom and of the United States by statute declared it to be so; and in or after 1841 it was declared to be so by Austria, Prussia, and Russia. The home of professional piracy, happily now on a small scale, is the Malay Archipelago and the China Seas; Sea-Dyaks and Malays disputing with Chinamen the palm of hardihood as sea-robbers.

Piracy is recognised as an offence against the law of nations. It is a crime not against any particular state, but against all mankind, and may be punished in the competent tribunal of any country where the offender may be found, or into which he may be carried, although committed on board a foreign vessel on the high seas. It is of the essence of piracy that the pirate has no commission from a sovereign state, or from one belligerent state at war with another. Pirates being the common enemies of all mankind, and all nations having an equal interest in their apprehension and punishment, they may be lawfully captured on the high seas by the armed vessels of any particular state, and brought within its territorial jurisdiction for trial in its tribunals; but it is not permitted to put pirates to death without trial save in battle.

The infringement of the Copyright Acts is often spoken of as literary piracy; and the word is not unfairly extended to cover the case in which the publishers of one nation issue unauthorised reprints by authors of another nation—especially the case of American reprints of English works (see BOOK-TRADE, Vol. II. p. 316). Thus, several pirated reprints of the first edition of this Encyclopædia were issued and were being sold in 1890, in which obsolete facts and statistics twenty years old were reproduced with marvellous fidelity.

Piræus (Gr. *Peiraieus*), called also PORT DRACO, the harbour of both ancient and modern Athens (q.v.). Planned by Themistocles and laid out by Hippodamus of Miletus, the Piræus was built in the glorious days of Pericles; this ruler and Cimon before him built the three 'long walls' that connected Athens with its port (5 miles to the south-west), and so ensured a free and safe passage from one to the other at all times. It was both a war harbour and a commercial port, many foreigners living within its walls. Its arsenal (built 347–323 B.C.) and fortifications were destroyed by Sulla in 86 B.C., and from that time the town sank into decay. The modern Piræus, which has grown up since 1834, is a regularly laid-out but mean-looking town, with a naval and a military school, arsenal depôts, and manufactures of cottons, flour, paper, iron, nails, carts, furniture, &c., and is growing rapidly. A railway (1869), 5½ miles long, connects it with Athens. Its trade in 1890 was divided between £2,541,700 for imports—coal and railway plant, &c. (£357,400) from Britain, petroleum (£52,000) from the United States, and sheep and cattle (£41,000) from Russia—and £2,059,600 for exports, chiefly tobacco, valonia, hides, bones, horns, cheese, wool, &c. A total of 6000 vessels of 2½ million tons enter annually, one-half the tonnage being in Greek bottoms. Pop. (1871) 11,000; (1879) 21,055; (1889) 34,237; (1895, estimated) 37,500.

Pirano, a seaport of Austria, on a promontory on the south side of the Gulf of Trieste and 12 miles SW. of the city of Trieste. It has two harbours, an old castle, and manufactures of soap, glass, &c., with neighbouring salt-works. Pop. 9419.

Pirkheimer. See DÜRER.

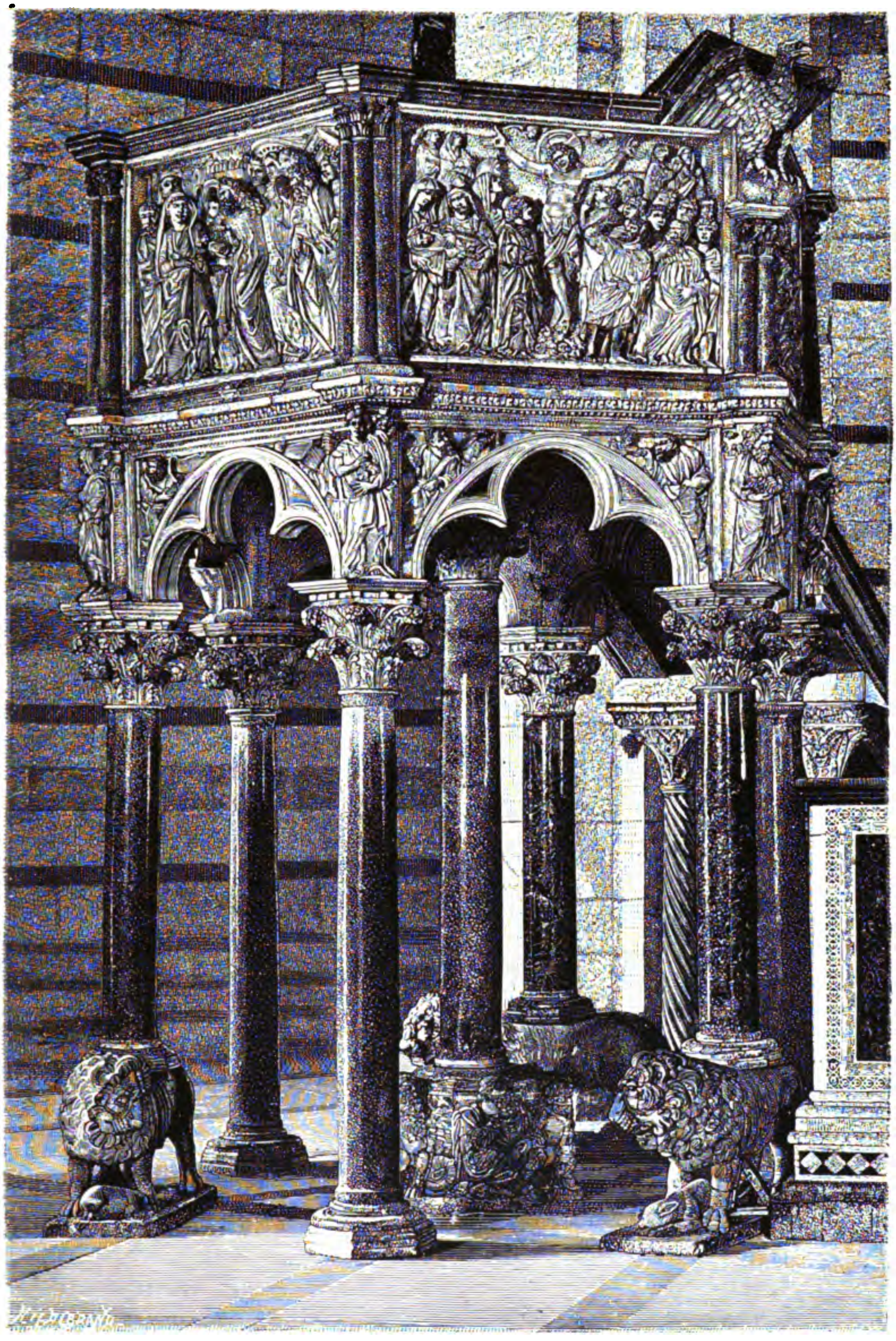
Pirmasens, a town of the Bavarian Palatinate, and formerly the chief town of the county of Hanau-Lichtenberg, 34 miles by rail W. of Landau. In 1885 it had 14,938 inhabitants; chief manufactures, shoes and musical instruments. Close by the Prussians under the Duke of Brunswick defeated the French commanded by Moreau on 14th September 1793.

Pirna, a town of Saxony, stands on the left bank of the Elbe, 11 miles by rail SE. of Dresden. Here are a fine 16th-century church; a castle (1573), used as a lunatic asylum since 1811; and manufactures of glass, chemicals, tobacco, stoves, &c. Eight thousand men are employed in the sandstone-quarries. Pop. (1890) 13,852.

Pirogue. See PERIAGUA.

Pirot, a town of Servia, on the Nischava, 30 miles ESE. of Nisch. It was occupied by Servian troops in 1877, and taken by the Bulgarians in 1885. Pop. (1891) 9930.

Pisa, one of the oldest cities of Italy, the rival of Venice and Genoa, which still has its walls standing and a citadel, is situated on the Arno, by rail 49 miles W. of Florence and 13 NE. of Leghorn. It was formerly a great port, though six miles from the sea, but owing to the silting-up of the river is now quite inaccessible to ships. Its commerce has been transferred to Leghorn. It is still a city of fine buildings, foremost amongst which is the cathedral (1063–1118), with a noble dome, fine paintings by Cimabue, Andrea del Sarto, and others, and beautiful marble altars. Its shape is that of a Latin cross, 311 feet long by 252 wide; the nave is 109 feet high. Externally it has a magnificent façade of four superimposed rows of pilasters and arches, and fine bronze doors by Giovanni da Bologna and others. Near the cathedral stands the round marble campanile, the 'Leaning Tower of Pisa,' which is a magnificent specimen of the southern Romanesque architecture, but is peculiar in that it (including the cornice) deviates about 14 feet from the perpendicular. This peculiarity is not due to original design. The tower seems to have begun to heel over to one side when the third story was completed; the architects deliberately accepted the conditions, and adhered to the inclining position, but diminished the slope of the upper stories so as to keep the centre of gravity well within the walls. (There are two leaning towers also at Bologna, q.v.) The tower is 180 feet in height, consists of eight stories divided by rows of columns, the last, which contains the bells, being smaller in diameter than the others. The tower was erected in 1174 and succeeding years by the architects Bonanno of Pisa and William of Innsbruck; but the eighth story was not completed till the middle of the 14th century. The marble Baptistery, or Church of St John (1152–1278), opposite the cathedral, is circular, and



THE PULPIT OF NICOLA PISANO IN THE CHURCH OF ST. JOHN AT PISA.

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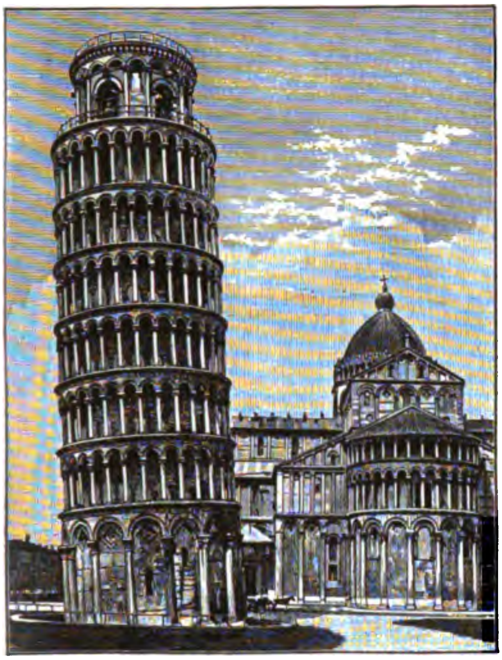
supports a dome, crowned with a cupola. The interior, noted for its wonderful echo, contains the grand and elaborate pulpit of Niccola Pisano (1260) and a large marble font. The beginning of the Campo Santo, or ancient national cemetery, was several loads of earth brought from Jerusalem towards 1200. In 1278–83 the ground was surrounded by cloisters by Giovanni Pisano, the walls of which were adorned with fresco-paintings by Orcagna, Benozzo Gozzoli, and others. The city contains numerous other churches, some of great age, dating from the 13th century and even earlier; also many fine palaces, private and official residences, including that of the archbishop. The university (1338) has a natural history museum, a botanical garden, a library (1742) of 120,000 volumes, and sixty lecturers and 600 students. The town possesses an academy of fine arts and archives. Amongst distinguished natives may be named the popes Eugenius III. and Nicholas V., the Visconti, Peter the Deacon, Leonardo the mathematician, Giovanni (but not Niccola) Pisano, and Galilei. The industrial activity is now confined to cottons, silks, ribbons, and the working of coral and alabaster. Dromedaries are bred at a royal farm in the neighbourhood. Pop. (1881) 37,704 (commune, 53,957). The province has an area of 1206 sq. m. and (1889) a pop. of 310,321.



Leaning Tower and Cathedral, Pisa.

History.—Ancient Pisa, originally an Etruscan city, became subject to Rome in the 2d century B.C.; but, on the decline of the western empire, it was compelled to submit in turn to the nations who successively overran Northern Italy. Early in the 11th century Pisa had developed into a powerful republic, possessing a formidable fleet and extensive territories along the Tyrrhenian Sea; it yielded little more than nominal homage to its suzerain lords, the emperors of Germany. Throughout the 11th century Pisa was at the height of its prosperity; to this period belong most of the splendid monuments of art that still adorn the city. It had extensive commercial relations with the East; its 'customs of the sea' (1075) were the pattern upon which the sea-laws of nearly all peoples navigating the Mediterranean were modelled. During the same century the Pisans repulsed the Saracens (1011), took Sardinia from them in 1022, attacked them in Africa in 1030, and routed them utterly off Palermo in 1062. Early in the next century, in 1114–16, they wrested the Balearic Isles from the same enemies. In the second crusade too they played a prominent part, and helped the pope against the Normans, taking Amalfi in 1135 and again in 1137. But already in the 11th century the rivalry between Pisa and Genoa had broken out. Florence too, a Guelph city, grew into an enemy of the Ghibelline Pisa. Wars many and often were waged between Pisa on the one side and a coalition of cities, headed by Florence and Genoa, on the other, with varying fortune, until in 1284 the Pisan fleet was crushed at Meloria. After this Pisa was compelled to give up Corsica, part of Sardinia, and 160,000 gold pieces to Genoa. At the same time Ugolino (q.v.) della Gherardesca made himself master of the town. Various individual rulers or tyrants followed, until the Pisans finally threw themselves (1399) under the protection of Galeazzo Visconti of Milan. The son of the latter sold the Pisan territory to their greatest enemies, the Florentines, from whose tyrannical rule they were for a time relieved by Charles VIII. of France, who, in 1494, accepted the protectorate of the city. When the French left Italy the old struggle was renewed; and, after a desperate resistance, the Pisans, in 1509, were compelled by hunger to surrender to the Florentine army. The most influential families, as formerly in 1406, emigrated. From this time Pisa steadily declined, until in the middle of the 16th century it had less than 8600 inhabitants. Its history henceforth coincides with that of Tuscany (q.v.). With the rest of Tuscany it became part of the kingdom of Italy in 1860.

THE COUNCIL OF PISA met in Pisa on March 25, 1409, and of which the twenty-third and last session was held on 7th August following. Its aim was to end the schism which had divided the Western Church for thirty years, and with this view the leading cardinals, finding that neither of the rival popes, Gregory XII. and Benedict XIII., would keep their promises to abdicate, set aside the claims of both, and themselves convoked a general council. It was attended from first to last by 24 cardinals, 4 patriarchs, 80 bishops, 102 proctors of bishops, 87 abbots, 200 delegates of abbots, besides many generals of orders, doctors, deputies of universities, and ambassadors. After the rival popes failed to appear in obedience to its summons, the council formally tried the claims of both in turn, and deposed them as schismatics and heretics. The cardinals then formed themselves into conclave and elected Cardinal Philargi, who assumed the name of Alexander V. But the council, instead of getting rid of the contending popes, had only added a third, and the faithful continued to be distracted in their allegiance for eight years longer, down to the time of the Council of Constance. Bellarmine considers the Council of Pisa as 'neither clearly approved nor clearly rejected;' Hefele says 'neither ecclesiastical authority nor the most trustworthy theologians have ever numbered it among the ecumenical councils.' See Hefele's *Concilien-geschichte*, vol. vi.

Pisagua, a small port of the now (since the peace of 1883) Chilian province of Tarapacá, 40 miles N. of Iquique by rail; pop. 2131. It was bombarded and was the scene of much fighting during the Chilian civil war in 1891.

Pisano, NICCOLA, a distinguished sculptor of Pisa, was born, apparently near Lucca, about 1206.

His earliest work is supposed to be the 'Deposition' over one of the doors of the cathedral at Lucca, dated 1237. His reputation is supported by three important works, which are still admired for their excellence—the pulpit of the baptistery at Pisa (1260), the 'Arca' or shrine of St Dominic for the church of that saint at Bologna (1267), and the pulpit of the cathedral at Siena (1268). He died at Pisa in 1278, and was buried in the Campo-Santo. He was also a great architect and a skilful engineer. His influence on art was wide, reviving the love of beauty and giving new birth to the plastic arts. His pupils Arnolfo and Lapo executed numerous works at Rome, Siena, and other cities. His son and heir in reputation, GIOVANNI PISANO (1250–1330), was not his equal either as sculptor or as architect. Niccola's pupil Andrea de Pontedera, generally called ANDREA PISANO (1270–1349), was first a goldsmith, but became famous as a worker in bronze and a sculptor in marble. He settled in Florence, and his best work there (one of the baptistery doors and many sculptures on the Campanile) shows strong traces of Giotto's influence. Vittore Pisano, or Pisanello (1380–1456), was both fresco-painter and medallist. See Crowe and Cavalcaselle, *Painting in Italy* (1864); Symond's *Renaissance in Italy* (1886); Leader Scott, *Early Italian Sculptors* (1882).

Piscat'aqua, a river which constitutes part of the boundary between Maine and New Hampshire, and forms at its mouth the excellent harbour of Portsmouth. See NEW HAMPSHIRE.

Pisciculture. Fish-culture is the art of increasing the supply of food-fishes—first, by breeding and rearing them artificially; secondly, by protecting the gravid fish and the natural spawning and nursery grounds through legislation; thirdly, by creating new breeding-grounds through the removal of obstructions or the placing of fascines, stakes, tiles, &c. for the collection of ova or of spat; lastly, by increasing the amount of natural food in any practicable manner. In recent years the artificial culture of sea-fish has been attempted on a large scale in several countries. In the United States and in Norway fully-equipped hatcheries for sea-fish and shellfish have been in operation for a number of years. In 1889 the Newfoundland government erected a marine hatchery at Dildo, Trinity Bay; and a similar establishment was completed in 1891 by the Canadian government near Pictou, on the Northumberland Strait, Nova Scotia. In 1890 the Newfoundland hatchery turned out over fifteen millions of cod fry and four hundred millions of young lobsters. In Britain the hatching of sea-fish has not yet been undertaken on a large scale; but very excellent experimental work has been done at Plymouth by Mr J. T. Cunningham, who succeeded in artificially fertilising and hatching the eggs of the common sole in the early part of 1890; at St Andrews by Professor M'Intosh; and by the Fishery Board for Scotland at Dunbar. Under the second head the Fishery Board for Scotland entered in 1883 on a series of experiments to ascertain what legislation, if any, was required to protect the inshore waters either as spawning, nursery, or food-producing grounds, and several bylaws have been passed protecting the greater portion of the Scottish inshore waters. These provisions were extended by the Herring-fishery (Scotland) Amendment Act, 1889.

Ponds for fresh-water fishes have been common from a very remote antiquity. It appears from Isaiah, xix. 10, that they were used in ancient Egypt. In the times of Roman luxury almost every wealthy citizen had fish-ponds. The Chinese have long bestowed more attention on pisciculture than any other nation, and with them it is truly a branch of economy, keeping up the supply of food, fish being used as much as meat by rich and poor at every meal. In China a large proportion of fish for the markets of the interior are reared in ponds. Some of these are generally placed in front of the villages, and in some places large numbers of them spread over plains. A common way of rearing in that country is to keep a number of male and female fish in small ponds so as to furnish eggs. After these are hatched, and the young fish become two or three inches in length, they are transferred to larger ponds. At the end of six or eight months they are caught and sent to market. Carp, perch, tench, and bream are some of the kinds kept in ponds. In some countries of modern Europe this branch of pisciculture is also prosecuted to a very considerable extent, particularly in Germany and Sweden, and of late years in France, in order to increase the supply of fish for the market. In Britain it has only recently been systematically prosecuted. The country-seats of the nobility and gentry have, indeed, been generally provided with fish-ponds, but in most cases rather as ornamental waters than for use. In the northern parts of Britain trout, perch, and pike are almost the only fish kept in ponds; in England they are often stocked with carp and tench, and are turned to much better account than in Scotland. In Germany ponds carefully attended to are found very productive and remunerative. There can be no doubt that in Britain also many a piece of land at present very worthless might easily be converted into a pond, and made to yield large quantities of excellent fish.

The greatest improvement in pisciculture, and a most important branch of it, to which the term is often restricted, is the breeding of fish in artificial breeding-places, from which not only ponds but rivers may be stocked; or the art of fecundating and hatching fish-eggs, and feeding and protecting the young animals till they are of an age to secure their own food and protect themselves from their numerous enemies.

In the middle ages, and especially in the 14th century, fish-ponds were common in the domains of princes and nobles and religious communities; but these were used only for rearing purposes. The first attempt at artificial fertilisation of fish eggs appears to have been made at the beginning of the 15th century, by Dom Pinchon, a French monk; but his experiments attracted no attention. Between 1725 and 1765 Stephan Ludwig Jacobi of Hohenhausen, Lippe-Detmold, bred trout artificially; but commercial pisciculture owes its origin to the French, the art having been first practised by Rémy, a poor fisherman who worked the streams of La Bresse in the Vosges. It was the great waste of eggs incidental to the natural system of fish-breeding that led Rémy about 1842 in conjunction with a partner, Géhin, to try to repeople the fish-streams of his native district. His plan, being successful, attracted the notice of many of the French savants, and led to preferment for Rémy; the new art was besides taken up by the government. At Hüningen in Alsace, on the Rhine, a gigantic fish-nursery and egg-depôt was erected in 1852, chiefly through the energy of M. Coste. Since the cession of Alsace to Germany the operations of the establishment at Hüningen have been conducted on a still larger scale by a German association.

Rémy and Géhin's plan of rearing trout artificially is this: At the time the female is about to spawn she is caught and gently pressed on the abdomen by the hand, when the ova or eggs spurt forth into a vessel containing water. In the same way the milt is taken from the male. The eggs are well mixed with the milt, and the water changed once or twice. The fecundation being completed, the next thing is to place the eggs for security into a covered vessel. Its early form was that of a flat, round box about eight inches in diameter, with a hinged lid. This was made of zinc, perforated with small holes, and had a layer of fine gravel on the bottom. A considerable number of fecundated eggs were enclosed in the box, which was then placed in the bed of a current of pure water and covered with pebbles, care being taken that the water passed freely through, as it is necessary for the eggs to be slightly agitated. The hatching takes place in from two to four months, the time depending on the nature of the water and other circumstances. For a description of the early changes which the fish undergoes, see **SALMON.** After the little fish are fully formed they are kept in the box from eight to fifteen days, and then set at liberty. The later plans for artificially propagating trout or salmon differ principally in mixing the ova and milt in an absolutely dry utensil and in the details of the hatching-boxes, in the use of houses, and in many of the young fry being kept in ponds till they are a year or more old.

The most sustained effort in British pisciculture has been in connection with the salmon-fisheries of the river Tay. At Stormontfield, near Perth, since 1853, a series of open-air breeding-boxes, covered with gravel and capable of receiving 500,000 eggs, have been in use; but for years nothing like this number have been hatched, and probably not 20,000 young fish annually have for some time past been turned out of the ponds there. The Tay District Fishery Board in 1883 erected a new hatchery a few miles away at Dupplin on the Earn. It was put up to try the system of glass grill hatching-boxes, designed prior to 1860 by M. Coste of Paris, and presently to be described as in use at Howietoun. On this plan it was estimated to hatch 300,000 ova. But in the autumn of 1883 the Board decided to adopt only partially the grill hatching, and to try along with it the simpler Canadian system of shallow trays of perforated tin-plate, and coated with Japan varnish; in which the eggs, instead of being in separate rows, are packed very closely together, river-water being used. In 1889 it was stated to be capable of hatching four or five hundred thousand fish.

The most extensive fish-rearing establishment in Great Britain is the one belonging to Sir James Maitland, situated at Howietoun, near Stirling. It consists of hatching-houses and, at a distance from them of half a mile, an extensive series of ponds. The principal hatchery is 86 feet long by 40 feet wide, each of its two stories being 10 feet high. Its walls, built of brick and concrete, are nearly 2 feet thick; and the roof is covered with a layer of concrete 3 inches thick, over which there is a thin cover of asphalt. The entire outer shell is thus a bad conductor of heat, so that it is not difficult to keep the water inside from falling below 44° F. Fig. 2 gives a sectional view of the hatchery. It will be seen that each floor has a considerable slope, which admits of the hatching or grill boxes (*a*, *a*, *a*, *a*, fig. 2) being placed in descending series. These are 134 in number, the ordinary size of them being 6 feet 9 inches long, by 1 foot 7 inches broad. In the bottom of each box four wooden frames are neatly fitted, each of which has rather more than 100 glass tubes, about ¼-inch in diameter, placed transversely. Fig. 1 shows a longitudinal section of one of these hatching-boxes, in which the dotted line indicates the position of the glass tubes. Upon these glass grills the fish-eggs lie in parallel rows, looking like small pink beads. Six cisterns or tanks (*b*, *b*, *b*), each 20 feet long and five feet broad, are fitted up in the lower portion of the ground-floor to receive the young fry after they begin to take food. At Howietoun both hatching-boxes and rearing-tanks are constructed of wood charred on the internal surfaces, and painted on the outside, their ends being formed of perforated zinc, which is closed with flannel when any depth of water is required in the tanks. At other hatcheries, however, the tanks and boxes are formed of slate, and sometimes of earthenware, but in such cases they are of smaller size. Often, too, the eggs are placed on perforated zinc or porous earthenware instead of glass grills. While the eggs are being hatched only spring water is used. It is brought underground to the two cisterns (*c*, *c*), and from these it is conveyed by lead pipes (*p*, *p*, *p*, *p*) to each series of hatching-boxes, over the grills of which it flows in a constant but not rapid stream. Each of the hatching-boxes contains about 15,000 eggs, but in the earlier part of the hatching-season (December) eggs are also placed in the 20-feet tanks, so that about four millions of

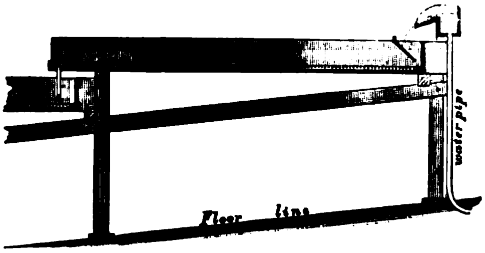


Fig. 1.

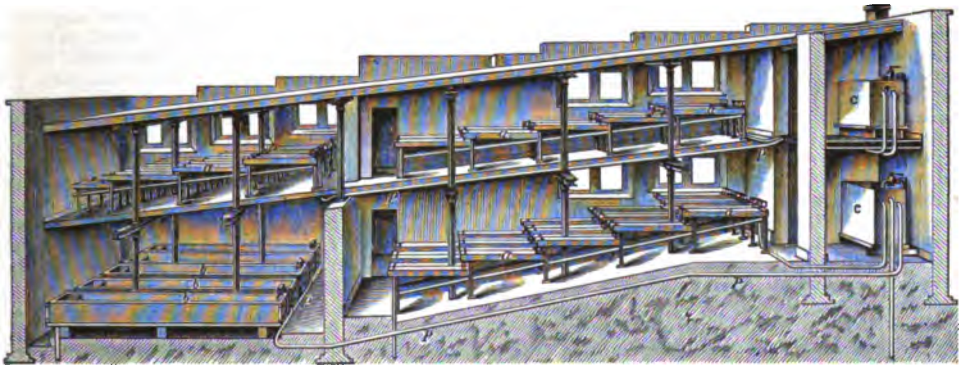


Fig. 2.

fish-eggs can be brought to maturity in one season. In 1890–91, 2,310,000 eggs were incubated, 81,500 yearling trout sold and 40,000 yearling trout retained, to grow into two-year-olds, and 19,000 two-year-old trout sold and 6000 retained.

The ponds at Howietoun are extensive and ingeniously planned, both for beauty and convenience. Water is supplied to them from a burn issuing from Loch Coulter, a lake of considerable size, and largely fed by springs. They are divided into a larger and a smaller group. The former consists of ten ponds, of which the largest measures 200 feet in length by 90 feet in width, and is 12 feet deep. Next to this is a sub-group of three ponds lying parallel to each other, each 270 feet by 45 feet, and 10 feet deep. These also contain Lochleven trout of different ages, and about 5000 in number in each pond. The remaining twenty-five ponds are each about 100 feet long, and contain respectively American brook trout (*Salmo fontinalis*), yellow trout (*Salmo fario*), and more Lochleven trout under three years of age. Their various levels are so arranged that by means of open tracts and dividing-boxes the water is slowly but constantly flowing from the highest to the lowest pond in the series, and sluices are provided so that any single one can be emptied when required. Each pond is also provided with a cleansing pipe.

At Howietoun the young fry are fed chiefly on grated eggs and beefsteaks made up into strings like vermicelli, yearlings and two-year-olds are fed on minced horse-flesh, and older trout on shellfish. But some pisciculturists strongly recommend that additional kinds of food, such as boiled liver, chopped worms, fish-roe, and biscuit-dust, should be given in turns to fry. A large proportion of trout die—many, as some experienced persons think, of starvation—during their first year, even when kept in ponds regularly supplied with food. The strong repel and devour the weak at feeding-time, but the mortality, in so far as it may be caused by food at all, is probably more due to the kind used, or to the form in which it is given. In the case of rearing-ponds situated near the sea, mussels and shrimps are much used for feeding purposes. At Guildford, Surrey, the trout are allowed to find their own food, but with this system the ponds must be large in proportion to the number of fish contained in them, as well as favourably situated with respect to a sufficiency of natural food. Near St Pölten, Lower Austria, this plan is adopted. There are a number of small ponds or ditches with stagnant water and aquatic plants, which are used as nurseries to propagate the larvæ of insects, small crustaceans, and other low forms of animal life on which trout naturally feed. From time to time part of the water swarming with these creatures is admitted to adjoining ponds with pure water in which the fish live. It probably depends on the locality of the ponds which method of feeding succeeds best in a commercial sense.

In Great Britain it is as yet only members of the Salmonidæ family which have been artificially reared on a commercial scale. But quite recently some attention has been given to the cultivation of what are called 'coarse' fresh-water fish. By this is meant pike, perch, roach, carp, tench, and a few others. Of these pike and perch are perhaps the two most likely to be profitable. It is feared, however, that so long as the markets are fairly well supplied with sea-fish, salmon, and trout the chance of these coarse fish being largely consumed as food is not great. They have all, more or less, a comparatively insipid taste, but this could no doubt be improved by proper attention to their food. Pike being great cannibals, there is more difficulty in stocking ponds with them, even when there is not much difference in their size, than with most other fish. Perch—which have an extraordinary power of increase—spawn readily in confinement, but it is said that the fry are not very easily reared. In America persevering efforts are being made to acclimatise the mirror carp, which is a favourite fish for the table in Germany. See PIKE, PERCH, and CARP.

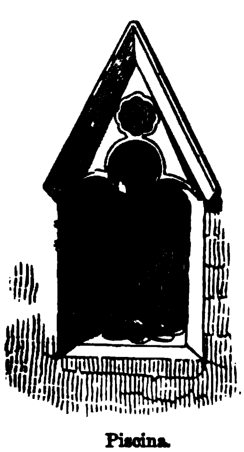
Pisciculture is practised in America on a very large scale. The United States Fish Commission have several stations for hatching eggs of the Salmonidæ, the largest being on the M'Leod River, California, established for the ova of the California salmon (*Salmo quinnat*). The report of the commissioner, Professor Spencer Baird, gives the total production of eggs at this station for the season of 1879 as about 9,500,000; but the number for 1878 was 14,000,000. In 1879, 2,300,000 were hatched at the station to keep up the stock in the Sacramento River, 4,150,000 were taken to the eastern states, and the remainder were sent to Canada, France, Germany, and Holland. The Californian salmon can adapt itself better than the common species to comparatively warm water, so that it will thrive in some rivers where the latter will not; but whether it will be successfully introduced into Europe is still a matter of uncertainty. This station is now chiefly used for hatching the rainbow trout (*Salmo irideus*), 28,700 fry being planted in the M'Leod River in 1885. There is another hatching-station at Bucksport, Maine, for the Atlantic salmon (*Salmo salar*); and a third at Grand Lake Stream, Maine, for breeding the Schoodic or landlocked salmon, which is a variety of the *Salmo salar*. In the United States there are several hatcheries for the propagation of shad, the aggregate yield of which in 1885 was 38,000,000 young fish. As regards numbers, however, both salmon and shad sink into insignificance compared with the quantity of white fish, of which the most important species is *Coregonus clupeiformis*, reared in the piscicultural establishments of the Lake States (see COREGONUS). The production of eggs of this fish in the year 1885 reached the grand total of 268,000,000. Besides the hatcheries under the direction of the Fish Commission, most of the states have hatcheries of their own. In 1890 those belonging to the state of New York alone distributed 39,930,000 fry and eggs of trout, shad, pike, &c.; the station at Caledonia, in that state, has distributed 18,000,000 trout, salmon-trout, carp, pike, and muscalongue in one year. Hatching-stations for the cod and other sea-fish are also being tried. For oyster-culture, see OYSTER.

Canada is not far behind the United States with respect to the scale of her fish-breeding establishments. The principal ones—twelve in number—are owned by the government, and their production for the year 1889 amounted to 11,673,500 salmon-eggs, 5,140,000 salmon-trout eggs, 30,600,000 eggs of white fish (*Coregonus albus*), and 21,000,000 eggs of members of the Percidæ family, besides smaller numbers of other species, making a total of 68,700,000. The common or Atlantic salmon has been introduced into Tasmania, and seems now to be thoroughly acclimatised, numbers of adult fish, besides shoals of the young, occurring in the rivers. One or more species of British trout have also become established in Tasmanian as well as in Australian and New Zealand rivers. At Otago there is a trout-hatchery. In Victoria the Californian salmon has been found to succeed better than the common species.

See works on Pisciculture or departments of the subject by Armistead (1870), Andrews (on salmon and trout, 1886), Ashworth (on Stormontfield, 1875), Atkins (fittings for salmon-culture, Washington, 1879), Boccius (1841 and 1848), Buckland (1863 and in *Nat. Hist. of Brit. Fishes*, 1880), Burgess (1891), Capel (on trout, 1877),

Francis (1865), Fry (New York, 1866), Goode (in the Trans. Amer. Fish-culture Assoc., New York, 1881), Gorlick (2d ed. Cleveland, Ohio, 1880), Seth Green (on trout, Rochester, N.Y., 1870), Guy (on stocking, 1884), Jacobson (from a Report of the U.S. Commission, 1880), Sir James Maitland (a history of Howietoun, 1887), Nicols (on salmon at the Antipodes, 1882), Norris (on American fish-culture, Philadelphia, 1868; Lond. 1869), Roosevelt (Rochester, N.Y., 1879), Slack (on trout, New York, 1872), Stone (on trout, Charleston, 1877), Wilmot (on Canadian fish-culture, Ottawa, 1882), Wilson (on salmon at the Antipodes, 1879). Also French works by Coste (1850 and 1858), Géhin and Rémy (1851), Lamiral (1851), Lamy (1866), Millet (1870), Quatrefages (1854), Raveret Wattel (1874 and 1879), Rémy (1854 and 1856), De Bon (1880); Gobin, *La Pisciculture en Eaux Douces* (1889), *La Pisciculture en Eaux Salées* (1891); and German works by Max von dem Borne (1875), Haack (1872), and Jacobi (in the *Hannoverisches Magazin* for 1763—believed to be the earliest printed notice of modern fish-culture), Nicklas (1880), Vogt (1875), Benecke, Dalmer, and Von dem Borne (1886); also the annual Bulletins and Reports of the United States Fish Commission, and the *Bulletins de la Société d'Acclimatation de France.*

Piscina (named from the swimming-pond in the old Roman baths), in Catholic churches, a shallow stone basin with a drain usually leading directly to the earth, in which the priest washes his hands, and rinses the chalice at the end of the celebration of mass. In England it is almost invariably placed on the south side of the choir, at a convenient height.



Piscina.

Pisek, a walled town of Bohemia, stands on an affluent of the Moldau, 84 miles by rail S. by W. of Prague, and has iron and brass works, and manufactures of paper, boots, hats, &c. Pop. 10,596.

Pisgah, a name that seems to have applied generally to the mountain-range or district to the east of the Lower Jordan, identical with, or itself a part of, the mountains of Abarim (Deut. xxxii. 49; xxxiv. 1), one of the summits of which is Mount Nebo (the modern *Neba*), 2644 feet above the level of the Mediterranean. From this point Moses enjoyed his glimpse of the Promised Land, in early spring. It is not the highest point among the spurs which here run out from the Moabite plateau, but Major Conder points out that it is the nearest ridge to the Israelite camp in the plain of Shittim. He describes the view to the east as shut in but two miles off by the shelving edge of the Moabite plateau, and to the south as closed five miles off by a long ridge, but that to the west as including all the Judæan watershed, and in clear weather all Samaria and Lower Galilee, as far as Tabor and the chain of Gilboa. The Sea of Galilee and Hermon are shut out by the lofty range of Penuel (*Jebel Osh'a*) in Gilead, while the western watershed of Judæa and Samaria makes it impossible to see the waters of the Mediterranean; but below to the south-west the northern half of the Dead Sea is seen, bordered by the precipices of Engedi, beyond which stretches the dreary Jeshimon or desert of Judah. The burial-place of Moses is unknown, but may have been, suggests Conder, in the terrible gorge of the Zerka M'aïn, on the south side of the cliff of Peor, or Minyeh, the Callirhoe of the tyrant Herod's days. Its old Hebrew name appears to have been Nehaliel ('the valley of God').

Of the three stations from which Balaam watched the encampment of Israel, Conder makes the first Bamoth-Baal (*Maslubîyeh*), a high ridge separated from Nebo by a deep valley; the second, the ridge of Nebo itself; the third, the top of Peor, over against Jeshimon, a cliff called *Minyeh*.

Pishín, a district of Southern Afghanistan, just north of Quetta, which has been governed by a political agent of the Governor-general of India since 1878. The British occupied it on account of its great strategical importance: it is the meeting-place of several roads, practicable for troops but not for wheeled carriages, leading from Sind and Punjab to Kandahar. The district—area, 3600 sq. m.; elevation, 5000 feet—consists of alluvial valleys separated by ranges of hills, the whole sloping south-west, and surrounded by mountain-chains that reach in north and south 11,000 feet. The people, partly settled, partly nomad, grow wheat, barley, maize, millet, lucerne, water-melons, and musk-melons, and trade in horses to India. Pop. 60,000. A branch of the Indus valley line traverses the principal valley.

Pisidia, one of the ancient divisions of Asia Minor, lay on the south, separated from the sea by the narrow strip of Pamphylia, and having Phrygia on the north, Isauria on the east, and Lycia on the south-west. Traversed by the main chain of the Taurus, it is a mountainous region, with an inhospitable climate. The people, a race of hardy and lawless mountaineers, were greatly given to predatory expeditions, and do not seem to have paid any regular obedience to the various oriental and other conquering races until Roman times. Under the Roman supremacy there were several prosperous cities, as Sagalassus, Antioch, Selge, Termessus. The boundaries of the province varied at different periods.

Pisis'tratus (Gr. *Peisistratos*), a famous 'tyrant' of Athens, was born about 600 B.C. At first he co-operated with his kinsman, the famous Solon, and in the war against the Megarians acquired considerable military distinction; but afterwards, when probably his ambitious views had become more matured, he came forward as the leader of one of the three parties into which Attica was then divided—the *Diacrii* (party of the Highlands), chiefly a labouring population, jealous of the rich, and eager for equality of political privileges. Driving into the market-place of Athens one day, and exhibiting certain self-inflicted wounds, he called upon the people to protect him against his and their enemies; and, a general assembly of the citizens being summoned, a partisan proposed to allow him a bodyguard of fifty men. The measure was carried in spite of the strenuous opposition of Solon. Gradually Pisistratus increased the number, and in 560 B.C., when he felt himself strong enough, seized the Acropolis. The citizens, in general, seem to have tacitly sanctioned this high-handed act. Megacles and the Alcmæonids—the heads of the rich aristocratic party—fled from the city, but returned in 554 and drove Pisistratus into exile in Eubœa (552). Supported by Thebes and Argos, he was able in 541 to sail with a strong force, landed in Attica at Marathon, and marched on the capital. His partisans hurried to swell his ranks. At Pallene he encountered his opponents, and completely defeated them, but used his victory with admirable moderation. When he entered the city no further resistance was made, and he resumed the sovereignty at once. He lived for sixteen years afterwards in undisturbed possession of power, dying 527 B.C., and transmitting his supremacy to his sons, Hippias and Hipparchus, known as the *Pisistratidæ*. Although the precautionary measures he adopted to establish his authority involved at first a resolute and stringent policy, yet no sooner had he placed himself out of danger than he began to display that wonderful tact, moderation, and sympathetic appreciation of the wishes of the Athenians that have won him the praise and esteem of all later ages. He firmly, but not harshly, enforced obedience to the laws of Solon; emptied the city of its poorest citizens, and made them agriculturists, supplying such as had no resources with cattle and seed; secured provisions for old and disabled soldiers; bestowed great care on the celebration of the religious festivals of the Atticans; encouraged literature more than any Athenian had ever done before—it is to Pisistratus, or to the poets, scholars, and priests about him, that we owe, for example, the first complete edition of Homer; and, like his still more brilliant successor in the following century, Pericles, he adorned Athens with many of its most beautiful buildings, such as the Lyceum, temples to the Pythian Apollo and the Olympian Zeus, &c. See works on Pisistratus by Fluch (1885) and Töpffer (1886).

Pisolite (Gr., 'pea-stone'), a concretionary limestone, differing from oolite in having the particles as large as peas.

Pistacia, a genus of trees of the natural order Anacardiaceæ, having diœcious flowers without petals, and a dry drupe with a bony stone. The Pistacia or Pistachio tree (*P. vera*) is a small tree of about 20 feet high, a native of Persia and Syria, but now cultivated in all parts of the south of Europe and north of Africa, and in many places naturalised. It has pinnate leaves, with about two pair of ovate leaflets, and an odd one, flowers in racemes, fruit ovate, and about the size of an olive. The stone or nut splits into two valves when ripe; the kernel, which is of a bright green colour, is very oleaginous, of a delicate flavour, and in its properties very much resembles the sweet almond. In the south of Europe and in the East *Pistachio nuts* are much esteemed; but as they very readily become rancid they are little exported to other countries. They are sometimes called *Green Almonds*. Oil is expressed from them for culinary and other uses. In cultivation one male tree is allowed to five or six fertile ones. The tree produces flowers and even fruit readily enough in the south of England, but the summers are not warm enough to ripen the fruit, and the tree is apt to be destroyed by a severe frost. The Mastic-tree, or Lentisk (*P. lentiscus*), yields the gum-resin called Mastic (q.v.). It is a native of the countries around the Mediterranean. The Turpentine-tree (*P. terebinthus*) yields the Turpentine (q.v.) known in commerce as *Cyprus Turpentine*, *Chian Turpentine*, or *Scio Turpentine*, which is of a consistency somewhat like that of honey, a greenish-yellow colour, an agreeable odour, and a mild taste, and in its properties resembles the turpentine of the Coniferæ, but is free from acridity. It is obtained by making incisions in the trees, and placing stones for the turpentine to flow upon, from which it is scraped in the morning, before it is liquefied again by the heat of the sun. The tree is about 30 or 35 feet in height, and has pinnate leaves, of about three pair of leaflets and an odd one, the flowers in compound racemes, the fruit nearly globular. The kernel of the fruit is oleaginous and pleasant. The Batoum Tree (*P. atlantica*), a round-headed tree about 40 feet in height, a native of the north of Africa, produces a fruit much used by the Arabs; and a gum-resin of pleasant aromatic smell and agreeable taste, which exudes from its stem and branches, is chewed to clean the teeth and impart a pleasant smell to the breath. The fragrant oil of the kernels of *P. oleosa*, a native of Cochin-China, is used there to perfume ointments.

Pistil, that part of the Flower (q.v.) which, after flowering is over, is developed into the fruit. See FRUIT.

Pistoia (anc. *Pistoria*), a town of Italy, stands 21 miles by rail NW. of Florence, on a spur of the Apennines. Its streets are thoroughly Tuscan, and it is surrounded with walls, pierced by five gates, and has a citadel. The chief buildings are the cathedral of San Jacopo (12th and 13th centuries), containing a magnificent altar of silver (1286–1407) and several good pictures; the church of St Bartholomew, with a fine white marble pulpit by Guido of Como (1250); St Andrea, with Giovanni Pisano's pulpit (1301); St John, with a font by Giovanni Pisano and terra-cottas by Andrea della Robbia; the 14th-century communal palace; and other palaces. The principal manufactures are iron and steel wares, and firearms—the word 'pistol' in all probability takes its name through *pistolese* = 'a dagger,' from Pistoia (Pistola). Population, 20,190. Here Catiline was defeated in 62 B.C. The town was conquered by Florence and Lucca in 1306.

Pistol is the smallest description of Firearms (q.v.). See also REVOLVER.

Pistole, a gold coin formerly current in Spain and Italy, and originally equivalent to about eleven old French livres, though till about 1730 it was merely an irregular piece of gold. Its value varied somewhat at different times and in different countries, usually being between fifteen and sixteen shillings. The gold pistoles once current in parts of Germany were in most cases merely convenient multiples of the ordinary thaler and gulden. The *louis d'or* was intended to take in France the same place as the pistole in Spain.

Pita-hemp, one of the names of the Agave fibre. See FIBROUS SUBSTANCES.

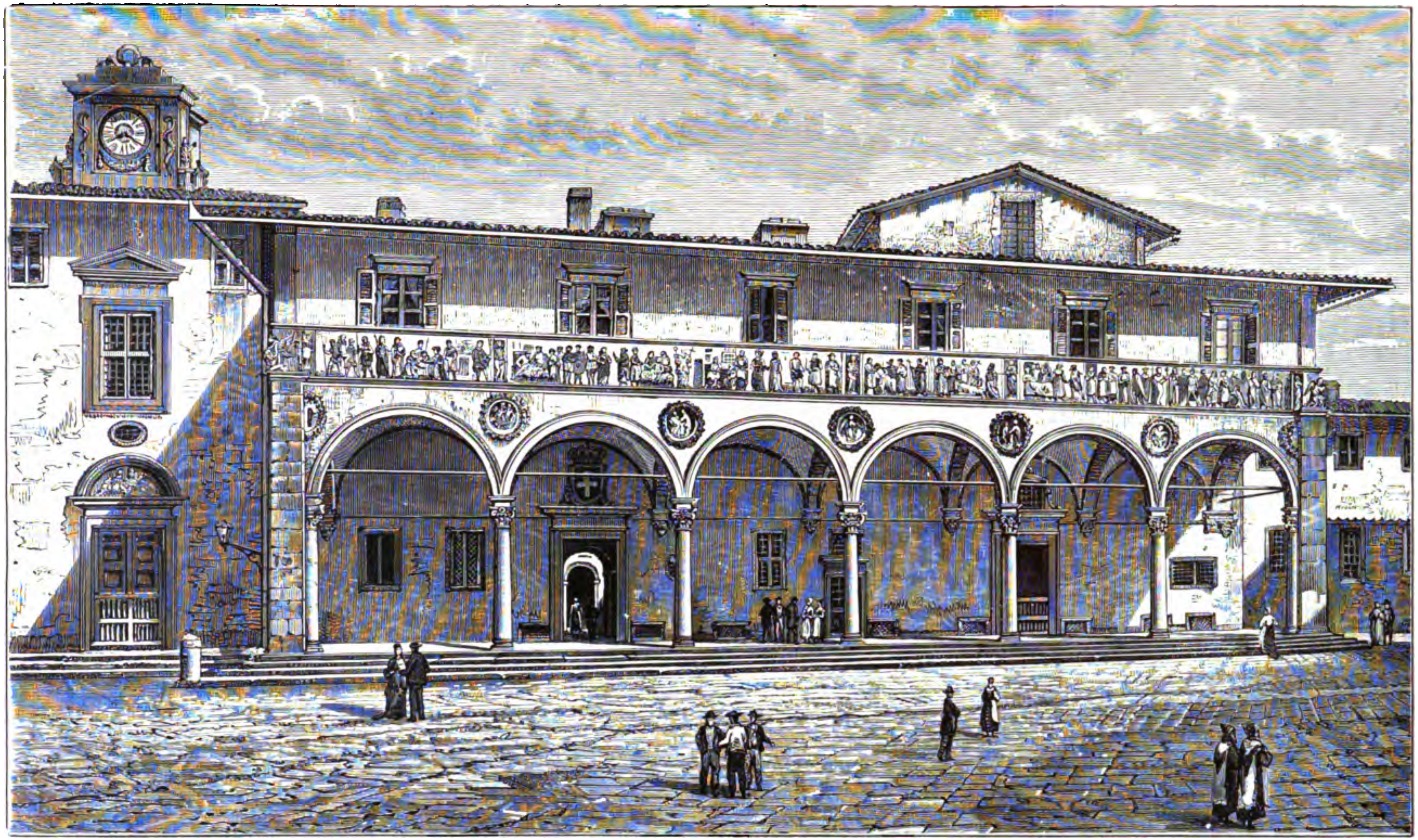
Pitaka, a division of the Buddhists' sacred literature; the *tripit'aka* meaning the three great divisions of their canonical works, the *Vinaya* (discipline), *Abhidharma* (metaphysics), and *Sútra* (aphorisms in prose), and collectively, therefore, the whole Buddhistic code.

Pit and Gallows, a rendering of the grant of capital jurisdiction (*cum fossa et furca*) made to vassals by the crown in feudal times. Male felons were usually hanged on the gallows (*furca*); women drowned in a ditch or well (*fossa*). See BARON, DROWNING.

Pitaval, FRANÇOIS GAYOT DE (1673–1743), compiler of the famous collection of *Causes Célèbres* (q.v.), served in the army, but became an advocate, and was known as an industrious and painstaking compiler. Of his great work there have been numerous abridgments, continuations, and translations; and his name has become so identified with the collecting of criminal cases that a similar work, published by various editors in Leipzig in 1843 and succeeding years, was called *Der Neue Pitaval* (2d ed. 36 vols. 1857–72; new series, 1866 *et seq.*).

Pitcairn, ROBERT (died 1855), editor of the invaluable collection of *Criminal Trials in Scotland from 1484 to 1624* (4 vols. Edin. 1830–33), held a post in the Register House at Edinburgh. He was an active member of the Bannatyne Club, and secretary of the Calvin Translation Society (founded 1843).

Pitcairne, ARCHIBALD, physician and satirist, was born at Edinburgh, 25th December 1652. He studied first theology and then law at the univer-



FACADE OF THE HOSPITAL OF CEPPO, PISTOIA.

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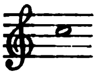
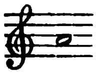
sity of his native city; but having gone to France in ill-health, made final choice of medicine as his life study, completing a distinguished course at Paris. He practised with success in Edinburgh till 1692, when the fame of his treatise on Harvey's discovery of the circulation of the blood secured him a call to Leyden as professor. Here he remained only a year; his lectures being ultimately published as *Elementa Medicinæ Physico-Mathematica* (1718). He returned to Edinburgh to become one of the most famous physicians of his time; producing also *Dissertationes Medicæ* (1701). But he was even more notorious as a Jacobite, an Episcopalian, a satirist of Presbyterian men and things, and, according to his opponents, as an atheist and scoffer at religion. *The Assembly* is a comedy in ridicule of the General Assembly of the kirk; and *Babell, or the Assembly* (1692), is a poem with the same aim. His Latin verses, some of which were republished by Ruddiman in 1727, are creditable. He died 20th October 1713.

Pitcairn Island, a solitary island in the Pacific Ocean, between Australia and South America, in 25° 3′ S. lat. and 130° 8′ W. long., measures 2½ miles by 1 mile. It was discovered by Carteret in 1767, and was at that time uninhabited, although there were unmistakable evidences that it had been inhabited at one time. In 1790 it was taken possession of by nine of the mutineers of H.M.S. *Bounty* (see BLIGH), with six Tahitian men and a dozen women, the ringleader being called Christian. Four years later the native men one night murdered all the Englishmen, except Alexander Smith, who afterwards assumed the name of John Adams. Thereupon the women, in revenge, murdered all the Tahitian men. According to another account, the white men and the Tahitians murdered each other at intervals, until only two Englishmen were left alive. Certain it is that at the end of ten years John Adams was left alone, with eight or nine women and several children; and from them the present inhabitants (126 in 1890) are descended. Adams, changed by these tragic adventures, and sobered by his responsibilities, set about the education of his companions in Christian principles. The little colony was unknown to the world until 1808, when it was 'discovered' by Captain Folger of the American sealing ship *Topaz;* the first British vessel to visit it did not arrive until 1814. The islanders were visited again in 1825 and 1830, and in 1831, as their numbers had rapidly increased (to 87), they were at their own request removed to Tahiti by the British government. But, disgusted by the immorality and other undesirable customs of their Tahitian relatives, the most of them came back to Pitcairn Island after about nine months, in a vessel chartered by themselves. The island was annexed to Britain in 1839. Nearly 200 of the islanders were transferred to Norfolk Island in 1856, but a number of them afterwards returned. Pitcairn Island enjoys a lovely climate; its mountainous surface reaches 1008 feet in Outlook Ridge; the soil is fertile, and produces yams, cocoanuts, bread-fruit, sweet potatoes, bananas, &c. The people bear a high character for virtue, contentedness, and uprightness, and choose their own pastor and magistrate.

See Sir J. Barrow, *Mutiny of the Bounty* (1831); Lady Belcher, *Mutineers of the Bounty* (1870); and T. B. Murray, *Pitcairn Island* (1854; new ed. 1885).

Pitch, the degree of acuteness of musical sounds. A musical sound is produced by a series of vibrations recurring on the ear at precisely equal intervals; the greater the number of vibrations in a given time the more acute or higher is the pitch (see SOUND). The pitch of musical instruments is adjusted by means of a tuning-fork, consisting of two prongs springing out of a handle, so adjusted as to length that when struck a particular note is produced, that note being C  in Britain, and A  in Germany. It is obviously important to have a recognised standard of pitch by which instruments and voices are to be regulated; but there is, unfortunately, not the uniformity that might be desired in the pitch in actual use. For two centuries, down to about 1827, the pitch in use was nearly uniform (C = 498 to 515 vibrations per second); but since then, owing mainly to an aim of wind-instrument makers to obtain greater brilliance of tone, it has constantly been rising, to the detriment of soprano voices especially, till in 1859, in the Covent Garden opera band, it was a semitone higher (C = 538). In a few instances, as in Steinway's American pianos, this is even slightly exceeded. The French government, on the report of a special committee, in 1859 fixed the pitch of C at 522, which continues in use in France to this day, and is known as French pitch. An international conference, where all the chief European countries were represented except France and England, was held in Vienna in 1885, which resulted in the adoption of French pitch as the standard. An effort towards uniformity in pitch in Great Britain, made in 1859–69 by the Society of Arts, and a subsequent attempt initiated by the Royal Academy of Music in 1885, had no practical result. Most British orchestras continue to play at the higher pitch (known as Philharmonic), while in music not orchestral, and with vocalists generally, a pitch about the French is used. The main obstacle to the lowering of pitch is the expense of new wind-instruments, it being impossible to lower the old ones to so great an extent. See A. J. Ellis, *History of Musical Pitch*, reprinted from the *Journal* of the Society of Arts, 1880, and given in abstract in *Nature*, vol. xxi.

Pitch. When the tar from wood or coal is distilled, volatile naphtha or 'spirit' is obtained at low temperatures, and as the heat is increased heavy oils and other products appear in the distillate. If the temperature reaches redness, coke or carbon is left as a residue, but if the fire is withdrawn before the distilling vessel becomes red—i.e. before the heavy oils in the tar begin to break up—the residue is pitch. A softer and tougher pitch is obtained if the fire is removed early than if the heat is continued till coking begins. In the latter case it is more black, glossy, and brittle. An elastic pitch is got from bone tar, and another from stearine residues, and both are valued by varnish and tarpaulin makers. Pitch is also obtained from natural petroleum. Wood-tar pitch is much more used in America than in England, chiefly for protecting timber from the weather and the attacks of insects. Coal-tar pitch is most largely employed in the manufacture of patent fuel, from 5 to 8 per cent. of it being required to form Briquettes (q.v.) of small coal or coke breeze. It has other applications, such as in the manufacture of black varnishes for coating iron, and to a less extent for protecting wood and other substances, in the preparation of artificial asphalt (see ASPHALT), and to yield lamp-black when burned. *Burgundy Pitch* is the subject of a separate article (see also PINE). In some parts of Persia and Afghanistan a kind of pitch is prepared by the destructive distillation of goat and sheep dung, which is applied as a remedy for sores or ulcers on sheep and some other animals.

Pitcher-plant. See INSECTIVOROUS PLANTS.

Pitch Lake. See TRINIDAD.

Pitchstone, or RETINITÉ, an acid volcanic glass, dark green, reddish brown, yellow, dark blue, or black, and occasionally showing a streaked or clouded appearance. It has a pitch-like or greasy lustre, breaks with a conchoidal or splintery fracture, and is translucent on thin edges. It is usually rich in microlites, and often contains crystalline granules and crystals of felspar, pyroxene, hornblende, biotite, and quartz. Now and again it shows perlitic and spherulitic structures. When conspicuous crystals of sanidine (see FELSPAR) are abundantly present in the rock it is termed *Pitchstone Porphyry*. It occurs in the form of dykes and also as lava-flows. The name pitchstone has sometimes been given to the darker varieties of menilite, a form of opal.

Pith, or MEDULLA, is the central cylinder of tissue in the stems of Dicotyledons and Gymnosperms. In all plants where it is found it is continuous in the young state. In older plants it may be continuous, as in the elder, oak, &c., in the form of transverse discs, as in the walnut, or wanting in the internodes, as in hemlock, &c. In very young plants it is composed of thin-walled cells filled with protoplasm and cell-sap, and takes part in the conduction of nutritive substances throughout the plant. The cell-walls usually remain very thin, the protoplasm is soon all used up within the cells, and their further growth ceases. Examined microscopically, pith cells are usually polygonal in transverse section, while they are rectangular in longitudinal section, and not much longer than broad. The ring of wood immediately surrounding the pith consists largely of spiral and annular vessels, and is known as the medullary sheath. The pith is connected with the cortex and bast by the medullary rays, which are composed of cells similar to those of the pith, and which convey sap to the inner parts of the stem. In the early life of most trees the pith serves as a storehouse for starch and other reserve substances; but as the tree becomes older the pith is crushed inwards, communication with the cortex and bast is physiologically obstructed, and the pith cells become dry and full of air.

Pithe'cus (Gr., 'an ape'), a name formerly used by zoologists for various groups of apes and monkeys. *Pithecia* is the genus of South American monkeys which includes the Sakis and allied species.

Pithom, one of the store-cities which the children of Israel built for Pharaoh (Exod. i. 11), conclusively identified in 1883 by the excavations of M. Naville with the deserted Arab village Tell El-Maskhûta, on the Fresh-water Canal and railway line from Cairo to Ismailia, about half-way between Ismailia and Tell El-Kebîr. A small portion of the site had already been uncovered, and certain finds dedicated to the god Tum (the setting sun) described by M. Maspero in the *Revue Archéologique* for 1878. Lepsius thought that it marked the site of Raamses (Rameses), but M. Naville's brilliant conjecture was verified when once he had laid bare the entire square enclosure and excavated the interior chambers. Pithom is enclosed by a wall forming a square, each side of which measures some 650 feet. The wall is built of unusually large and well-made bricks, and is about 22 feet thick. The whole area within the enclosing wall, about ten acres in extent, is full of solidly built chambers, divided from each other by carefully built partitions, 8 to 10 feet thick, formed of bricks made both with and without straw. The most startling feature about these chambers is that they have no doors, and must therefore have been mere storehouses or granaries entered by trap-doors from the upper stories, which were most probably dwelling-rooms. Further M. Naville has proved that Pithom (Pa-tum) was the sacred name, and Thuku (Succoth) the ordinary name, and has thus established, in opposition to Brugsch, this place as the first resting-place of the Israelites on their journey out of Egypt (Exod. xii. 37). He believes that Rameses II. (14th century B.C.) built the temple; and further that the place is identical with the Hero or Heroöpolis of Greek and Roman times. See Naville's *Store City of Pithom* (1885).

Pitlochry, a Perthshire health-resort, on the Tummel, 13 miles NNW. of Dunkeld. It has a tweed manufactory. Pop. 1131.

Pitman, SIR ISAAC, founder of the Pitman system of Shorthand (q.v.), who was knighted in 1894, was born at Trowbridge, Wiltshire, 4th January 1813. His father, a factory overseer and afterwards cloth manufacturer, was superintendent of the poet Crabbe's Sunday-school. Young Pitman, a studious and religiously disposed youth, was for a time a clerk, and after some preliminary training taught a school at Barton-on-Humber (1832–36) and at Wotton-under-Edge, where he turned his attention to the popularising of shorthand, and issued through Bagster his *Stenographic Sound Hand* (1837). Copies of his second edition were put into circulation simultaneously with the introduction of the penny post in 1840. Dismissed from Wotton because he had joined the New (Swedenborgian) Church, he conducted a school at Bath (1839–43). Henceforward his career is the history of the development of shorthand and spelling reform. He wrote, travelled, and lectured in its interest, his working day commonly lasting from 6 A.M. till 10 P.M., with three hours for meals and relaxation. In 1842 he brought out the *Phonetic Journal*, with which the late A. J. Ellis was for a time associated. In 1845 premises were opened in London for the sale of Pitman's publications. In recognition of his exertions he was presented with £350 and a marble timepiece in 1862, and at a phonographic jubilee meeting in 1887 was presented with a marble bust of himself. At the beginning of his career he had a narrow income, part of which he spent in the cause. Up till 1890 he had issued from his Phonetic Institute, Bath, 150 different shorthand books, and his *Phonographic Teacher* was selling at the rate of 150,000 annually. From the date of issue 1,370,000 had been sold. There were also eighty-four shorthand associations, and a National Phonographic Society, whilst the subject had been recognised in the Education Code (1890) and the Technical Instruction Act of 1889, so that Pitman's labours of more than half a century have been crowned with success. About 95 per cent. of reporters in England, the colonies, and America use Pitman's system, which has been adapted to the Welsh, French, German, Italian, Spanish, Dutch, Japanese, and Malagasy languages. It is estimated that its practitioners all over the world number above half a million. See T. A. Reed's *Biography of Isaac Pitman* (1890).

Piton Bark. See CARIBBEE BARK.

Pitra, JEAN BAPTISTE, was born at Champforgueil, near Autun, August 31, 1812, entered the order of St Benedict, and devoted himself to historical studies in the abbey of Solesme. In 1858 he was sent by the pope to Russia to study the Slavonic liturgy, was created a cardinal-priest in March 1863, librarian of the Vatican in 1869, and Cardinal-bishop of Frascati in 1879. He died February 3, 1889. His works include *Histoire de Saint Leger* (1846), *Vie du R. P. Libermann* (1855), the invaluable *Spicilegium Solesmense* (5 vols. 1852–60), *Juris Ecclesiastici Græcorum*

Monumenta (1864), *Triodion Katanacticon* (1879), and *Hymnographie de l'Église Grecque* (1867).

Pitrè, Giuseppe, the greatest of Italian folklorists, was born at Palermo, 23d December 1841. His father dying during his childhood, he was brought up by the self-sacrificing care of a devoted mother, and on the outbreak of the revolution in 1860 volunteered into the army of Garibaldi. At the close of the war he studied medicine at Palermo, graduating in 1866. While yet a student he had begun his literary career with *Sui Proverbi Siciliani e Toscani* (1862), *Profili biografici di contemporanei Italiani* (1864), &c.; but about 1868 he began the great work of his life when he left the study of literature proper for that of popular literature and folklore generally. With incessant and enthusiastic labour he has since devoted himself to his chosen study, and enriched science and honoured his native land with a long series of books and papers of the highest value. His 'Biblioteca delle Tradizioni popolari Siciliane' alone includes 19 volumes (1870–91), the most important of which are the *Canti popolari Siciliani* (2 vols. 1870–71; 2d ed. 1891); *Fiabe, Novelle e Racconti popolari Siciliani* (4 vols. 1875); *Proverbi Siciliani* (4 vols. 1880); and *Usi e Costumi, Credenze e Pregiudizi del popolo Siciliano* (4 vols. 1887–89). Still another series, the 'Curiosità popolari Tradizionali,' includes ten volumes (1885–91). Much of Dr Pitrè's best work has been contributed to the pages of the well-known folklore quarterly, the *Archivio per lo Studio delle Tradizioni popolari*, edited from its foundation in 1882 by himself and S. Salomone-Marino. Besides the foregoing Dr Pitrè has published an exhaustive *Bibliografia delle Tradizioni popolari d'Italia* (1891); many monographs and papers on Sicilian folk-songs; proverbs; riddles; historical traditions; customs connected with birth, marriage, death, and burial; as well as special popular beliefs and superstitions, as those connected with particular festivals, Friday, the Evil Eye, and the like. Good collections are his *Novelline popolari Toscane* (1878), and *Novelle popolari Toscane illustrate* (1884).

Pitri (Sansk., 'father;' plur. *Pitaras*), the deceased ancestors of a man, but in the special sense in which the word occurs in Hindu mythology, an order of divine beings inhabiting celestial regions of their own, and receiving into their society the spirits of those mortals for whom the funeral rites have been duly performed. They include therefore collectively the manes of deceased ancestors (see Lares); but the principal members of this order are beings of a superior nature.

Pitscottie, Robert Lindsay of, the author of *The Chronicles of Scotland*, extending from the reign of James II. to the year 1565. There is nothing to learn of Lindsay personally, except that he was born about the beginning of the 16th century, and was proprietor of the lands of Pitscottie in Fifeshire. He is best known by his territorial appellation. His Chronicle was Sir Walter Scott's favourite Scottish history; and though Pitscottie was not contemporary with the whole of the events he describes, he must, for the latter portion of his history, have derived much of his information from eye-witnesses. His style is quaint and graphic, and his facts in general trustworthy, except where he deals in marvels, to which he is a little prone. It is he, for instance, who tells, on the authority of Sir David Lyndsay, Lyon King-of-arms, that striking story of the intrusion of the apparition to the presence of James IV. in Linlithgow, of which Scott gives a vivid picture in *Marmion*. The best edition of Pitscottie's history is Dalyell's (2 vols. 1814).

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Pitt, William, the second son of the great Earl of Chatham and of Lady Hester Grenville, was born at Hayes, near Bromley, in Kent, on 28th May 1759. At the time of his birth his father was still in the House of Commons and in the very zenith of his fame, and the future statesman grew up amid associations and surroundings that were well fitted to foster that political ambition which was to be the guiding and almost the sole impulse of his life. His constitution in boyhood seemed very weak; he was never sent to school, but his education advanced so rapidly under a private tutor, that he was able to enter Cambridge when only fourteen. He was then a shy, reserved boy of exceedingly precocious talents, of irreproachable morals, and of regular and studious habits, little drawn to college society and amusements, and already distinguished by a rare self-control and concentration of purpose. From his earliest youth political life was placed before him as his ideal, and all his studies converged to that end. He became an excellent classical scholar, but he valued the classical writers mainly as a school of language and of taste; and it was observed how carefully he analysed their styles, noted down every just or forcible expression, and compared the opposite speeches on the same subject, observing how each speaker met or evaded the arguments of his opponent. Like many others he found in Locke a great master of clear and accurate thinking. His father superintended his studies with much care, and it was remembered that he specially recommended to him the sermons of Barrow as models of style and reasoning, and the histories of Polybius and Thucydides as fountains of political wisdom; that he taught him elocution by making him declaim the grandest poetry in Shakespeare and the speeches of the fallen angels in the *Paradise Lost*; and that he exercised him in fluency by accustoming him to translate into flowing English long passages from the classical writers. To this last practice Pitt largely ascribed that amazing command of choice and accurate English in which he surpassed all his contemporaries. When little more than a boy he was an attentive and discriminating listener to the debates in parliament. He became thoroughly familiar with the matchless eloquence of his father, and together with his brother-in-law, Lord Mahon, he supported his father into the House of Lords on the 7th April 1778 on that memorable occasion when Chatham delivered his last speech against the surrender of America, and fell down, stricken by mortal illness, on the floor of the House.

Pitt was left with a patrimony of less than £300 a year. He was called to the bar in the June of 1780, and went on the Western Circuit, but in September parliament was dissolved, and he at once threw himself into politics. He stood for Cambridge University, but found himself at the bottom of the poll; his disappointment, however, was speedily allayed, for Sir James Lowther gave him a seat for his pocket-borough of Appleby, and Pitt entered the House of Commons on 23d January 1781.

He came into the House bearing a name which was beyond all others revered by Englishmen, with the advantage of being in no way mixed up with the calamitous American war, and with talents that had already acquired an extraordinary maturity. The Tory ministry of Lord North was then tottering to its fall, crushed by the disasters in America, and confronted by an opposition which consisted of the Old Whigs who followed Rockingham, among whom Fox and Burke were conspicuous, and of a smaller body who had been especially attached to the fortunes of Chatham, and who were chiefly represented by Shelburne, Camden, and Barré. Pitt lost no time in throwing himself into the fray. He spoke on the 26th February with brilliant success in defence of Burke's Bill for Economical Reform, and on several successive occasions he assailed the falling ministry. He denounced the American war and the corrupt influence of the crown with extreme violence, but he refused to throw in his lot irrevocably with the party of the opposition, and shortly before the fall of North he publicly declared that he could not expect to bear a part in the coming ministry, as he 'would never accept a subordinate position.' The words are said to have escaped from him in the heat of the debate, and the House was startled and a little amused at the arrogance of a young man who was not twenty-three, who was absolutely without official experience, and who had been little more than a year in parliament, declaring that he would accept no office except in the Cabinet.

But Pitt had attained a position that placed him far above lasting ridicule. Fox spoke of him as already one of the first men in parliament. Burke said of him that he was not a chip of the old block, but the old block itself; Horace Walpole wrote that he had shown logical powers that made men doubt whether he might not prove superior even to Fox; and when upon the resignation of North in March 1782 a ministry was formed under the leadership of Rockingham, combining the two sections of the opposition, Pitt remembered his pledge and refused several offers, among others the Vice-treasurership of Ireland with a salary of £5000 a year. He gave, however, a general and cordial support to the new ministers, but he at the same time brought forward the question of parliamentary reform, on which they were profoundly divided. It was a question which fell naturally to him, for his father had been one of the first to urge it. On the 7th May he moved, in a speech of great brilliancy, for a select committee to inquire into the state of the representation, and was only defeated by 161 to 141. He soon afterwards supported a measure of Sawbridge for shortening the duration of parliament, and a measure of Lord Mahon for preventing bribery at elections.

A close personal and political connection about this time grew up between Pitt and Henry Dundas, who had been Lord Advocate under North. It proved of great importance to the career of Pitt. Dundas had none of the intellectual brilliancy or of the moral dignity of the younger statesman, but he had one of the best political judgments of his time, he had great talents both for business and for debate, and he was a most shrewd and sagacious judge of the characters of men—a gift in which Pitt through his whole life was somewhat wanting.

The Rockingham ministry lasted only for three months. The king detested it; it was from the first profoundly divided, and a bitter personal and political animosity had broken out between Charles Fox and Lord Shelburne, its two most conspicuous members. On 1st July 1782 Lord Rockingham died, and the question of leadership at once broke up the party. Fox insisted on the leadership of the Duke of Portland, a wealthy and respectable, but perfectly undistinguished nobleman, who was then Lord-lieutenant of Ireland. The king gave the post of First Lord of the Treasury to Shelburne, who had an incomparably higher political position, and who had been a favourite friend and colleague of Chatham, though there were features in his character that already excited great unpopularity and distrust. Fox, with a considerable section of the Rockingham Whigs, at once resigned, and Pitt entered the Cabinet as Chancellor of the Exchequer in the reconstructed ministry. Public opinion generally blamed Fox, and one of the consequences of his resignation was that the House of Commons was divided into three distinct parties. There was the party of Fox, the party of North, and the party of the government, and no one of them could command a clear majority. A coalition of some kind was inevitable. Shelburne leaned towards an alliance with North, but Pitt positively refused to have any connection with the statesman whom he deemed responsible for the American war. Peace was not yet attained, but the negotiations which had been pursued by the preceding ministry were steadily pushed on. Provisional articles of peace between England and the United States were signed in November 1782, and preliminary articles with France and Spain in the following January, while a truce was established with Holland, and the first steps were taken towards a very liberal commercial treaty with the United States.

Pitt bore a leading part in the debates in parliament, and his reputation steadily rose, but the Shelburne ministry was weak, divided, and short-lived. The peace following a disastrous war necessarily involved sacrifices that were profoundly unpopular, and the character of Shelburne aggravated the divisions that had already appeared. Several resignations took place, but Pitt stood loyally by his chief, and endeavoured without success to induce Fox to rejoin the ministry. Fox, however, declared that he would never again serve any ministry with Shelburne for its head, and to the astonishment and indignation both of the king and of the country, he united with the very statesman whose expulsion from public power had been for years the main object of his policy, and whom he had repeatedly threatened with impeachment. North, irritated at the ostracism with which he had been threatened, readily entered into the alliance. Two factious votes of censure directed against the peace were carried through the Commons by majorities of 16 and 17, and on 24th February 1783 Shelburne resigned.

Pitt had displayed the most splendid parliamentary talents in the discussions that preceded the fall of the ministry, and although he could not overthrow the compact weight of parliamentary influence opposed to him, he profoundly moved the country and placed his own position beyond dispute. On the fall of the Shelburne ministry, the king, hoping to escape the yoke of the coalition, implored the young statesman to accept the leadership, and gave him an absolute authority to name his colleagues. It was a dazzling offer, and Pitt was not yet twenty-four, but he already possessed a judgment and a self-restraint which is rarely found at any age in combination with such brilliancy and such courage, and he saw clearly that the moment of triumph had not yet come. After a long struggle and many abortive efforts the king was obliged to yield, and on the 2d April the coalition ministry was formed with the Duke of Portland as First Lord of the Treasury, and Fox and North as joint Secretaries of State.

It commanded a large majority of the votes, and included a great preponderance of the ability in the House of Commons, but the king viewed it with a detestation amounting to loathing, and the nation was profoundly scandalised by the alliance on which it rested. Pitt was offered his old post of Chancellor of the Exchequer, which he peremptorily refused. As leader of the opposition, he brought forward, in the form of resolutions, an elaborate scheme of parliamentary reform, including an increase of the county members. He was defeated by 293 to 149, but he at least succeeded in bringing Fox and North into direct collision. He brought forward another important measure for the reform of abuses in the public offices, which passed the Commons but was rejected in the Lords. The peace which was carried by the new ministry differed very little from that which they had censured when in opposition; and very soon the bill of the government for subverting in some important respects the charter of the East India Company and reorganising the government of India, produced another great change in the disposition of power.

The feature of the scheme which chiefly excited indignation and alarm was the creation by the existing legislature of a new supreme body in England, consisting of seven commissioners who were to be immovable except by an address from either house for four years, and who were during that period to have an absolute control of the patronage of India. It was contended that this measure would give the party who were now in power an amount of patronage which would enable them to overbalance the influence of the crown, dominate the parliament, and control succeeding administrations. These objections were brought forward by Pitt with great power, but with extreme exaggeration, and the king and the nation were speedily alarmed. The India Bill passed by large majorities through the Commons, but when it came into the House of Lords the king authorised Lord Temple to say that he would consider any man his enemy who voted for the bill. The communication produced an immediate effect. The bill was rejected in the Lords by 95 to 76; the ministry refused to resign, and the House of Commons supported them by large majorities; but the king peremptorily dismissed them on 18th December 1783, and next day it was announced that Pitt had been called to the head of affairs as Chancellor of the Exchequer and First Lord of the Treasury.

Pitt had already abundantly displayed his parliamentary ability, his judgment, and his discretion. He was now to display in the highest degree his courage. In the eyes of nearly all the best judges in England his position was a hopeless one, and his administration was likely to be even more brief than the three which had preceded it. There was a majority of more than a hundred against him in the Commons, and the parliamentary influence behind it was so great that an immediate dissolution must have been disastrous. He was called to office by a grossly unconstitutional interference on the part of the king, and every day which he remained in office under the censure of the House of Commons added to the falseness of his position. Temple, on whom he had greatly relied, threw up the seals of Secretary of State which he had accepted, and in the House of Commons Pitt was himself at this time the only cabinet minister, while Dundas was the only considerable debater who supported him against the united attacks of North, Fox, Burke, and Sheridan. But Pitt fought his battle with a skill and a resolution that have never been surpassed in parliamentary history. A long succession of hostile votes was carried, but they failed to drive him from office, and soon unequivocal signs appeared that the country was with him. The magnanimity with which at this critical period he refused to take for himself a great sinecure office which fell vacant added greatly to his popularity. Addresses in his favour poured in from all the leading corporations in the country. The majorities against him grew steadily smaller. At last, on 25th March 1784, the long-deferred blow was struck. Parliament was dissolved, and an election ensued which swept away nearly 160 members of the opposition, made Pitt one of the most powerful ministers in all English history, and prepared the way for a ministry which lasted, with a few months' intermission, for no less than twenty years.

In this great and powerful ministry English political life assumed much of its modern aspect. The House of Commons acquired a new importance in the constitution, the people a new control over its proceedings, and the First Lord of the Treasury complete ascendency in the government. The system of 'king's friends' controlling the ministry was finally destroyed, and when the chancellor, Lord Thurlow, attempted to perpetuate it, he was peremptorily dismissed. The skilful management of the regency question established the right of parliament to provide for the exercise of supreme power during the incapacity of the king. Direct parliamentary corruption was finally put down. Great numbers of sinecure places were abolished, and great reforms were introduced into the system of collecting the revenue and issuing public loans. The government of India was reorganised on the system of a double government, which continued with little change till the abolition of the East India Company in 1858. The whole system of taxation and of trade duties was thoroughly revised, and no minister since Walpole had approached Pitt in his complete competence in dealing with trade questions. The finances of the country, which had been extremely disorganised by the American war, became once more flourishing. A commercial treaty, based upon more enlightened commercial doctrines than any English statesman, except Shelburne, had yet adopted, was negotiated with France. In foreign politics Pitt was for some years equally successful. Some troubles that had arisen with Spain were put down by a display of prompt and judicious firmness. In conjunction with Prussia a revolutionary movement in Holland which was fomented by French influence was suppressed, and the triple alliance of England, Prussia, and Holland contributed largely to terminate the wars between Sweden and Denmark and between the emperor and the Turks, though it met with a mortifying failure in its dealings with Russia. Pitt's love of peace was very sincere, but the influence of England in European councils rose greatly under his ministry, and he showed much decision and tact in extricating England from a dangerous complicity with the ambitious designs of her Prussian ally. Up to the time of the French Revolution there was no decline in his ascendency, his popularity, or his success.

A few adverse criticisms, however, may be justly made. He cast aside too lightly on the first serious opposition parliamentary reform and the abolition of the slave-trade, and it became evident to good observers that he cared more for power than for measures, and was ready to sacrifice great causes with which he had sincerely sympathised and which he might have carried, rather than raise an opposition that might imperil his ascendency. His once famous Sinking Fund is now universally recognised to have been thoroughly vicious in its principle; and in the latter part of his career it led him to the absurdity of borrowing largely at high interest in order to pay off a debt that had been contracted at low interest. His attempt to establish free trade between England and Ireland failed through an explosion of manufacturing jealousy in England, which obliged him to modify his original propositions in a way which was unpalatable to the Irish. More real blame attaches to him for his opposition to all serious measures to remedy the enormous abuses in the Irish parliament and for the great uncertainty of his policy towards the Irish Catholics. The great evils which grew up in England in his time in connection with the sudden development of the factory system appear never to have attracted his attention, and he made no effort to mitigate them. He created peerages with extreme lavishness and with very little regard to merit, and although his patronage was not positively corrupt, few ministers have shown themselves more indifferent to the higher interests of literature, science, and art.

When the French Revolution broke out his policy was one of absolute neutrality towards the contending parties, and this neutrality he most faithfully observed. He wholly failed, however, to understand the character and the supreme importance of the Revolution. He believed that it was merely a passing disturbance, and that its principal effect would be to deprive France for some years of all serious influence in European affairs, and almost to the eve of the great war he was reducing the armaments of England. There is no real doubt that he was forced most reluctantly into war by the aggressive policy of France in Flanders and towards Holland; but he drew the sword believing that France was so disorganised and bankrupt that a struggle with her would be both short and easy; he was almost wholly destitute of the kind of talents that are needed for a war-minister, and he had to contend with an almost unexampled outburst of military enthusiasm, and soon after with the transcendent genius of Napoleon. His belief in the probable shortness of the war and in the efficacy of his sinking fund, led him into the great error of raising his war expenses in the first stages of the war almost wholly by loans, and thus laying the foundation of an enormous increase of debt. His military enterprises were badly planned and badly executed, and he had none of his father's skill in discovering and bringing forward military talent. For some years it is true his ascendency in parliament continued to increase. The great Whig schism of 1794 and the secession of Fox reduced the opposition to utter insignificance. But even in his domestic measures Pitt was no longer fortunate. Through fear of the revolutionary spirit which had infected some portions of the population, he was led into repressive measures very little in harmony with his earlier career. Corn had risen to famine price, and great distress prevailed, and the government attempted to meet it by very ill-conceived relaxations of the poor-laws—by levying rates for the purpose of increasing wages, and by granting parochial relief in proportion to the number of children in a family, and thus offering a direct premium to improvident marriages. In Ireland disaffection was steadily growing, and Pitt tried to win the Catholics by measures of conciliation, and especially by the concession of the suffrage; but the opposition of the king, divided councils, and the vacillation of his own mind impaired his policy, and the injudicious recall at a very critical moment of a popular viceroy contributed largely to the savage rebellion of 1798. He then tried to place Irish affairs on a sound basis by a legislative union which was to be followed by Catholic emancipation, the payment of the priests, and a commutation of tithes. The first measure was carried by very corrupt means, but the king, who had not been informed of the ultimate intentions of his minister, declared himself inexorably opposed to Catholic emancipation, which he deemed inconsistent with his coronation oath. Pitt resigned his office into the hands of his follower Addington in February 1801; but a month later, on hearing that the agitation of the Catholic question had for a time overthrown the tottering intellect of the king, he declared that he would abandon the Catholic question during the remainder of the reign, and he resumed office in May 1804 on the understanding that he would not suffer it to be carried. His last ministry was a melancholy and a humiliating one. The war, which had been suspended by the peace of Amiens, had broken out with renewed vehemence. There was great danger of invasion, and Pitt earnestly desired to combine the most eminent men of all parties in the ministry; but the king forbade the admission of Fox. The principal followers of Fox refused to join without their chief, and Lord Grenville and his followers took the same course. Grenville, who had long been one of Pitt's ablest colleagues, was now completely alienated. A junction with Addington was effected, but it lasted only for a short time, and it added little to the strength of the ministry. Dundas, Pitt's oldest friend and colleague, had been lately made Viscount Melville. He was placed at the head of the Admiralty; but a charge of misappropriating public funds was raised against him, and in 1805 he was driven ignominiously from office. Pitt's own health was now broken. His spirits had sunk; the spell which had once surrounded him had in a great degree passed away, and although the victory of Trafalgar saved England from all immediate danger of invasion, the disasters of Ulm and Austerlitz threw a dark cloud over his closing scene. He died in his forty-seventh year on 23d January 1806. The House of Commons by a great majority voted him a public funeral and a monument in Westminster Abbey.

He was never married, and he never mixed much in general society; but in all his private relations he was pure, amiable, simple, and attractive. He was a warm friend. His temper was very equable, and till near the close of his life very cheerful. He had much ready wit, and he could easily throw off the cares of office, and even join heartily in the games of boys. He maintained to the last his familiarity with the classics, but his serious interests were exclusively political. He only once crossed the Channel, and he appears to have been wholly untouched by the great contemporary currents of literature and non-political thought. He was not free from the prevailing vice of hard drinking, and he has been justly blamed for having allowed his great indifference to money to degenerate into a culpable carelessness. In 1801 some of his friends subscribed £12,000 towards the payment of his debts, and in the following year he sold Holwood, his country place. But these measures proved wholly insufficient. With no extravagant tastes, with no family to support, with no expensive elections, and with an official income of at least £10,000 a year, he left £40,000 of debt, which was paid by the nation. In public he was cold and repellent, and there was something theatrical in the unvaried dignity of his demeanour; but few men possessed to a higher degree the power of commanding, directing, and controlling, and he inspired the nation with an unbounded confidence both in his character and in his abilities. England has seen no greater parliamentary leader, few greater masters of financial and commercial legislation, and he was one of the first statesmen to adopt the teaching of Adam Smith. If his eloquence was very diffuse, if it showed little imagination, or depth or originality of thought, it was at least supremely adapted to all the purposes of debate, and it rarely failed in its effect. He was, in a word, a great peace-minister; but in the latter part of his life an evil fate brought him face to face with problems which he never wholly understood and with difficulties which he was very little fitted to encounter.

His political life has been written in much detail by Tomline and by Gifford; but by far the fullest and best biography of him which has yet appeared is that of Lord Stanhope. Lord Macaulay has made him the subject of a well-known biographical essay, and Mr Goldwin Smith of two brilliant lectures, and the reader may consult the monographs by Mr Walford (1890) and Lord Rosebery (1891). The career of Pitt, however, is indissolubly intertwined with the whole English history of his time, and in that connection it may best be studied.

Pittacus, one of the 'Seven Wise Men' (q.v.) of ancient Greece.

Pittenweem, a small seaport of Fife, a royal (since 1542) and parliamentary burgh (St Andrews group), 3¼ miles NE. of Elie by rail, with fisheries. There are ruins of a 12th-century priory. Pop. (1890) 1940.

Pittsburgh, the second city of Pennsylvania, is built on a narrow strip of land where the Allegheny and Monongahela rivers meet to form the Ohio: it extends some 7 or 8 miles up the rivers, and 2 or 3 miles down the Ohio. Pittsburgh is by rail 444 miles from New York, 354 from Philadelphia, and 468 from Chicago. The business portion of the city is on a plain, less than a mile in width, along the banks, while the hills, commanding delightful views, are covered with handsome residences. In this region, where the prevailing soft shales and sandstones have been worn away by the rivers to a depth of 500 or 600 feet, the horizontal layers of coal are exposed, and access afforded to the coal-seams on the sides of the hills and at the bottom of the valleys to an extent elsewhere unknown; the great Pittsburgh coal layer, 8 feet thick, like a broad black band extends around the city 300 feet above the river. Since the introduction of natural gas (see below) the former sobriquet of the 'smoky city' is a misnomer; the clearness of the atmosphere has given an impetus to architecture, and the many new dwellings and business houses are really models of beauty and solidity. The court-house, costing $2,500,000, is of Quincy granite, and is connected with the gaol by a 'bridge of sighs.' The government building cost $1,500,000, and there are besides a city hall of white sandstone, a new Exposition Building, and numerous churches, among which the large Roman Catholic cathedral and Trinity Church (Episcopal) deserve notice. Pittsburgh possesses a good system of schools, is the seat of a Catholic college, and has a free library (Carnegie) in course of erection. The three rivers are crossed by fifteen bridges, some of them monuments of engineering skill; and the different parts of the city are also connected by a dozen lines of cable, electric, and horse cars.

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Pittsburgh's manufactures include everything which can be made of iron, from a 58-ton gun to nails and tacks; steel in its various applications; all descriptions of glass and glassware; silver and nickel-plated ware; Japan and Britannia ware; pressed tin, brass, bronzes; earthenware, crucibles, fire-pots, bricks; furniture, wagons, and carriages; brushes, bellows, mechanical supplies of all kinds; natural-gas fittings, tools for oil and gas wells, &c. The production of iron and steel in Pittsburgh and the vicinity is about one-fifth of the total production in the United States. The city contains twenty-one blast-furnaces, which in 1889 produced 1,293,435 tons of pig-iron (a little less than one-seventh of the amount of the whole country), and thirty-three rolling-mills, twenty-seven of which roll steel; their production in 1889 was 1,105,573 tons of steel, and 638,450 tons of rolled iron. Of wrought-iron pipe 350,000 tons, and of iron and steel for structural purposes 65,000 tons were manufactured in 1890. There are forty-nine iron-foundries, representing a capital of $10,000,000, two mills for rolling copper, and a dozen manufactories of white lead, lead paint, lead pipe, or shot. Of glass-factories there are thirty-four where window-glass is made, thirty-seven for flint and lime glass, ten for lamp-chimneys, five for green bottle-glass, and fifteen for prescription-vials.

Eight separate companies—with one directing head—for manufacturing air-brakes, automatic signals, electric light apparatus, and supplying heat and light have a combined capital of $23,170,000. The incandescent lamp has been brought to the greatest state of perfection in this city. Since about 1883 natural gas has been largely used for domestic and manufacturing purposes (see GAS-LIGHTING, Vol. V. p. 105). It is obtained from isolated districts a few miles in extent, within a radius of 20 miles from the city. By drilling into the earth from twelve to fifteen hundred feet a natural gas—mainly methane—rushed from the opening with a pressure of four or five hundred pounds to the square inch, which was found sufficient to force it through pipes to the houses and factories in the city. The purity of this gas, its great heating power, and its cleanliness make it a most excellent substitute for coal for domestic and manufacturing purposes. In 1890 some 7,500,000 cubic feet of this gas were daily consumed in the city. But of late the supply is less abundant, and some factories have returned to the use of coal. In 1892 there were terrible strikes, accompanied by much fighting and bloodshed, at the Carnegie steel-works at Homestead, near Pittsburgh.

The position of Pittsburgh on the eastern border of the great Mississippi river-basin, and her facilities for penetrating to every part by river and rail, give her great natural advantages for trade, and as a depôt for exchange and trans-shipment of the produce that naturally comes to her as a centre. In the river business over $9,500,000 are invested. Two lines of packets ply on the Monongahela and three on the Ohio. Seventy tow-boats and thousands of coal-boats, barges, and flats are engaged in the coal trade. In 1889 4,000,000 tons of coal were sent by river to the southern states, while 16,000,000 tons more—making altogether about two-thirds of the yearly output of bituminous coal for the entire state—were sent away by rail or consumed in Pittsburgh itself. In the district there are 15,000 coke-ovens making 6,000,000 tons of coke. Twelve district railroads centre here, six of which are trunk lines. These lines reach out to all points of the compass. The immense volume of transcontinental business passing through Pittsburgh annually is probably excelled by no city except perhaps Chicago. Pittsburgh has twenty-seven national banks and twenty state banks, with a total capital of $14,856,750. The interests of Allegheny City (q.v.; pop. in 1890, 105,287), on the opposite bank of the Allegheny River, though it is a separate municipality, are in all respects identical with those of Pittsburgh.

History.—In the early history of America the site of Pittsburgh was a point of great interest, and was familiarly known as the 'Gateway to the West.' Here traders, settlers, and adventurers, who had worked their way from Philadelphia by a chain of forts, congregated, and here flat-boats were built which carried them down the Ohio to the unknown regions beyond. In 1754 a few English traders built a stockade at the point, but were driven away by the French the following April. The latter replaced the stockade by a fort, which, in honour of the governor of Canada, they called Duquesne. It was near the present outskirts of the city that Braddock (q.v.) was surprised in 1755; and on October 15, 1758, General Grant and his Highlanders had reached the hill on which the court-house now stands when they were surrounded by the Indians and nearly exterminated. The following month, however, General Forbes took possession of what remained of old Fort Duquesne, the French having fled down the Ohio, leaving the buildings in ruins. In 1759 the English commenced a large and strong fortification, which, in honour of the elder Pitt (see CHATHAM, EARL OF), then prime-minister, they called Fort Pitt. The fort is said to have cost the English government £60,000. The settlement became a borough in 1804, and in 1816 the borough was incorporated as the city of Pittsburgh. Pop. (1810) 4768; (1840) 21,115; (1870) 86,076 (with Birmingham, included soon after, 121,799); (1880) 156,389; (1890) 238,617.

Pittsfield, capital of Berkshire county, Massachusetts, 151 miles by rail W. of Boston. Beautifully situated on a plateau where six lakes round the city give rise to the Housatonic River, it contains a marble court-house, a handsome athenæum, and a ladies' seminary, and has a fine park near its western border. Cotton and woollen goods, silk, boots and shoes, and tacks are manufactured. Pop. (1860) 8045; (1880) 13,364; (1890) 17,281.

Pittston, a mining-town of Pennsylvania, on the Susquehanna River, 9 miles by rail NE. of Wilkesbarre. Besides a railway bridge, there are two other bridges connecting it with West Pittston (4000). Pittston contains also a number of foundries and knitting-mills, and a silk-factory. Pop. (1870) 6760; (1890) 10,302.

Pituitary Body, a rounded body of the size of a small bean situated in the sella turcica in the sphenoid bone on the floor of the cavity of the skull. It contains small cavities lined by epithelium. It is not known to possess any function. It derives its name from its having been once supposed to secrete the fluid which is now known to be yielded by the Schneiderian or pituitary membrane of the nostrils (see Nose). It is composed of two parts, the one a downgrowth from the floor of the third ventricle of the brain, the other an upgrowth from the pharynx, from which it has become completely separated. A disease called acromegaly is by some supposed to result from enlargement of this gland.

Pit Villages are collections of earth-caves, dug in the ground and covered with stones, wooden or wattle lids, or clay or sods of turf. They were used by prehistoric races or by races at the lowest stages of barbarism. A good example was unearthed during the latter half of the 19th century near St Mary Bourne, north-east of Andover, in north-western Hampshire. The pits are reached by entrance shafts, sloping downwards. The pits themselves are oval or pear-shaped, varying between 22 and 42 feet in length, and are about 12 or 13 feet wide, and 5 feet high, with the fireplace in the centre. Flint and bone implements and rude pottery have been found in them.

Pityri'asis (from the Greek word *pityron*, 'bran') is the term given to certain of the squamous or scaly diseases of the skin, in which there is a continual throwing off of bran-like scales of epidermis, which are renewed as fast as they are lost. It is most common on the scalp, when it is known as *dandriff*, and must be treated with weak alkaline lotions, or, if these fail, with diluted white precipitate ointment, provided there is no inflammation. *Pityriasis rubra* is a severe disease, affecting the whole or almost the whole body, and closely allied to, if not identical with, a severe form of dry Eczema (q.v.). *Pityriasis* or *Tinea versicolor* is due to the presence of a parasitic fungus, the *Microsporon furfurans*; it occurs in the form of irregular yellowish or brownish patches, confined to the parts of the body covered by the clothes. Microscopic examination of the exfoliated scales shows the spores and filaments of the fungus. The treatment of this affection must be solely local. Probably the best remedy is the application of a saturated watery solution of sulphurous acid gas, or of one of the sulphites dissolved in diluted vinegar, or of white precipitate ointment.

Pius, the name of nine among the Roman pontiffs, of whom the following only appear to call for particular notice.—Pius II., originally known as Æneas Sylvius, was a member of the noble family of Piccolomini, and was born in 1405 at Corsignano near Siena. His early life was stained with moral irregularities, and, like other humanists of his time, he wrote licentious poems, letters, and at least one loose novel—*Lucretia and Euryalus*. At twenty-six he was employed as secretary to Domenico da Capranica, Bishop of Fermo, at the Council of Basel. He soon developed a genius for diplomacy, and from 1432–35 was employed in missions to Scotland, England, and Germany. Returning to Basel he sided with the council in its conflict with the pope, and on the election of the antipope, Felix V., was chosen as his secretary. But, having been sent on an embassy to the Emperor Frederick III., he was without difficulty induced to accept office in the imperial court, and served on several embassies and other missions of importance on behalf of the emperor. Up till this time he had lived a life of unrestrained self-indulgence, but at the age of forty his passions had burned themselves out, and he was able to take orders and make his peace with Rome—the only means of obtaining a reward adequate to his ambition. He won over Pope Eugenius IV. by the frankness of his apology and earned his gratitude by his adroitness in bringing back to the papacy the allegiance of the neutral German Church. Almost the last act of the pontiff was to reward him with the bishopric of Trieste. It was not, however, till the end of 1456 that Æneas was free to leave the uncongenial atmosphere of Germany. Nicholas V. had employed him without rewarding him, but Callistus III. created him a cardinal. On the death of Callistus in 1458 he was elected pope, and took the name of Pius II. He possessed a marvellous power of adapting himself to circumstances, and the profligate and shifty intriguer made a most decorous pope. He was embarrassed by contests about Neapolitan and German affairs, but his reign is chiefly memorable for his efforts to organise an armed confederation of Christian princes to resist the progress of the Turkish arms. He died at Ancona, 14th August 1464, his last moments darkened by the failure of his great scheme. Æneas Sylvius was one of the most eminent scholars of his age. His works were published at Basel (1 vol. fol. 1551), and consist chiefly of histories, or historical dissertations and materials of history. The most interesting of his writings, however, are his letters, which throw a vivid light upon their age. The same may be said of a biographical commentary, or rather autobiography, published under the name of the copyist Gobellinus, and apparently altered by his secretary Campanus.

See Voigt's *Life* (3 vols. Berlin, 1856–63); also two papers by Bishop Creighton in *Macmillan's Magazine*, vol. xxvii., and vol. ii. (1882) of his *History of the Papacy during the Reformation*.

Pius IV., Giovanni Angelo Medici, was born of humble parents at Milan in 1499, was educated at Bologna, and under Paul III. rose rapidly to be Archbishop of Ragusa, vice-legate of Bologna, and cardinal (1549). He was elected pope at the close of 1559. His reign is chiefly memorable as that in which the protracted deliberations of the Council of Trent were brought to a close. The famous Creed of Pius IV., or Tridentine Creed, was confirmed by a bull dated 26th January 1564. Pius died, December 8, 1565, in the arms of his nephew, St Charles Borromeo. His Correspondence with the Emperor Maximilian II. has been edited by Schwarz (Paderborn, 1889).

Pius V., originally named Michele Ghislieri, was born of poor parents, in the village of Bosco, near Alessandria, in 1504, and at the age of fourteen entered the Dominican order. His merit was recognised by Paul IV., who named him Bishop of Sutri and Nepi in 1556, and cardinal in the following year. His austere temper prompted him as inquisitor-general for Lombardy to employ the most rigorous measures for repressing the Reformed doctrines. Under Pius IV. he was translated to the see of Mondovi, and was chosen unanimously as his successor, January 8, 1566. As pope he laboured to restore discipline and morality at Rome, reduced the expenditure of his court, prohibited bull-fights and other amusements, suppressed prostitution, and regulated the taverns of the city. He zealously maintained the Inquisition, and strove to enforce everywhere the disciplinary decrees of the Council of Trent. The whole spirit of his pontificate is most strikingly exhibited in the decree by which he ordered the yearly publication of the celebrated bull, *In Cœna Domini* (1568)—an attempt to apply to the 16th century the principles and the legislation of Hildebrand. His impotent bull releasing Queen Elizabeth's subjects from their allegiance (1570) fell harmless even upon patriotic English Catholics in a heroic age. But the most momentous event of the pontificate of Pius V. was the expedition which he organised, with Spain and Venice, against the Turks, and which resulted in the great naval engagement of the Gulf of Lepanto, on 7th October 1571. Pius died in the following May, 1572, and was canonised by Clement XI. in 1712.

Pius VI., originally named Giovanni Angelo Braschi, was born at Cesena, December 27, 1717. He was selected by Benedict XIV. as his secretary; and under Clement XIII. he was named to several important appointments, which led finally, under Clement XIV., to his elevation to the cardinalate (1773). On the death of Clement XIV. Cardinal Braschi was chosen to succeed him, February 15, 1775. His internal administration was enlightened and judicious. To him Rome owes the drainage of the Pontine Marsh, the improvement of the port of Ancona, the completion of the church of St Peter's, the foundation of the new Museum of the Vatican, and the general improvement and embellishment of the city. Soon after his accession he found himself at serious variance with the Emperor Joseph of Austria and Leopold of Tuscany, whose reforms had swept away much of the papal supremacy. The pope repaired in person to Vienna, but, though received kindly, failed to restrain the emperor from further curtailing his privileges. Soon after came the outbreak of the French Revolution and the confiscation of all church property in France. The pope launched his thunders in vain, and ere long the storm broke upon his own head. The murder of the French political agent Basseville in a street scuffle at Rome (1793) gave the Directory an excuse for the attack. In 1796 Bonaparte took possession of the Legations, and afterwards of the March of Ancona, and by a threatened advance upon Rome extorted from Pius, in the treaty of Tolentino (19th February 1797), the surrender of these provinces to the Cisalpine Republic, together with a heavy war contribution. The murder of General Duphot of the French embassy in December was avenged by Berthier marching on Rome and taking possession of the castle of St Angelo. Pius was called on to renounce his temporal sovereignty, and on his refusal was seized, February 20, and carried to Siena, and afterwards to the celebrated Certosa or Carthusian monastery of Florence. On the threatened advance of the Austro-Russian army in the following year he was transferred to Grenoble, and finally to Valence on the Rhone, where, worn out by age and grief, he died, August 28, 1799.

Pius VII., originally Gregorio Luigi Barnaba Chiaramonti, was born at Cesena, 14th August 1742. He entered the Benedictine order at an early age, taught philosophy and theology at Parma and at Rome, became Bishop of Tivoli, and on being created cardinal was translated to the see of Imola. After the death of Pius VI. Cardinal Chiaramonti was chosen his successor (March 14, 1800). Rome, which up to this time had been occupied by the French, was now restored to the papal authority, and in the July of that year Pius VII. entered into his capital; while next year the French troops were definitively withdrawn from the papal territory, with the exception of the Legations. Aided by his secretary, Cardinal Consalvi, Pius restored order in his states, and in 1801 concluded a *concordat* with Bonaparte. But much of the advantage thus gained by Rome was annulled simultaneously by Bonaparte's *Articles organiques*, which concerned the discipline of the church on marriage, on the clergy, and on public worship. These had never been submitted to the pope, and called forth his strongest opposition. In 1804 Napoleon compelled Pius to come to Paris to consecrate him as emperor. He was well received, but failed to get any modification of the articles, and not six months after his return to Rome the troops of Napoleon seized Ancona, and finally in February 1808 General Miollis entered Rome, and took possession of the castle of St Angelo. Ere long a decree was issued annexing the provinces of Ancona, Fermo, Urbino, and Macerata to the kingdom of Italy. The usurpation was consummated (May 17, 1809) by a decree annexing Rome and all the remaining papal territory to the French empire. The pope on June 10 retaliated with a bull of excommunication directed against the robbers of the holy see, yet without formally naming Napoleon. The unhappy pope was next removed to Grenoble, then to Savona, and finally to Fontainebleau. There he was forced into signing a new concordat, recognising the annexation of the Roman states to the empire (January 25, 1813). The fall of Napoleon allowed him to return, and on May 24, 1814 he re-entered Rome. The Congress of Vienna formally restored to him his territory, and the remainder of his reign was devoted, under the enlightened advice of Consalvi, to wise measures of internal administration. Brigandage was sternly suppressed, as well as secret societies, especially that of the Carbonari; while the Jesuits were restored, and concordats concluded with Naples, Prussia, Würtemberg, and other courts of Germany. Throughout his life Pius was a model of gentleness, simplicity, benevolence, and Christian charity. He died August 20, 1823, after having broken his thigh through a fall.

Pius IX., Giovanni Maria Mastai Ferretti, occupant of the papal chair during one of the most eventful periods in the history of the papacy, was the fourth son of Count Jerome Mastai Ferretti, and was born at Sinigaglia, May 13, 1792. His epileptic attacks rendered him unfit for the Noble Guard, whereupon he turned to the study of theology, and was admitted to deacon's orders in December 1818. For five years he presided over the orphanage of Tata Giovanni, next accompanied the Apostolic delegate Monsignor Muzi to Chili. In 1825 he returned to Rome, was made canon of S. Maria in the Via Lata, and head of San Michele, a great hospital for destitute children. In 1827 he was made Archbishop of Spoleto by Leo XII., and transferred to Imola by Gregory XVI. in 1832. In 1840 he became a cardinal, and on the death of Gregory XVI. in 1846 was elected by acclamation to succeed him. He was avowedly the leader of the reforming party, and twelve hours after his election Cardinal Gaysruck, Archbishop of Milan, reached Rome with instructions from Austria to veto his election. He took the name of Pius IX., and entered at once on a course of reforms, by which he hoped to establish the papal government on a popular but yet firm basis. His first step was to grant an amnesty to all prisoners and exiles for political offences. He next removed most of the disabilities of the Jews, authorised railways, and projected a *Consulta* or council of state, and in March 1848 published his *Statuto Fondamentale*, a complete scheme for the temporal government of the papal states by means of two chambers, one nominated by the pope, the other (with the power of taxation) elected by the people. At first the new pope was the idol of the populace. Mazzini hailed the new policy with enthusiasm, and Carlyle declared that 'the old chimera was rejuvenised!' But the revolutionary fever of 1848 spread too fast for a reforming pope, and the refusal to make war upon the Austrians finally forfeited the affections of the Romans. On November 15, 1848, his first minister, Count Rossi, was murdered in broad daylight, and two days later a threatening mob assembled in the square of the Quirinal. On the 24th the pope escaped to Gaeta, a Neapolitan seaport near the Roman frontier. A republic was proclaimed in Rome, the provisional heads of which proceeded with great moderation and wisdom to a complete and radical remodelling of the civil government of the state. Pius from his exile addressed a remonstrance to the various sovereigns. In April 1849 a French expedition was sent to Civita Vecchia, and on July 2 General Oudinot took Rome, after a siege of thirty days. The papal government was re-established, but Pius himself did not return till April 12, 1850. From this time his government, swayed by Antonelli, was the very reverse of what it had been, and to the end of his life he continued an unhesitating and unyielding Conservative. After the war for the unification of Italy the Legations, Ancona, and a considerable part of the papal territory southward in the direction of Rome were annexed to the kingdom of Italy, but Pius persistently refused to cede any portion or to enter into any compromise.

In his ecclesiastical policy he was incessantly active, henceforward closely related with the Jesuits, and ever uncompromising in his ultramontanism; and at last he proceeded to promulgate dogmatic definitions about problems that had been left unsettled by the wisdom of the ages. He re-established the hierarchy in England, he sanctioned the establishment in Ireland of a Catholic university, and condemned the principles upon which the Queen's Colleges in that country were constituted. He concluded with Austria a concordat much more favourable to church authority than the existing ecclesiastical laws had permitted. By the bull 'Ineffabilis Deus' (8th December 1854) he decreed as a doctrine of the church the faith of the Immaculate Conception (q.v.) of the Blessed Virgin Mary; his famous encyclical 'Quanta Cura,' and the Syllabus, or list of prevalent errors especially to be reprobated, appeared in December 1864. But the most important event of his pontificate was the convocation of the Vatican Council, at which bishops from all parts of the Catholic world assembled in December 1869. It was adjourned in July 1870, after it had proclaimed the celebrated decree of the Infallibility (q.v.) of the Pope, when on a subject of faith or morals he issues a decree *ex cathedrâ* to the universal church. For the last ten years the pope's temporal power in Rome had been only maintained by French bayonets, and on the withdrawal of the garrison at the outbreak of the war with Germany the soldiers of Victor Emmanuel crossed the frontiers, and, after the short delay of a feeble and half-hearted defence, entered the city amid the acclamations of the populace, and so terminated the temporal power of the pope. The result of the *plebiscitum* on October 2 was 40,805 for, and but 46 against, union with Italy, and for the rest of his days the pope lived a voluntary prisoner within the Vatican, having the mortification to see his capital become the centre of a united kingdom of Italy, its king enthroned in the Quirinal with the affections of all his subjects. He renewed with all solemnity his oft-repeated protest, and refused the pension of £129,000 voted him by the national parliament. His loss was in some measure compensated by the revival, as a voluntary contribution, of the ancient tribute of Peter's-pence (q.v.). In June 1871 his reign reached the unparalleled duration of twenty-five years, and on June 3, 1877, he celebrated the jubilee of his episcopal consecration. He died a month after Victor Emmanuel (to whom he sent the papal benediction), on 8th February 1878.

See Lives by J. F. Maguire (2d ed. New York, 1878), T. A. Trollope (2 vols. 1877), and Wappmannsperger (Ratisbon, 1878); also the articles ITALY, GARIBALDI, and MAZZINI.

Pizarro, FRANCISCO, the conqueror of Peru, was the illegitimate son of a colonel of infantry named Gonzalo Pizarro, and was born at Trujillo in Estremadura, it is believed about 1470 or 1475. He received no education, and was not even taught to read and write, but entered the military service at an early age, and served under the 'Great Captain' (Gonsalvo di Cordova) in Italy. In 1509 we find him at Darien in the expedition of Alonzo de Ojeda. He also served under Vasco Nuñez de Balboa when he crossed the isthmus and discovered the South Sea, led an expedition as far as Biru, to the south of the isthmus on the Pacific coast, and eventually became a citizen of Panamá. In 1522 Don Pascual de Andagoya also reached Biru, and there collected information respecting the great empire of the Incas. Returning to Panamá to prosecute the discovery, he became so ill that he was induced by the governor to hand over the enterprise to three partners, Francisco Pizarro, another old soldier named Diego de Almagro (q.v.), and a wealthy ecclesiastic named Hernando Luque. Pizarro was to lead the expedition, Almagro was to keep open communications, and Luque was to supply the funds. Their first attempt was a failure, but in 1526 Pizarro and Almagro sailed in two vessels, with Bartolomé Ruiz, a very expert and gallant sailor, as pilot. Pizarro landed his men, Almagro returned to Panamá for supplies, and Ruiz made a voyage to the southward, being the first European to cross the equator in the Pacific Ocean. Almagro returned, and the expedition proceeded southwards. But they were not yet strong enough to form any settlement, and eventually Almagro was sent back for reinforcements, while Pizarro and part of the force remained on an island discovered by Ruiz, in 1° 57′ N., called Gallo. The arrangement caused much discontent. The men complained that they were being left to starve. The governor of Panamá refused to give any further countenance to an enterprise which seemed doomed to failure, and two vessels, under Pedro Tafur, were sent to bring the people back from Gallo. Pizarro refused to return. Drawing a line along the sand, he called upon those who remained resolute to achieve success in spite of all difficulties to come over to his side. Thirteen men crossed the line. Tafur returned with the rest to Panamá. Pizarro and his devoted little band removed to another island, called Gorgona, where there was more game and better water. For a long time the governor of Panamá refused to allow any help to be sent. At last Ruiz was allowed to sail with one small vessel. He reached Gorgona, and Pizarro embarked, full of hope. Sailing southward they reached the Peruvian port of Tumbez, and collected full information respecting the empire of the Incas. Returning to Panamá, Pizarro proceeded to Spain to apply for authority to undertake the conquest of Peru.

The capitulation between Queen Juana and Pizarro was signed on 26th July 1529. Pizarro was made adelantado and captain-general, while Almagro received the title of marshal. Pizarro took back with him his four brothers, Hernando, Juan, Gonzalo, and Francisco Martin de Alcantara. He sailed from San Lucar on 19th January 1530, and from Panamá on 28th December 1531, with three vessels carrying 183 men and 37 horses. Almagro was to follow with reinforcements. Landing at Tumbez, the Spaniards commenced the march inland in May 1532, and on 15th November entered the city of Cajamarca. The Inca Atahualpa, after defeating his brother and ending a long civil war, was in the neighbourhood, on his way to Cuzco, the capital of the empire. Pizarro captured the native sovereign by treachery, and after extorting an enormous ransom, amounting to 4,605,670 ducats (£3,500,000 of our money), treacherously put him to death on 29th August 1533. The royal share of the treasure was sent to Spain, with tidings of the conquest. Pizarro then marched to Cuzco, and set up the young Inca Manco as nominal sovereign. On 6th January 1535 Pizarro founded the city of Lima, as the capital of his new government. He was created a marquis by the Emperor Charles V., while Almagro was empowered to occupy territory for 200 leagues from the southern boundary of Pizarro's government. But that southern boundary was not fixed. Almagro declared that Cuzco was within his grant, but was induced to forego his claim, and to undertake the conquest of Chili. The marquis was busy founding cities on the coast, while his brothers were at Cuzco, when a great insurrection of the Indians broke out. Both Cuzco and Lima were closely besieged, and Juan Pizarro was killed. For many months the Spaniards were in great danger, but in the spring of 1537 Almagro returned from Chili, raised the siege of Cuzco, and took possession of the city, claiming to be its lawful governor. The Marquis Pizarro had no intention of allowing his rival to retain Cuzco. Too old to take the field himself, he entrusted the command of his forces to his brothers, who defeated Almagro on 26th April 1538, and beheaded the old soldier soon afterwards. The property of his followers was confiscated. Pizarro remained at Lima, consolidating his power, and despatching various expeditions for discovery and conquest. But Almagro's followers were driven to desperation; they were called in derision 'men of Chili,' and the marquis treated them with contemptuous indifference. One of them, named Juan de Rada, matured a conspiracy for the assassination of the governor. The conspirators attacked his house during the mid-day meal, and murdered the old conqueror, who was between sixty-five and seventy, on 26th June 1541. The body of Pizarro was buried in the cathedral by stealth and at night.

Francisco Pizarro is one of the most prominent figures in the history of Spanish conquest in the New World. He was brave and determined, a man of inflexible constancy of purpose and infinite resource. His followers were devoted to his service, and some of his friendships endured until death. The indelible stain on his character is the treacherous execution of the Inca Atahualpa. Although without education, he rose to the greatness of his position, and proved himself to be an able and far-seeing administrator. Falling by the hands of assassins, he was defended by devoted friends, and died as bravely as he had lived. Pizarro was never married. By the Inca princess, Inez Huayllas Nusta, a sister of Atahualpa, he had two children—Gonzalo, who died young, and Francisca, who went to Spain with her step-father, Don Francisco Ampuero, a knight who married Inez after the assassination of the marquis. Francisca married her uncle Hernando Pizarro in 1551, and by him had three sons and a daughter. Hernando, for having beheaded the Marshal Almagro at Cuzco, was imprisoned in the castle of Medina del Campo on his return to Spain, where he remained until 1560. He married his niece during his imprisonment, which could not have been very rigorous. He died at Trujillo, the original home of himself and his brothers, in 1578.

Gonzalo Pizarro, brother of the Marquis Francisco Pizarro, served with his father in Italy when a boy. He accompanied his brother Francisco in the conquest of Peru, and did very good service when the Indians besieged Cuzco, and in the conquest of Charcas. In 1539 Gonzalo Pizarro undertook an expedition to the so-called Land of Cinnamon, the forest-covered region to the eastward of Quito. He left that city with 350 Spaniards and 4000 Indians on Christmas Day, and the hardships and sufferings endured by Gonzalo and his companions have seldom been equalled. Descending the rivers Coca and Napo, Gonzalo entrusted the command of a small vessel he had built to Francisco de Orellana, one of his lieutenants, who was to go in advance and seek for supplies. But Orellana deserted his starving comrades, discovered the whole course of the river Amazon, and returned to Spain. Out of the 350 Spaniards that left Quito 50 deserted with Orellana, 210 died of hunger and disease, and the miserable remnant returned to Quito with their intrepid leader in June 1542.

When Gonzalo Pizarro heard of the assassination of his brother the marquis he retired to his estates in Charcas. In 1544 the new viceroy, Blasco Nuñez Vela, arrived in Peru to enforce the 'New Laws.' The Spaniards were dismayed, and entreated Gonzalo to leave his retirement and protect their interests. He consented, chose an old veteran named Francisco de Carbajal as his lieutenant, and assembled a force of 400 men. The viceroy fled, and Gonzalo entered Lima in triumph on the 28th of October 1544 at the head of 1200 Spaniards, and several thousand Indians dragging the artillery. He was declared governor of Peru. Blasco Nuñez de Vela fled to Quito, but was closely followed by old Carbajal, and defeated and killed in the battle of Anaquito on January 18, 1546. Gonzalo Pizarro was undisputed master of Peru. Carbajal retired to Charcas to work the silver-mines.

When news of this revolt reached Spain the licentiate Pedro de la Gasca, an astute and very able ecclesiastic, was appointed to proceed to Peru as president of an 'Audiencia,' or court of five judges, and to restore order. He sailed in May 1546, and arrived at Panamá in August, where he gained possession of Pizarro's fleet by a combination of cunning and force. Gasca landed at Tumbez in June 1547. Gonzalo Pizarro, despairing of being able to make head against the president, determined to retreat into Chili. But there was a force, under an officer named Diego Centeno, hanging on his rear; and it was necessary to dispose of it first. Centeno was utterly defeated in the battle of Huarina, near the banks of Lake Titicaca, and the doomed Pizarro was so elated at the victory that he abandoned all idea of retiring into Chili. He advanced to Cuzco, and the President Gasca approached him by leisurely marches, encamping on the plain of Sacsahuana, near Cuzco, in April 1548. On the 9th Pizarro and Carbajal marched out of Cuzco, and both sides made ready for battle. But soon there were symptoms of desertion on

Pizarro's side. The desertions took place by companies and squadrons. So Gonzalo Pizarro sorrowfully took his way to the president's camp, and gave himself up. Carbajal was seized by the soldiers and hanged the following day. Gonzalo, the last of five famous brothers, was beheaded in presence of the whole army on the 10th of April 1548, at the age of forty-two. He left, by an Inca princess, a son known as Francisquito, who was made legitimate by the emperor in 1544, and a daughter named Inez, who was married in Lima. Francisquito was sent to Spain, but died young.

See Lives by Helps (1869) and Towle (Boston, 1878), also works cited at PERU.

Pizzicato, a phrase used in music for the violin or violoncello, to denote that here the strings are to be twitched with the fingers in the manner of a harp or guitar.

Placebo (Lat., 'I will please'), in the Roman Catholic service of vespers for the dead the name of the first antiphon, which begins with the word. In medicine it is an epithet applied to a remedy intended to humour or gratify a patient rather than to exercise any curative effect.

Place-names. See NAMES.

Placenta, or AFTER-BIRTH, the structure which unites the unborn mammal to the womb of its mother and establishes a nutritive connection between them. The placenta is peculiarly a mammalian structure, but it is not developed in Ornithorhynchus and Echidna, which lay eggs, nor is it more than incipient in the Marsupials, which bring forth their young after a short gestation. In all other mammals it occurs in various forms, partly embryonic in its origin, partly maternal, always acting as a double vascular sponge, by means of which the blood of the mother nourishes and purifies that of her unborn young. Vague prophecies of it occur in two cartilaginous fishes and in two lizards, in which there is a connection between the yolk-sac of the embryo and the wall of the oviduct.

In the hedgehog, which is a conveniently central type of mammal, the connection between embryo and mother has the following history. (*a*) The outer wall of the embryonic sac is moored to the wall of the uterus by small cellular outgrowths known as the preliminary 'villi,' and minute cavities between these are bathed by the blood of the mother. (*b*) The growing embryo becomes ensheathed by the double folds of the Amnion (q.v.), the inner parts of which form the 'amnion proper,' while the outer form the 'sub-zonal membrane.' Part of the yolk-sac wall fuses with this sub-zonal membrane; from the united area vascular villi grow out into the wall of the uterus, which is now much modified. Thus is formed a 'yolk-sac placenta,' as exhibited for a time by Insectivores and Rodents. (*c*) But the most important union between mother and offspring is that due to the union of Allantois (q.v.) and sub-zonal membrane. If there has been a yolk-sac placenta it dwindles before this new and more efficient union. From the united area vascular villi grow out into depressions or crypts in the uterine wall, part of which is modified into a spongy vascular tissue. In Insectivores, Bats, and Rodents the original outer wall of the embryonic sac persists between the placental villi and the maternal blood, and mediates between them.

The final placenta thus consists (1) of a maternal part—viz. a modified region on the wall of the uterus—and (2) of an embryonic part—viz. part of the allantois, fused to the sub-zonal membrane, and giving off vascular villi, between which and the maternal blood the persistent outer wall of the embryonic sac sometimes persists and mediates.

The term 'chorion' has been used in so many senses, that it seems advisable to abandon it. It is best applied to the union of sub-zonal membrane and allantois ('true chorion'), or to the union of sub-zonal membrane and yolk-sac ('false chorion').

The embryonic part of the placenta necessarily comes away at birth, and sometimes the vascular part of the maternal placenta is also discharged when the young is born. When this is the case, the placenta is called 'deciduate,' or better 'caducous.' When the maternal part of the placenta does not come away at birth the placenta is called 'indeciduate,' or better 'non-caducous.' Of non-caducous placentation two kinds are distinguished: *Diffuse*, when the villi are scattered over the surface of the embryonic sac (in Manis among Edentates, in the dugong, in Cetacea, in most Ungulates except Ruminants, in Lemurs); *Cotyledonary*, when the villi occur in patches (in Ruminants). Of caducous placentation three kinds are distinguished: *Zonary*, when the villi form a partial or complete girdle round the embryo (in Orycteropus and Dasypus among Edentates, in Elephants and Hyrax, in Carnivora); *Discoidal*, when the villi occur on a circular cake-like disc (in most Edentates, in Insectivores and Bats, in Rodents); *Meta-discoidal*, when the villi are at first scattered, but are afterwards restricted to a disc (in Monkeys and in Man). Sir William Turner, the 'grand-master of placental research,' allots the lowest place to such diffuse forms of placenta as that of the pig, but others maintain that the discoidal type as illustrated in the Insectivora is the most primitive. In Botany 'placenta' usually means the portion of the Ovary (q.v.) which bears the ovules. See also AMNION, ALLANTOIS, FŒTUS, MAMMALS.

Placenza. See PIACENZA.

Placitum Regium (called also *Placet*, *Exequatur*, *Lettres Patentes*) is an act or instrument executed in virtue of the privilege claimed by the government in certain kingdoms to exercise a supervision over the communications of the Roman pontiff with the clergy and people of those kingdoms, and to suspend or prevent the publication of any brief, bull, or other papal instrument which may appear to contravene the laws of the kingdom, or to compromise the public interest. The early Christian emperors, it is well known, freely extended their legislation into the affairs of the church; and one constant cause of conflict between church and state in the mediæval period was the attempt on the part of the sovereigns to control the free intercourse of the pope. In the Pragmatic Sanction in France, and in the similar legislation of Spain, Portugal, Sicily, and the Low Countries during the 15th century, the claims of the state are asserted; and among the so-called 'liberties' of the later Gallican Church (q.v.) was a certain subjection to the state in this particular. But it was in the German states that the claim was most formally embodied in the constitutional law. In England the statute of Præmunire (q.v.) was an example of the same tendency.

Placoid Fishes, an order of fishes, in the classification proposed by Agassiz, characterised by having *placoid* (Gr. *plax*, 'a broad plate') scales, irregular plates of hard bone, not imbricated, but placed near together in the skin. They are all Cartilaginous Fishes (q.v.). See SCALES.

Plagal. See PLAIN-SONG.

Plagioclase. See FELSPAR.

Plagiostom'ata. See CARTILAGINOUS FISHES.

Plague, a term used in the middle ages of all fatal epidemics indiscriminately, but now restricted to a very malignant kind of contagious fever prevailing at certain times and places epidemically, characterised by buboes, or swellings of the lymphatic glands, by carbuncles and petechiæ, and apparently furnishing very imperfect security against its recurrence in the same individual.

The first extensive outbreak of this disease on record took place in the 6th century A.D., and devastated the whole Roman empire. It is supposed to have started from Lower Egypt: but from this time frequent epidemics occurred in Europe, culminating in the Black Death (q.v.) in the 14th century. It continued to ravage the north and west of Europe up till the 17th century. The last outbreak in England in 1663–65 caused the 'Great Plague of London,' and spread almost all over the country (see LONDON, Vol. VI. p. 699). Since the end of the 17th century it has only twice visited western Europe; in 1707–14 it spread from Russia and Hungary as far as Sweden, Denmark, Prussia, and Bavaria; and in 1720–22, being introduced from Syria into Marseilles, it destroyed almost half the population there, and spread through Provence. During all this time its most constant seats, so far as is known, were the countries bordering the Eastern Mediterranean—Lower Egypt, Syria, Asia Minor, and Turkey in Europe. But from all these it has meantime disappeared. The last cases known in Egypt occurred in 1844, and in the others in 1841. It was hoped that the disease had become extinct, but since then it has occurred more than once in Arabia, Tripoli, Persia, and Mesopotamia, and in 1878–79 it spread to south-east Russia. Moreover, it has been present in India at least since 1815, sometimes in extensive epidemics (e.g. the 'Páli plague,' 1836–38), but most constantly in districts on the southern slopes of the Himalayas; and it was very prevalent in the province of Yunnan, China, in 1871–73. In both these regions it existed at least down to 1879.

It is the most destructive of all known epidemics. Rarely less than 60, sometimes 90 per cent. of those attacked die. 'It often carries off half the population of a town or of a district in which it prevails, and it may completely root out whole families, so that no survivor remains.' The Black Death of 1348–50 is believed to have destroyed not less than a quarter of the population of Europe.

The general symptoms resemble those of other severe fevers: shivering, rise of temperature, aching in head, back, and limbs, sickness, &c. Great weakness succeeds, with mental disturbance leading to coma or delirium. Death often occurs before any characteristic symptoms are developed; but at an early stage dark spots or patches often appear on the skin, produced by subcutaneous hæmorrhages (petechiæ, ecchymoses), and bleeding may also take place from the various mucous membranes. Bleeding from the lungs, though rare in recent epidemics, was regarded as a characteristic symptom of the Black Death in its most virulent form. About the second or third day the most distinctive features of the disease are developed—viz. one or more buboes or glandular swellings, usually in the neck, armpits, or groins: these generally break and lead to prolonged suppuration. In a few cases they are absent altogether. Carbuncles not infrequently develop at a later stage of the disease. No specific treatment is known. Good nursing, good nourishment, free stimulation, early opening of the buboes seem to comprise all that can be done for the patient. The cause of the disease is as obscure as that of most epidemics. There can be no doubt that it is a highly infectious disease, and that the infection may be conveyed by clothes, bedding, &c., as well as by direct contact with the sick. In all epidemics it has been observed that the unhealthy conditions produced by poverty and filth are extremely favourable to the disease, and that it has been much less prevalent and severe among those in comfortable circumstances and healthy surroundings.

See Hecker's *Epidemics of the Middle Ages* (published by the Sydenham Society, 1844); Hirsch's *Geographical and Historical Pathology* (vol. i., New Sydenham Society, 1883); and the articles BLACK DEATH, EPIDEMIC.

Plaice (*Pleuronectes platessa*), a common flatfish in the same genus as the flounder. It usually inhabits sandy and muddy banks off the European coasts from France to Iceland. Like the flounder, it may pass from estuaries into rivers, and can even thrive in fresh-water ponds. It often lies slightly covered with sand, but with the eyes exposed and watchful for prey. The food consists of molluscs, crustaceans, and worms, but especially of the first. It spawns in early spring, and is in best condition about the end of May. It was once a common belief that shrimps were the parents of plaice! The plaice is taken both by lines and trawl-nets, is in considerable esteem for the table, and is plentiful in the British markets. Those from sandy ground are said to be much more palatable than those from the mud. Compared with the flounder, the plaice is rather broader in proportion to its length. The general size weighs about 2 to 3 pounds, but much larger specimens are often caught; the coloured side is predominantly olive-brown with orange spots, but the colour changes rapidly in precise harmony with that of the ground on which the fish rests; six blunt tubercles extend from the eye to the beginning of the lateral line, which has an almost straight course.

Plaid. See HIGHLANDS.

Plain, a geographical term which hardly admits of precise definition. It is generally applied to extensive tracts of approximately level or undulating country, which occur at less than 1000 feet above the sea. Broad areas of similar character at higher elevations are usually termed *Tablelands* (q.v.) or *Plateaus*. This is the general rule, but when the surface of a plain slopes gradually upwards to heights of several thousand feet, the whole tract is still called a plain. As an example may be cited the great plains east of the Rocky Mountains, which fall imperceptibly away towards the east from an elevation of 6000 feet or so. Among the most characteristic plains are the wide alluvial lands of the greater rivers. But the term is extended to such low-lying regions as central Ireland, the Midlands of England, middle Europe, &c.—regions which have no great elevation and present a gently undulating surface, interrupted now and again by isolated hills, and lines of cliffs and escarpments. From the same point of view the whole interior of North America lying between the Rocky Mountains in the west and the Alleghany and White Mountains in the east, and extending from the Gulf of Mexico to the shores of the Arctic Ocean, may be called a plain. So likewise more than half of Europe is a plain that is continued into Asia and extends northward over vast regions of that continent. Plains necessarily differ much in appearance according to the nature of soil and climate, from the dreary, sandy wastes of north Africa to the luxuriant fertility of the South American silvas. Wide regions of comparatively level ground in each of the great continents have acquired various names, such as the *Steppes* and *Tundras* of eastern Europe and Asia, the *Deserts* of Arabia and Africa, the *Savannahs* and *Prairies* of North America, and the *Llanos*, *Pampas*, and *Silvas* of South America. See DESERT.

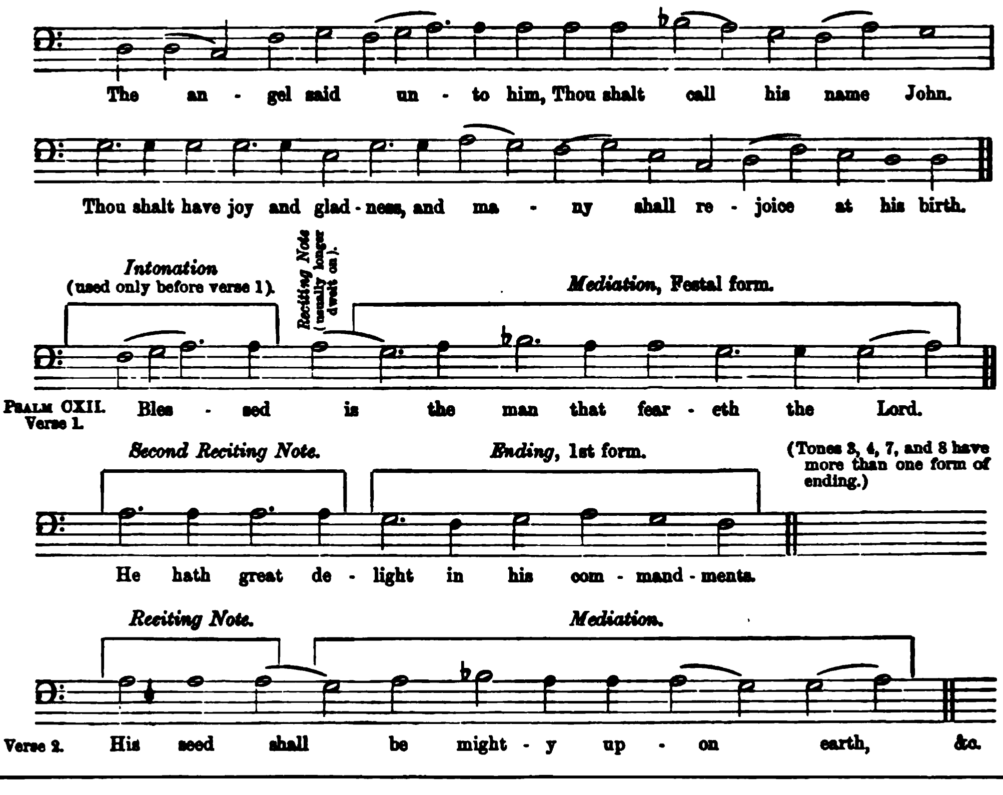
Plainfield, a city of New Jersey, on Green Brook, 24 miles by rail WSW. of New York, many of whose business men have their homes here.

Clothing, hats, and machinery are manufactured. Pop. (1860) 3224; (1890) 11,267.

Plain-song, PLAIN-CHANT, GREGORIAN CHANT, or GREGORIAN MUSIC, is the music used in the Christian church of the West from the earliest times, still in use in all Roman Catholic churches, and extensively revived since the rise of the High Church party in the English Church. Many good musicians, however, consider its interest as antiquarian rather than musical. Its distinguishing points are (1) its recitative-like character, as opposed to what was styled *musica mensurata*—i.e. *barred* music, with a marked and regular rhythm, which was the essential point of ancient Greek music, and more or less of nearly all modern music; (2) the *modes*, or scales, in which it is written, which are more numerous and varied than the modern major and minor; and (3) its being (originally) sung in unison, though much of it is susceptible of treatment in harmony, and is now frequently so heard. It used to be stated also that the notes in it were all of equal length, but this view is now generally repudiated and condemned. It embraces music for all parts of the Roman services, from the *Accents* (nearly in monotone) proper to the various readings to the more elaborate melodies of the antiphons and hymns, and the various parts of the mass. The best known and most ancient of all is the music of the eight Tones sung to the Psalms, commonly called the Gregorian Tones. As to the origin of these many different views prevail, some ascribing them to a Greek, some to a Hebrew source, others to the early Christians; there seems some probability, though there is no direct evidence, that they were actually derived from the music of the temple service. As at first plain-song was handed down orally only, and the early systems of notation were very defective, it is impossible to determine how far it may have been corrupted. It was first reduced to system by St Ambrose (died 397), but much more extensively by St Gregory the Great, towards the end of the 6th century. There have of course been large additions since. How he noted the music is uncertain; the early notation and rules of plain-song were so complicated that it is said ten years' study were necessary to acquire a mastery of them. Local varieties of the proper melodies gradually sprang up, almost every diocese having an office-book peculiar to itself—e.g. the antiphonary and gradual of Sarum, said to be one of the purest. The earliest known existing record of plain-song is the Antiphonarium, or rather Gradual, in the library of the monastery of St Gall in Switzerland, probably of the 9th or 10th century. Various directories have been published, notably that begun by Palestrina and finished by Guidetti; the latest, issued under sanction of the pope, is the great series published at Ratisbon by Pustet, beginning in 1871 with the Gradual. The music is still always printed in the old square notes on a stave of four lines. At the Reformation the Gregorian music was adapted to the new vernacular services of the English Church by John Marbeck, who published in 1550 *The Book of Common Praier noted*; and his arrangement is still in use in cathedral services. Anglican chants are modelled on the Gregorian psalm tones. See ANGLICAN, CHANT.

The modes, or scales, of plain-song require some explanation. Their variety has been acknowledged by first-rate authority as affording greater resource of expression than our major and minor modes; and music has been written in them by great modern composers—e.g. the 'Hymn in the Lydian Mode' in Beethoven's Quartet, op. 132. They

SPECIMEN OF ANTIPHON, LEADING TO A PSALM, SET TO THE FIRST TONE, FROM THE RATISBON 'VESPERAL,' TRANSLATED AND IN MODERN NOTATION.


The an - gel said un - to him, Thou shalt call his name John.
Thou shalt have joy and glad - ness, and ma - ny shall re - joice at his birth.
Intonation (used only before verse 1).
Reciting Note (usually longer dwelt on).
Mediation, Festal form.
PSALM CXII. Verse 1.
Bles - sed is the man that fear - eth the Lord.
Second Reciting Note.
Ending, 1st form.
(Tones 3, 4, 7, and 8 have more than one form of ending.)
He hath great de - light in his com - mand - ments.
Reciting Note.
Mediation.
Verse 2.
His seed shall be might - y up - on earth, &c.

were derived from, though it is not certain that they were identical with, the Greek diatonic scales, after which they have been named. The principle of their formation is that each of the seven natural sounds of the diatonic scale forms the keynote, or 'final' of a mode, which embraced that note and the seven above it. (The melodies rarely exceeded an octave, and no flats or sharps are found except an occasional B flat.) This would give us seven modes; but to each of these is attached another, in which the melody, while having the same final or keynote, instead of ascending to the octave above, ranges from the fourth below it to the fifth above. The former are called the *authentic* modes, the latter *plagal*. The difference of the modes, and the effect of the melodies in them, is owing, it will be noticed, to the various positions of the two semitones in the scales. The difference between an authentic and a plagal melody may be illustrated from two psalm-tunes—Newton or New London, and the Old Hundredth, in the first of which the melody lies between the keynote and its octave, but in the other between the fourth below and the fifth above the keynote. But while the whole fourteen modes are enumerated, for the sake of completeness in theory, two of them are universally rejected in practice as defective—the two having B as their keynote. The modes are, then, arranged in pairs as follows. The 1st or Dorian (authentic) embraces the notes from D on the middle line of the bass stave to the D above, and has its keynote on D; the 2d or Hypo-dorian (plagal) has the same keynote, but its compass is from the A below to the A above it; the 3d or Phrygian (authentic) and its corresponding plagal mode, the 4th or Hypo-phrygian, have similarly their keynotes on the E of the third space of the bass stave; the 5th or Lydian and 6th or Hypo-lydian have F for final; the 7th or Mixo-lydian and 8th or Hypo-mixo-lydian have G; the 9th or Æolian and 10th or Hypo-æolian end on A; then come the rejected modes on B, styled the Mixo-locrian and Hypo-mixo-locrian; then the Ionian or Iastian and Hypo-ionian or Hypo-iastian on C, numbered variously as 11th and 12th, or 13th and 14th, according to the rejection or inclusion of the two preceding. The Ionian is the modern major mode. St Ambrose's arrangement of the melodies was said to have been confined to the 1st, 3d, 5th, and 7th modes (authentic); while the relative plagal modes, 2d, 4th, 6th, and 8th, were added by St Gregory. In these are written the correspondingly numbered eight psalm tones; the Peregrine Tone, used only for the psalm *In exitu Israel*, is in the 9th mode. The other modes were finally added in the 8th century under Charlemagne. Each mode has its reciting note, or Dominant—not to be confounded with the modern term in harmony.

Various specimens of plain-song hymn melodies will be found in *Hymns Ancient and Modern*—e.g. No. 14, the vesper hymn of St Ambrose, 'O Lux beata Trinitas;' and No. 96, the hymn of Fortunatus, 'Vexilla Regis prodeunt,' which may be studied in a different treatment by Gounod in the 'March to Calvary' in his *Redemption*.

See the Rev. Thomas Helmore's *Manual*, *Brief Directory*, and *Primer* of Plain-song; various articles by Mr W. S. Rockstro in Grove's *Dictionary of Music*; and the *Magister Choralis*, by Rev. F. X. Haberl (trans. by Rev. N. Donnelly, Ratisbon, 1877). An edition of the official Roman *Directorium* was printed in 1874, also at Ratisbon, by Pustet. See also the article HARMONY.

Planarian, a term practically co-extensive with Turbellarian, and applicable to the members of the lowest class (Turbellaria) of worm-like animals. They live in fresh and salt water and sometimes in damp earth. They are unjointed 'worms' with a ciliated skin; the food-canal is often branched, but has no posterior opening; from the simple brain two lateral nerves extend backwards; the body-cavity is undeveloped; there are no respiratory or circulatory organs; the excretory system consists of branching tubes ending in ciliated cells; all but two genera are hermaphrodite. Their simplicity is well illustrated by the fact that some multiply by dividing into two, while a fragment of others may re-grow the whole. In *Microstoma lineare* a temporary chain of eight or sixteen individuals is sometimes formed by budding. In diet they are carnivorous, but a few are parasitic—suggesting the next class of Trematodes. As illustrative genera we may note Planaria, in fresh water; Vortex and Convoluta, with green species (the colour being probably due to partner Algæ); Gunda, with hints of segmentation; Microstoma and Stenostoma, the two unisexual genera; Graffilla and Anoplodium, parasitic; Bipalium and Geodesmus, on land; Cœloplana and Ctenoplana, in some ways suggestive of the Cœlenterate Ctenophora.

Planché, JAMES ROBINSON, playwright, archæologist, and herald, was born in London, 27th February 1796, the son of a watchmaker of Huguenot descent. His first extravaganza, *Amoroso*, was produced at Drury Lane Theatre in 1818, and others soon followed. In 1823 he designed for Charles Kemble the dresses and appointments for the play of *King John*, and afterwards for other Shakespearian productions. In 1824 he wrote English words for Weber's *Der Freischütz*, and in 1826 for *Oberon*; and in the period following 1831, when he was engaged by Madame Vestris at the Olympic, nearly 200 dramatic pieces came from his pen—the most adaptations, but a large number original dramas (e.g. *Charles XII.*) and extravaganzas. Of the latter five volumes were published in 1880. In 1843 he helped to found the British Archæological Association, and for over twenty years he was its honorary secretary and editor of its 'Journal.' In 1854 he was made Rouge Croix Pursuivant, and in 1866 Somerset Herald; in 1872, at the age of seventy-six, he received a civil list pension of £200 a year. He died May 29, 1880.

Among Planché's works, besides two histories of British costume and a *Cyclopædia of Costume*, are his *Introduction to Heraldry* (18th ed. 1866); *Regal Records, or a Chronicle of the Coronations of the Queens Regnant of England* (1838); *The Pursuivant of Arms* (3d ed. 1874); and *The Conqueror and his Companions* (2 vols. 1874). See his *Recollections and Reflections* (2 vols. 1872).

Planchette, a thin heart-shaped piece of wood mounted on three props, two of which are furnished with castors, and one is a pencil which may be made to trace characters on a sheet of paper by resting the fingers upon the instrument, and thus almost insensibly steering it in any direction required. Its use is as a supposed medium for spiritualistic communications; and it is obvious with what ease an instrument so sensitive to movement may be manipulated so as to startle the credulous into belief. See, however, the *Proceedings of the Psychical Society* (1888, &c.).

Plane (*Platanus*), the sole genus of trees of the natural order Platanaceæ. The species of plane are few; natives of temperate climates in the northern hemisphere; tall trees, with deciduous large palmate leaves and smooth whitish bark, which annually scales off in large pieces.—The Oriental Plane (*P. orientalis*), a native of Greece and the East, was planted by the Greeks and the Romans as an ornamental tree, no other tree, indeed, commanding equal admiration; and for centuries the youth of Greece assembled under its shade in the groves of Academus to receive lessons in philosophy. The plane is still planted for shade and ornament in the south of Europe. Many fine trees exist in England, but they were at one time much more numerous, great part having died in the end of the 18th century. The spring frosts and the insufficient duration of the summer for the proper ripening of the wood render Scotland less suitable for its cultivation, yet there is a tree at Gordon Castle 66 feet high. No tree better endures the atmosphere of a large city, and there are no finer trees within the precincts of London than its plane-trees. Noble specimens are to be seen in Hyde Park and Russell Square, in London, and the avenue of the Thames Embankment is formed with this tree. In the East the plane attains an immense size. One tree in the meadow of Buyukdere, on the banks of the Bosporus, is 141 feet in circumference at the base, extends its branches 45 feet from the trunk, and is believed to be more than 2000 years old. The wood of the plane, when young, is yellowish white; when old it is brownish, fine grained, takes a high polish, and is esteemed for cabinet-making. A rich alluvial soil and the vicinity of water are most suitable to this tree. The North American Plane, or Buttonwood (*P. occidentalis*), is a very similar tree. It is the largest deciduous tree of the United States, and abounds on the banks of the great rivers of the middle states. Its timber is not very valuable, and is very liable to decay. A tree of this species on the bank of the Thames, in Chelsea Hospital gardens, is 115 feet high, with a trunk 5 feet in diameter.—The name plane-tree is commonly given in Scotland to what in England is known as the Sycamore (*Acer pseudo-platanus*), which resembles the true planes in its foliage, but is neither a plane nor a true sycamore, being really the Greater Maple. See MAPLE.

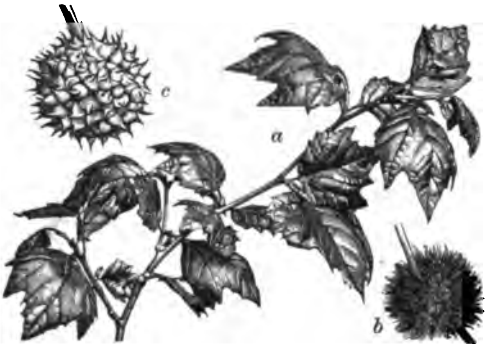


Fig. 1.—Oriental Plane (*Platanus orientalis*): *a*, branch; *b*, flower, and *c*, fruit, on larger scale than *a*.

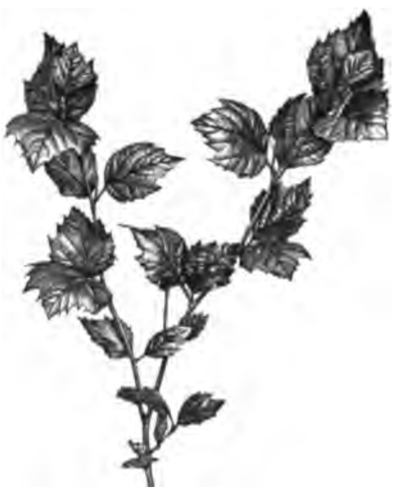


Fig. 2.—Branch of *Platanus occidentalis*.

Planetarium. See ORRERY.

Planetoids, or ASTEROIDS, are now usually known as Minor Planets. See PLANETS.

Planets (Gr. *planētes*, 'a wanderer') are those heavenly bodies (including the earth) which belong to our solar system, and revolve in elliptic orbits round the sun. They are often denominated *primary planets*, to distinguish them from their moons or satellites, which are called *secondary planets*. The name planet is of considerable antiquity, and was applied to these dependents of the sun to distinguish them from the myriads of luminous bodies which stud the sky, and which present to the naked eye no indication of change of place (see STARS). The planets at present known are, in the order of their distance from the sun, Mercury, Venus, the Earth, Mars, the Planetoids (q.v.), Jupiter, Saturn, Uranus, and Neptune. Six of these, Mercury, Venus, the Earth (which was not, however, then reckoned a planet), Mars, Jupiter, and Saturn, were known to the ancients; Uranus was discovered by Sir William Herschel (q.v.) in 1781; and Neptune, after having its position and elements determined theoretically by Leverrier and Adams, was discovered by Professor Challis and Dr Galle in 1846. The Planetoids, of which some 300 are now known, have all been discovered since January 1, 1801. Six of the planets, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune, are attended by one or more satellites; Uranus (generally), Neptune, almost all the Planetoids, and all the satellites except the Moon are invisible to the naked eye. The visible planets can be at once distinguished from the fixed stars by their clear steady light, while the latter have a sparkling or twinkling appearance. The planets, as observed from the Earth, move sometimes from west to east, sometimes from east to west, and for some time remain stationary at the point where progression ends and retrogression commences. This irregularity in their movements was very puzzling to the ancient astronomers, who invented various hypotheses to account for it. See (under Ptolemy) PTOLEMAIC SYSTEM. The system of Copernicus, by assuming the sun, and not the earth, as the centre of the system, explained with admirable simplicity what seemed before a maze of confusion.

The planetary orbits differ considerably in their degrees of eccentricity, the Planetoids, Mars, and Mercury being most, and the larger planets least eccentric. No two planets move exactly in the same plane, though, as a general rule, the planes of the larger planets most nearly coincide with that of the ecliptic. The latter are consequently always to be found within a small strip of the heavens extending on both sides of the ecliptic; while the others have a far wider range, Pallas, one of them, having the angular elevation of its orbit no less than 34° 42′ above the ecliptic. According to Kepler's Laws (q.v.), the nearer a planet is to the sun the shorter is the time of its revolution. The arrangement of the planets in the solar system bears no known relation to their relative size or weight, for though Mercury, Venus, and the Earth follow the same order in size and distance from the sun, yet Mars, which is farther from the sun, is much less than either the Earth or Venus, and the Planetoids, which are still farther off, are the least of all. Jupiter, which is next in order, is by far the largest, being about 1½ times as large as all the others together; and, as we proceed farther outwards, we find Saturn less than Jupiter, and Uranus than Saturn, though Neptune, the remotest, is somewhat larger than Uranus.

With reference to their distance from the sun, as compared with that of the Earth, the planets are divided into *superior* and *inferior;* Mercury and Venus are consequently the only 'inferior' planets, all the others being 'superior.' The inferior planets must always be on the same side of the Earth as the sun is, and can never be above the horizon of any place (not in a very high latitude) at midnight; they are always invisible at their superior and inferior conjunctions, except when, at the latter, a *transit* (see SUN) takes place. The superior planets are likewise invisible at conjunction, but when in opposition they are seen with the greatest distinctness, being then due south at midnight. The time which elapses from one conjunction to its corresponding conjunction is called the *synodic period* of a planet, and in the case of the inferior planets must always be greater than the true period of revolution.

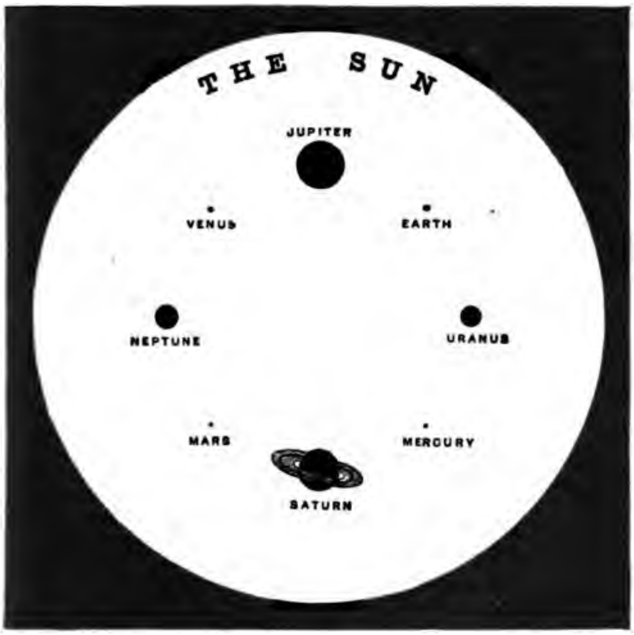


Fig. 1.—Diagram showing the comparative sizes of Sun and Planets.

Mercury, the planet which is nearest the sun, is also, with the exception of the Planetoids, the smallest (being only three times the bulk of the moon), and performs its revolution round the sun in the shortest time. Its greatest elongation is never more than 27° 45′, and consequently it is never above the horizon more than two hours after sunset, or the same time before sunrise; on this account, and from its small apparent size (5″ to 13″), it is seldom distinctly observable by the naked eye. It shines with a peculiarly vivid white or rose-coloured light, and exhibits no spots. Its year (or sidereal period of revolution round the sun) is 87·969 days.

Venus, the next in order of distance and period, is to us the most brilliant of all the planets. Its orbit is more nearly a circle than any of the others, and when at its inferior conjunction it approaches nearer the Earth than any other planet. Its apparent angular dimensions thence vary from 10″ at the superior to 66″ at the inferior conjunction. Its greatest elongation varies from 45° to 47° 12′, and therefore it can never be above the horizon for much more than three hours after sunset, or the same time before sunrise. While moving from the inferior to the superior conjunction Venus is a *morning star*, and during the other half of its synodic period an *evening star*. When this planet is at an elongation of 40° its brilliancy is greatest, far surpassing that of the other planets, and rendering a minute examination through the telescope impossible. At this period it sometimes becomes visible in the daytime, and after sunset is so bright as to throw a distinct shadow. Astronomers have repeatedly attempted to ascertain the nature and characteristics of its surface, but its brightness so dazzles the eyes as to render the correctness of their observations at best doubtful. From the changes in the position of dusky patches on its surface, which have been frequently noticed, it is concluded that it revolves on its axis, and that its equator is inclined to the plane of its orbit at an angle of 75°; but many astronomers doubt these conclusions. Its year is 224·7 days. Professor Schiaparelli has shown reason for believing that both Mercury and Venus always present the same face to the sun. Both Venus and Mercury necessarily exhibit phases like the moon. For *transits* of Venus, see SUN.

The *Earth*, the next planet in order, will be found under its own name; it has a single satellite, the *Moon* (q.v.). Its year is 365·256 days.

Mars, the first of the superior planets, is much inferior in size to the two previous, its volume being about ⅐th of the Earth's, and, after Mercury, its orbit is much more eccentric than those of the other planets. When it is nearest to the Earth (i.e. in opposition) its apparent angular diameter is 30″; when farthest from it (i.e. in conjunction), not more than 4″. Mars revolves on its axis (which is inclined at an angle of 28° 27′) in 24 hours 37 minutes, and its year is 687 days long. In 1877 Hall of Washington discovered that it had two satellites, now named Phobos and Deimos. It shines with a fiery red light, and is a brilliant object in the heavens at midnight when near opposition; when seen through the telescope its surface appears to be covered with irregular blotches, some of them of a reddish, others of a greenish colour, while at each pole is a spot of dazzling white. The red spots are surmised to be land; the green, water; but the markings on Mars appear to have changed considerably since they were first observed. The white spots at the poles are with some reason supposed to be snow, since they decrease when most exposed to the sun, and increase under the contrary circumstances. The Phases (q.v.) of Mars range between full, half, full (in conjunction, if visible), and half.

The Planetoids.—After Mars in order come the *Planetoids* (see below), formerly but improperly called Asteroids.

Jupiter, the next in order, is the largest of all the planets, its bulk being more than 1400 times that of the Earth, though, from its small density, its mass is only 300 times more. After Venus it is the brightest of the planets and the largest in apparent size, its angular diameter varying from 30″ to 50″.

When looked at through a telescope it is seen to be considerably flattened at the poles, owing to its rapid revolution on its own axis; and its surface is crossed in a direction parallel to its equator by three or four distinct and strongly-marked belts, and a few others of a varying nature. Spots also appear and remain for some time on its surface, by means of which its revolution on its axis has been ascertained. Separate spots give, however, slightly different periods, and some even are seen to move past one another, so that a period of 9 hr. 55 min. 21 sec., while generally accurate, is not given by every spot. This planet is attended by four satellites, which are easily observable through an ordinary telescope, and which have rendered immense service in the determination of longitudes at sea, and of the motion and velocity of light. The satellites, which were discovered by Galileo, were proved by Sir William Herschel to revolve on their own axes in the same time that they revolve round their primary. The smallest is about the same size as our Moon, the others are considerably larger. The year of Jupiter is 4332·584 days.

Saturn, next in position, is about 745 times larger in volume, though only about ninety times greater in mass, than the earth. Its apparent diameter when in opposition is 20·3″, and there is a considerable flattening towards the poles. Its surface is traversed by dusky belts much less distinctly marked than those of Jupiter, owing doubtless in great part to its inferior brightness; its general colour is a dull white or yellowish, but the shaded portions, when seen distinctly, are of a glaucous colour. The most remarkable peculiarity of Saturn is its ring, or series of concentric rings, each one parallel and in the same plane with the others and with the planet's equator. The ring is *distinctly* separable into three parts; the two outermost are bright like the planet itself, while the innermost (called the 'Dusky' or 'Crape' ring) is of a purplish colour, and is only discernible through a powerful telescope. They are most probably composed of a multitude of small satellites in rapid revolution round the planet. They are not always visible when Saturn is in the 'opposite' half of its orbit, for when the plane of the rings is intermediate between that of the Earth's orbit and of the ecliptic their dark surface is turned towards us, and when the sun is in their plane only the narrow edge is illumined; in both of these cases the ring is invisible from the Earth. Its plane being inclined at an angle of 28° to the ecliptic, we see the two surfaces of the ring alternately for periods of fifteen years at a time; and at the middle of each period the rings attain their maximum obliquity to the ecliptic, and are then best seen from the Earth. It is hardly necessary to remark that at the end of each period they become invisible. Saturn has also no less than eight satellites, seven of which revolve round it in orbits little removed from the plane of the ring, while the eighth, which is the second in size, is considerably inclined to it. Two of the satellites were discovered by Herschel in 1787 and 1789, four by Cassini in 1672 and 1684, one by Huyghens in 1655, one by Mr Lassell in England and Professor Bond in America in 1848. The satellites are all situated outside of the ring, and the largest of them is nearly equal to the planet Mars in size. The year of Saturn is 10,759·219 days.

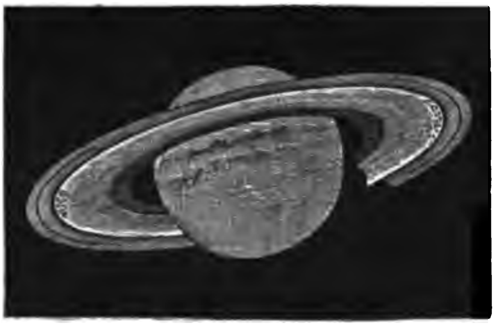


Fig. 2.—Saturn, as observed by Trouvelot with the 26-inch Washington Refractor.

Uranus, the next planet in position, was discovered accidentally by the elder Herschel on 13th March 1781, and was named 'the Georgium Sidus' and 'Herschel,' but these names soon fell into disuse. It is about seventy-two times greater than the Earth in volume, and thirteen times in mass; but, though so large, its distance is so much greater in proportion that astronomers have been unable to gain much information concerning it. No spots or belts have hitherto been discovered on its surface, and consequently its time of rotation and the position of its axis are unknown. It is attended by a number of satellites, but so minute do these bodies appear that astronomers hitherto have been unable to agree as to their exact number; Sir William Herschel reckoned six, while other astronomers believe in the existence of four, five, and eight respectively. That there are at least four is beyond doubt. The year of Uranus is 30,686·820 days.

Neptune is the next and outermost member of the solar system, and, at a distance of nearly 3000 millions of miles from the centre of the system, slowly performs its revolution round the sun, accomplishing the complete circuit in about 165 solar years. It is about ninety times larger than the Earth, but from its extreme remoteness is of almost inappreciable magnitude when seen through an ordinary telescope. It was the disturbance in the motion of Uranus caused by the attractive force of this planet which led Leverrier and Adams to a calculation of its size and position, on the supposition of its existence; and the directions which were given by the former to Dr Galle of Berlin, specifying its exact position in the heavens, led that astronomer to its discovery on 23d September 1846 (see ASTRONOMY). Mr Lassell of Liverpool discovered that Neptune is attended by one satellite. The satellites of Uranus and Neptune differ from the other planets, primary and secondary, in the direction of their motion, which is from east to west, and in the case of the former in planes nearly perpendicular to the ecliptic. Both Uranus and Neptune were observed long before the times of Herschel and Leverrier, but they were always supposed to be stars. Uranus is known to have been observed by Flamsteed between 1690 and 1715, and Neptune by Lalande in 1795.

In astronomical tables, almanacs, &c. the planets are for convenience denoted by symbols instead of their names, as follows: Mercury, ☿; Venus, ♀; Earth, ⊕; Mars, ♂; the Planetoids, in the order of their discovery, ①, ②, ③, &c.; Jupiter, ♃; Saturn, ♄ or ☽; Uranus, ♅; Neptune, ♆ or ⯉; the Sun, ☉; the Moon, ☾.

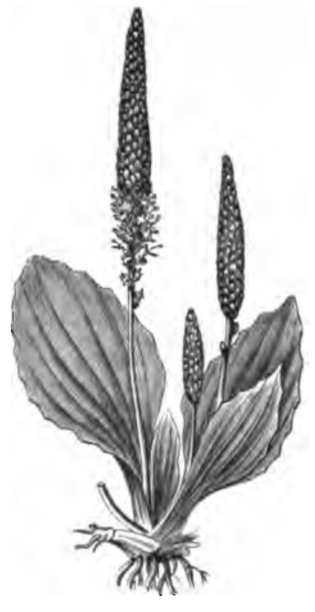
Minor Planets, the name given to that numerous group of very small planets which is situated in the solar system between Mars and Jupiter. Till the 19th century they remained undiscovered; but for some years before their existence had been suspected, mainly owing to the remarkable hiatus in the series of the planetary distances when compared with the law of Bode (q.v.). On 1st January 1801 the first of them (Ceres) was detected by Piazzi of Palermo, and his success roused his brother astronomers to search for more planets. Their search was successful, for Olbers (q.v.) discovered two (Pallas and Vesta) in 1802 and 1807, and Harding one (Juno) in 1804; but, as all researches for some time subsequent to 1807 were unavailing, astronomers gradually allowed themselves to settle down into the belief that no more planetoids remained to be discovered. But the detection of a fifth (Astræa) by Hencke in 1845 revived the hope of fresh discoveries, and from this period no year (excepting 1846) has passed without adding to the list. The number known at the beginning of 1851 was 13, of 1861 was 62, of 1871 was 112, of 1881 was 219, of 1891 was 299. This remarkable success of the astronomers of our time is due to the systematic manner in which the zodiacal belt has been explored, and the place and apparent size of every star of this region distinctly determined; so that the presence of a wandering body can at once be detected. Among the most successful of the discoverers of planetoids have been Palisa of Vienna, and C. H. F. Peters (1813–90) of Hamilton College, U.S. The former, since 1872, has discovered more than 70, on one occasion as many as five in a week; while the latter, after 1861, discovered 48.

The magnitudes of these celestial bodies have not been accurately ascertained, but it is certain that they are exceedingly small as compared even with Mercury, the least of the other planets; the diameter of the largest among them being generally believed not to exceed 450 miles, while most of the others are very much smaller than this. They also differ, generally speaking, from the rest of the planets in other respects; their orbits are of greater eccentricity, are inclined to the ecliptic at a greater angle, and are interlaced in a most intricate manner, crossing each other so frequently as to form, when viewed perpendicularly, a kind of network. The consequence of this is that a planetoid which is nearest the sun at one part of its orbit is, when at another part of its orbit, farther from it than are several of the others, and a mutual eclipsing of the sun at different periods by two planetoids must be of very frequent occurrence. The mean orbit of the first 251 planetoids coincides, however, within 30′ with that of Jupiter. Of the planetoids of which the elements had by 1891 been satisfactorily calculated, Medusa (No. 149) has the shortest period of revolution, 1137·69 days, and Hilda (No. 153) the longest, 2869·92 days. The corresponding mean distances from the sun, expressed in parts of the earth's mean distance, are respectively 2·13275 and 3·95228. Till 1876 the extremes known in this respect were Flora and Sylvia respectively. The nearest approach to the sun is made by Phocea (perihelion distance, 1·787). Freia recedes farthest from him (aphelion distance, 4·002). Polyhymnia's orbit has the greatest eccentricity, amounting to 0·33998; Lomia's the least, 0·2176. Massalia's orbit makes a smaller angle—only 41′ 7″—with the ecliptic than that of any other planet in the solar system, while the inclination of the orbit of Pallas is no less than 34° 42′ 41″. After the first two or three of these bodies had been discovered the opinion was propounded by Olbers that they were but the fragments of some large planet; and this hypothesis received corroboration from the intimate connection which was shown to subsist among them; but of late years it has fallen out of favour with astronomers. Some infer that the planetoids are best accounted for by the nebular hypothesis. It has been calculated that the combined mass of all the planetoids cannot exceed one-fourth of the earth's mass.

For a Table of the periods, distances, size, density, &c. of the planets, see SOLAR SYSTEM. See also PHOTOGRAPHY, and SPECTRUM.

Plani'meter, a machine for measuring areas on a plane. The best-known form is that of Professor J. Amsler-Laffon of Schaffhausen, the theory of which will be found discussed in Williamson's *Integral Calculus*, and in Minchin's *Uniplanar Kinematics*. It consists of two rods hinged together. The extremity of the one rod is fixed, so that the free extremity of the other is able to trace out any form of curve limited only in size by the dimensions of the apparatus. The theory of the instrument depends upon the fact that, as the free end is made to trace out the boundary of any closed area, the hinged end oscillates to and fro along a curve, but traces out no area. Rigidly attached to the rod whose one end traces out the plane area is a graduated roller fixed with its axis of rotation parallel to the line joining the hinge and the tracing point. As the closed curve is being described the roller rotates because of the lateral movement of the rod; and the difference of the readings before and after the tracing has been accomplished gives a number proportional to the area that has been gone round. To Amsler-Laffon also is due a more elaborate form of integrator capable of measuring moments of inertia of areas. It greatly facilitates the calculation of displacements, metacentres, and curves of stability in naval designing.

Plantagenet, the surname of an Angevin family which in 1154 succeeded in the person of Henry II. to the throne of England on the extinction of the Norman dynasty in the male line, and reigned till 1485, when the battle of Bosworth gave the crown to the family of Tudor. The name was first adopted by Geoffrey, Count of Anjou, husband of Matilda, the daughter of Henry I., from the badge of a sprig of broom (*planta genista*) which he wore in his bonnet; and Henry I. is the only king to whom Mr Freeman would allow the name. The Plantagenet kings were Henry II., Richard I., John, Henry III., Edward I.–III., Richard II., Henry IV.–VI., Edward IV.–V., and Richard III. See the separate articles on these names; also, for the great struggle between its two rival branches, the article ROSES (WARS OF THE). Miss Norgate's *England under the Angevin Kings* (2 vols. 1887) is an altogether admirable history of the Plantagenet period as far as the reign of John.



Greater Plantain (*Plantago major*).

Plantain. For the tropical plantain (*Musa*), see BANANA. The English plant so called belongs to the Plantagineæ or Plantaginaceæ, a natural order of exogenous plants, mostly herbaceous and without stems; the leaves forming rosettes, flat and ribbed, or taper and fleshy; the flowers usually in spikes, and generally hermaphrodite; the calyx 4-parted, persistent; the corolla hypogynous, membranous, persistent, its limb 4-parted; the stamens four, inserted into the corolla, with long filaments; the ovary free, of a single carpel, 1—4-celled; the cells containing one, two, or many ovules; the fruit a membranous capsule with a lid. The *testa* of the seeds abounds in mucilage, which is easily extracted by boiling water. There are about 120 known species, diffused over all parts of the globe, but most abundant in temperate and cold countries. The most important genus is Plantago, the species of which often receive the English name Plantain. Five of this genus are found in the United Kingdom, the chief of which are the following: the Greater Plantain, or Waybread (*Plantago major*), one of the most common of British plants; a perennial, with broad ovate stalked leaves and long cylindrical spikes, growing in pastures, waysides, &c. It is very widely diffused over the world. Its seeds are a favourite food of birds, and the gathering of the spikes to feed cage-birds is familiar to every one. The leaves are applied to wounds by the peasantry in many districts. They are said also to be a useful application to ulcers and indolent scrofulous tumours. —The Ribwort Plantain, or Ribgrass (*P. lanceolata*), is another very common British plant, forming no small part of the herbage of many meadows and pastures, and sometimes sown by farmers, but with doubtful wisdom. Its leaves are lanceolate, and taper at both ends; its spikes are short, ovate or cylindrical, and placed on long angular stalks. Its seed is acceptable to cage-birds. This is the plant commonly known as 'bullies,' or 'sodgers,' the striking off the heads (or spikes) of which is such a favourite amusement of children.—The mucilage of the seeds of *P. ispaghula* and of *P. psyllium* is much used in India in catarrhs and other complaints; and *P. psyllium*—called Fleawort, and its seeds Fleaseed—is cultivated in France for the sake of this mucilage, which is used by paper-stainers in preference to that obtained from linseed, and is also extensively used by muslin manufacturers for stiffening their goods. The plant has a branched spreading stem, and recurved leaves.

Plantain-eaters (*Musophagidæ*), a family of Pie-like birds, of African distribution, arboreal habits, and vegetarian diet. The species of Musophaga are bluish black, the Turacous (Turacus) are light green with carmine wing-feathers. This occurrence of a green pigment (turacoverdin), as distinguished from a green colour, is unique among birds, and the carmine pigment (turacin) is also interesting because it seems to be partially washed out during the rainy season.

Plantation. See ARBORICULTURE. 'His Majesty's Plantations' was a not unusual term in the 17th and 18th centuries for the British settlements in America, to which it was customary to transport offenders, political and other, till the American Revolution. See PRISONS, TRANSPORTATION.

Plant-houses are garden structures designed for the protection and cultivation of the plants of warmer climates than our own. Apart from the style of architecture, a plant-house must be so constructed as to admit a maximum of light to the interior; there must also be ample provision for ventilation, and means for maintaining such atmospheric temperature as is necessary to the plants that are to be cultivated in it. Glass, wood, and iron are the materials of which plant-houses are made. Masonry is not essential in the erection of plant-houses, but it is very generally employed to give stability, durability, and architectural effects. Glass obviously is the most important material: the larger the amount of it that enters into the structure of a plant-house the better adapted will it be for the cultivation of plants; the means for securing the maximum of light is thereby provided, and its regulation is then under the control of the cultivator.

Under the term plant-house is included every kind of horticultural glass erection employed in the culture of flowering and ornamental plants, as distinguished from those which are devoted exclusively to the culture of fruit-trees or other plants that are grown solely for the sake of their fruit. They are broadly divided into three classes —viz. hothouse or plant-stove, intermediate house, and greenhouse. The structure of each class may be the same in all respects except in the power of the heating apparatus. In the hothouse it must be adapted to create and sustain tropical temperatures irrespective of the temperature of the outer air; in the intermediate house the heat of extra-tropical and temperate countries must be provided; and in the greenhouse all that is required of the heating apparatus is the exclusion of frost or the maintenance of a minimum temperature of 40° F. Hothouses are either dry or moist, according to the class of plants to which each may be devoted; the natives of dry tropical regions and those of maritime lake and river districts severally requiring special adaptations in connection with the heating apparatus for providing atmospheric humidity. Thus there may be tropical orchid-houses, tropical fern-houses, tropical aquatic-houses—the latter being fitted with tanks of heated water, in which Victoria regia, Nymphæas, and other aquatic plants of the tropics are cultivated; but the more common class of stove is that in which the internal arrangements are made with the view of accommodating a large variety of plants, having considerable diversity of constitutional requirement. The intermediate house may be subdivided in the same way into the cool orchid-house, the cool fernery, &c.; but more commonly it is adapted to the wants of miscellaneous plants, and very often indeed it is used temporarily for tropical plants during their period of rest, when a lower temperature and less humidity than those of the stove are desirable. The greenhouse may be a heath-house if exclusively devoted to the culture of Cape heaths (Erica) and kindred plants, or it may be a New Holland house, if its inhabitants are chiefly composed of the interesting natives of New Zealand, Tasmania, and other temperate parts of Australasia.

The conservatory is a plant-house in which a miscellaneous collection of plants, after having been grown elsewhere, is placed in order to display the beauty of flowers and foliage. It may be either cool or hot, according to the classes of plants accommodated in it. Being usually a place of resort, or a lounge accessible from the drawing-room or some other part of a mansion, its architectural features should be in harmony with those of the building of which it forms a part; but due regard should also be had, in deciding upon architectural details, to the providing of ample light, and the means of securing perfect ventilation. The propagating house is a plant-house devoted to the purpose of rearing the several classes of plants indicated in the foregoing, either by seeds, cuttings, grafting, or any other mode that may be required in particular cases. It may be heated or cool, and differs from the ordinary plant-house chiefly in being more restricted in atmosphere. It is fitted with close glass-cases, fixed or portable, for the purpose of preventing exhaustion, by the atmosphere, of cuttings and other subjects temporarily destitute of roots. An essential feature of the internal arrangements of the propagating house is a bed or beds filled with sand, cocoa-nut fibre, or any other cleanly material, in which the pots containing cuttings may be plunged at will, to prevent evaporation from their sides and fluctuations of temperature in their contents. These beds are usually provided with hot-water pipes, tanks, or flues below, for the purpose of giving bottom heat when required.

See also FORCING, GARDENING, HOTBED, ORCHIDS, PEACH, VINE, &c.; S. Wood, *Forcing Gardening* (1881); Fawkes, *Horticultural Buildings* (new ed. 1886); Rivers, *The Orchard House* (1881); and other works by Baines (1885), Hibberd (new ed. 1880), May (new ed. 1888), and Williams (new ed. 1883).

Plantigrades. See BEAR, CARNIVORA.

Plantin, CHRISTOPHE, an eminent printer, was born at St Avertin, near Tours, in 1514, and settled as a bookbinder at Antwerp in 1549; some six years later he began to print. The books that came from his office are distinguished for their accuracy and beautiful workmanship and finish. His business prospered, and he had often twenty presses or more in active operation at once. The most noted of all his publications is the *Biblia Polyglotta* (8 vols. 1569–73), which was printed under the personal superintendence of Arias Montanus, the court chaplain of Philip II. of Spain. Plantin's editions of the Bible in Latin, Hebrew, and Dutch, and editions of the Greek and Latin classics, are scarcely less celebrated. He died at Antwerp, 1st July 1589. He had set up printing-establishments in Leyden and Paris, and these, with that in Antwerp, were carried on by the husbands of his daughters. His office in Antwerp remained in the possession of the family of John Moretus, his son-in-law, until it was bought by the city in 1876 for 1,200,000 francs; out of it was created the 'Musée Plantin' (1877).

See Life by Max Rooses (in French, Antwerp, 1882); Backer and Ruelens, *Annales de l'Imprimerie Plantinienne* (Brussels, 1865); Degeorge, *La Maison Plantin* (3d ed. Paris,. 1886); and *Correspondance de Plantin* (edited by Rooses, Ghent, 2 vols. 1884–86).

Plant-lice. See APHIDES.

Plants. It is not possible to frame a complete definition of a plant as opposed to an animal; the most obvious distinction is that a plant is fixed, while an animal moves; and though it is quite true that plants form that kingdom of nature which is characteristically passive in its life, while the animal life is more vigorous, yet there are many animals, such as a sea-anemone, which are as fixed as a plant; and all plants are sensitive to the sun's rays, and move in response. Nor can we make a formal distinction between them in terms of the food they require; for although it is true that plants live upon simple unorganised materials, the salts and water of the soil, and the carbonic acid and oxygen of the air, and indeed serve as the source of all food for animals, yet there are many parasitic plants which live on the juices of other living creatures. What chiefly makes such a definition impossible is that at the bottom of the ladder of life there are innumerable living creatures which it is a mere formality to call either plants or animals. From such creatures as these it is possible that the two great kingdoms of nature have been evolved step by step in constantly diverging lines. But the diversity of nature of plant and animal life is such that they are mutually helpful to each other; plants having the means of feeding upon the carbonic acid of the air, using the carbon and giving out the oxygen, thus forming matter for the life of animals, who in return, by breathing out carbonic acid, help to keep the air in a fit state for plants. This mutual relation of the two kingdoms finds another expression in the aid that insects and some birds give to the higher plants, for in their search for honey they become covered with pollen, and carrying it from flower to flower secure cross-fertilisation; while it is probable that the bright colours of flowers have been to a certain extent evolved by the natural selection which the insects who visited them have exerted, by going more often to those of the brighter colour.

For the classification of plants and list of allied subjects, see BOTANY; for their life-processes, see VEGETABLE PHYSIOLOGY; see also the articles AGRICULTURE, BIOLOGY, CULTIVATED PLANTS, FIBROUS SUBSTANCES, FLOWER, GARDENING, and those on the great groups of plants—ALGÆ, CONIFERÆ, CYCADS, FERNS, FUNGI, &c.

MOVEMENTS OF PLANTS. The movements of plants may be divided into (1) those that take place during growth, including growth itself, many of which are common to all plants; and (2) those that may be seen in mature plants—these are rather the exception than the rule. The whole matter is fully treated in the article on Vegetable Physiology (q.v.); here a short and general account will be given.

Growth, in its rate and direction—the direction being really determined by the relative rate of various parts—is influenced by many factors; the effects of temperature, light, gravitation, and moisture are well marked.

Temperature.—There is a certain temperature at which growth is most rapid, also a minimum and a maximum at which it ceases; these points are different for different plants.

Light.—The formation of chlorophyll and therefore of starch depends, in nearly all cases, upon light, but that light generally retards *growth* may be seen by the long stems of plants grown in the dark, and by the bending of plants grown in a window towards the light. In a few cases, as in the older parts of the stems of ivy, growing parts turn away from the light. The rays towards the blue end of the spectrum are the most powerful in their effect upon the direction of growth.

Gravitation.—Stems generally grow upwards and roots downwards; that this is an effect of gravitation is proved by the following experiments. Place a seedling in a horizontal position; the growing tip of the stem will turn upwards and that of the root downwards. Rotate a plant slowly in a vertical plane, so as to cause the direction of gravitation to alter constantly; the direction of the growth of stem and root is irregular. Rotate a plant very rapidly, so as to introduce the so-called centrifugal force; the stem will grow towards the centre, that is, in the direction *opposite* to that of the acting force, and the root away from it, that is, *in* the direction of the acting force.

Moisture.—Roots always grow in the direction of the greatest moisture. This effect is a stronger one than that of gravitation, for if seeds germinate in a sieve filled with damp sawdust the roots at first grow downwards until they have grown through the sawdust out into the dry air; then the direction of growth changes, and the tips bend round and grow up again into the damp sawdust.

'Spontaneous' Movements of Growing Plants.—There are other movements of growing parts the causes of which are not well understood. Thus, the leaves of a young bud are kept close together, bent over the tip of the stem, by the more rapid growth of their under than of their upper surfaces. When the bud is older the upper surfaces of the leaves begin to grow more quickly than the under surfaces and the leaves unfold. Such movements are spoken of as nutations. The tips of climbing stems describe a 'circumnutation' due to successive alterations in the rate of growth of the sides of the stem. It is in virtue of these movements that such plants are able to climb by twining round a support. Tendrils have similar movements, but there are further complications (see VEGETABLE PHYSIOLOGY). All these movements are due to unequal growth of the parts of the plants.

The Movements of Mature Plants which we have now to describe are due to alterations in the turgidity of the cells. The exciting stimulus of some of these movements is known: it may be contact, light, temperature; in other cases it is obscure, as we have found to be the case with some of the movements of growing plants.

Contact.—The leaves of the Sensitive Plant (q.v.) droop when touched or shaken; the stamens of the Berberidaceæ, when touched, bend down and come in contact with the stigma. The tentacles of Drosera bend over, and the leaflets of Venus' Fly-trap close, when an insect alights upon them (see Insectivorous Plants).

Light and Temperature.—Many leaves—e.g. those of Mimosa and Oxalis—move up and down with variations of light and temperature. The sleeping and waking of plants—i.e. the folding of many leaves and flowers at dusk and their opening in the morning—are familiar examples of the effect of variations in external conditions.

Spontaneous Movements of Mature Plants.—The leaves of some few plants—e.g. the *Hedysarum gyrans*—rotate in the dark, while the leaves of Mimosa, Oxalis, and Trifolium move up and down. These movements are not seen in daylight, probably because they are obscured by the movements due to light. The movements of the leaflets of *Desmodium gyrans* are dealt with at Telegraph Plant. The plasmodia of Myxomycetes creep, Bacteria and Diatoms move in a way not yet understood, Volvox swims by means of cilia, the zoospores of Algæ and the antheroids of Mosses and Ferns swim after they have been set free.

Medicinal Plants.—The study of plants with genuine or fancied curative properties is as old as human thought and sickness. Even animals seek such medicines, and it must be remembered that our early ancestors were much more familiarly acquainted with fruits and seeds, roots and bulbs than are their more carnivorous descendants. But, while it may be contended that ancient medical treatment was in great part a natural return to more primitive vegetarian diet, it is obvious that men would be quick to profit by a wide and often costly experience of plants with special properties, poisonous and emetic, tonic and narcotic, excitant and sudorific. While botanical science is partly rooted in the garden, no small part of it has grown out of a primitive materia medica. Thus, in the writings of Hippocrates (460–377 B.C.) and those to which his name is extended 236 medicinal plants are recorded; the list swells in the works of Aristotle (387–322 B.C.) and Theophrastus (371–286 B.C.), while the 'Materia Medica' of Dioscorides (born in the 1st century A.D.) includes the names and partial descriptions of about six hundred. His work remained authoritative for fifteen centuries, and was continued on the one hand through the herbalists like Gerard and Culpepper into the botanical side of the modern pharmacopœia, on the other hand through such early botanists as Cæsalpinius into the independent—doubtless too independent—science of botany.

In connection with medicinal plants there are many interesting chapters of history with which the student should make himself acquainted—the weird stories of the old traffic in vegetable poisons; the magicians' use of narcotics and excitants; the mystical doctrine of Signatures (q.v.), according to which plants bore signs indicative of their virtues; the gradual decay of herb gathering and the loss of much of the ancient traditional lore; the persistent record of the old uses of plants in both technical and popular names, such as Pulmonaria, Sanicula, Tussilago, and wound-wort, scurvy-grass, gout-weed; the additions to the British flora by such importations as belladonna; the elimination from the modern pharmacopœia of many vegetable drugs whose value was only fanciful; the relegation of others to the list of spices; the modern discovery or rediscovery of the potencies of Calabar bean, cinchona, coca, and many more.

See Botany, Materia Medica, Pharmacopœia; Woodville, *Medical Botany* (4 vols. 1793); Hayne, *Beschreibung der in Arzeneikunde gebräuchlichen Gewächse* (1805–46); Nees von Esenbeck, Weihe, Walter, and Funke, *Sammlung der officineller Pflanzen* (1821–33); Bentley and Trimen, *Medicinal Plants* (4 vols. Lond. 1877); Luerssen, *Medicinisch-Pharmaceutische Botanik* (Leip. 1877).

Diseases of Plants (*Phytopathology*). Scientific investigation of the diseases of plants has not till recently been so widely and systematically followed up as the economic importance of the subject deserves. Our knowledge, therefore, of the causes and of the conditions of disease in the vegetable kingdom is comparatively limited and imperfect. Enough is, however, known to establish the general conclusion that, though there is in many cases a close analogy between the diseases of plants and animals, the causes of disease are very different in their nature in the main. While bacteria and the allied Schizomycetes are recognised as the active agents in the development of disease in animals, parasitic fungi are now regarded as the chief cause of disease in plants. Wet rot in the potato, rot in the bulbs of the hyacinth and the onion, gummosis in the tomato, yellows in the peach, and pink decay in wheat may be cited as the principal diseases of plants at present ascertained to be caused by bacteria.

Parasitic fungi are extremely numerous, and are as varied in their action and peculiar in the parts they affect as they are numerous. Some attack the roots, others the stem and branches, while the flowers and even the several organs of reproduction and the fruit are each liable to be attacked by some particular parasite which induces disease. They are almost always local in their action, and it is very rare to find a case in which the whole organism of a plant is affected in the sense that man and other animals are said to be constitutionally diseased. Instances there are in varieties of cultivated plants of something extremely like constitutional proneness to disease. Certain varieties of peas and of wheat are extremely liable to mildew, and to become abortive or die of the affection. But such extreme cases are regarded as evidence rather of local or temporary conditions being favourable to an overwhelming distribution of the parasite and the consequent multiplication of the lesions than of the permeation of disease which takes place in the organism of animals on the introduction of a microbe into the blood.

Nor is heredity so generally recognised as a factor in predisposing plants to disease as it is ascertained to be in animals. The tendency already alluded to in some varieties of peas and wheat, and a similar tendency to canker in some varieties of the apple, and the greater liability of certain varieties of the potato to succumb to disease than others, would indeed appear to be attributable to hereditary predisposition in the individual kinds. But it is generally conceded that such peculiarities are indications only of constitutional weakness in the variety, not of any hereditary proneness to disease.

In the suddenness of outbreak and the rapidity with which they spread when they first appear in a country or locality, there is a strong resemblance in some plant diseases to certain epidemics in animals. And this resemblance is carried further in tracing the subsequent history of notable plant diseases. They appear, like epidemics in animals, to exhaust their extreme virulence after a time. The cases of attack may continue numerous and frequent, but the type is less severe, the disease wears itself out. The potato disease of 1845 has continued annually in greater or less severity since that time; but from that year, and the two or three years immediately succeeding, it has ceased to be so formidable. Other instances might be mentioned in illustration of this resemblance of remarkable plant diseases to epidemics among animals—the vine disease (*Oïdium*), the hollyhock disease (*Puccinia malvacearum*), the celery disease (*P. Apii*), all of which made their appearance suddenly with such virulence and widespread rapidity as to threaten extinction of the species attacked, but are now sources of neither trouble nor alarm.

The direct action of parasitic fungi in causing disease in plants is through the mycelium or spawn injuring the host plants either by depriving them of nourishment, by impairing their power of assimilation, or by abnormally accelerating or retarding growth. The extent of injury inflicted is extremely variable, in some cases exterminating in degree, and in others, though widespread and general, having little ill effect upon the health of the subjects. Adverse external circumstances—such as unsuitable temperature, excess of dryness or moisture in the air and in the soil, deficiency of light, the presence of deleterious elements in the soil or of noxious gases in the atmosphere—by debilitating the plants render them more liable to attacks of fungi, and aggravate their severity.

The effects of disease in plants are extremely various. One of the most common manifestations of the presence of parasitic fungi in the tissues is *hypertrophy* in the parts affected. This may be either local or general; the roots, the stems, the leaves are all liable to this peculiar disorder. Many of the conifers are particularly subject to hypertrophies in disease. The so-called *Cedar-apples* of the United States, which occur in great abundance on the branches of *Juniperus virginiana*, are caused by the spawn of *Gymnosporangium macropus*. They are reniform tumours, and, as has been pointed out by Professor Farlow, originate by the mycelium entering a leaf and growing downwards into the bark of the smaller branches. Its presence acts as a source of irritation to the cells. The stem and branches of *Juniperus communis* are subject to hypertrophies caused by the spawn of *G. clavariæforme*. This is frequently to be observed in Britain, and the enlargements are of a very persistent character, and in effect impede the supply of sap to the branches beyond them. Similar tumours occur on the branches of the silver fir, which are caused by the spawn of *Peridermium elatinum*. But the most remarkable example of hypertrophy in connection with the diseases of any of the conifers is that which occurs in the larch disease, which is caused by the spawn of *Peziza calycina*. The presence of the spawn threads in the cortex, cambium, and woody tissues causes their death; but hypertrophy of the tissues of the surrounding parts is set up. The death and fissuring of the bark of the affected parts follows in due course, and the branch attacked eventually dies, and sooner or later also the tree succumbs to the disease. There are many other examples of this form of plant disease, nor are they peculiar to ligneous plants, but occur in humble herbaceous subjects, such as the violet, garden and other species of anemone, ranunculus, and even in grasses; but space will not permit of more extended notice of particular cases.

'Finger-and-toe,' 'Anbury,' and 'Club-root' are the common names given to a disease which attacks the turnip, cabbage, cauliflower, and other members of the important natural order of Cruciferæ. It assumes the form of tumours on the roots generally, but they also appear on the bulb of the turnip. They increase in number and in size as the plants grow, but eventually the plants cease to develop and die; the tumours becoming fœtid masses, and leaving the spores of the fungus (*Plasmodiophora brassicæ*) in the soil.

Diseases of plants of traumatic origin are those which result as a consequence of wounds which may have been received by a tree or shrub. Nature may have succeeded in covering over the wound, and superficially all may appear well; but it often occurs that some fungus, perhaps harmless to the subject while its bark is intact, finds a lodgment in the wound, and sets up parasitic disease.

Canker, though most familiar to us upon the apple-tree, is not uncommon upon such trees as the oak, ash, elm, beech, &c. It is caused by the same fungus (*Nectria distissima*) in every case. Gummosis, which is similar to canker, is caused by *Gleospora gummifera*, which occurs in several forms. This destructive disease, it has been suggested, was caused by bacteria, but Beyrinck has conclusively settled the point by inoculative experiments. It is quite innocuous when inoculated into other trees, such as the apple, pear, oak, and maple.

Some parasitic fungi cause disease and death by fastening on the woody tissues of trees and shrubs when these are exposed by reason of wounds and bruises of the bark. The spawn penetrates gradually to the core of even the largest trees, and effects their decay and death. Unlike the microscopic species which induce disease by penetrating the herbaceous parts of plants, these wound parasites are mostly large conspicuous fungi. Examples are to be found on the ash and the elm in *Polyporus squamosus*, and in two species of Agaricus, *A. ulmarius* and *A. adiposus*, the latter attacking wounded ash and beech trees, and the former wounded elm-trees, while *A. ostreatus* attacks injured laburnums.

Rot or gangrene in the stems of fir-trees is caused by *A. melleus*, the mycelium of which finds its way into the woody tissues by the roots and gradually ascends the trunk, inducing decay either in the form of moist or dry rot.

Atrophy occurs in the pine, in wheat, and in other plants in consequence of attacks of various minute parasitic fungi. *Uredo pinitorquum* attacks the pine tribe, and by arresting the flow of sap at the points attacked starves the branches beyond, causing sterility and eventually death. In like manner *Puccinia graminis* attacks the straw of wheat, and renders the ear abortive. But sterility is also caused by parasitic fungi attacking the organs of reproduction directly. Certain species attack the male organs only, as *Ustilago violacea*, some, such as *Thecaphora hyalina*, affect only the female organs, while *Ustilago carbo* effects the destruction of all the floral organs.

A singular feature in the economy of many of the minute parasitic fungi is that in one stage of their existence they are capable of living only on one kind of host plant, and at another stage on a species quite distinct; so distinct indeed, as in the case of the Puccinia above named, that in one form it attacks the barberry and in another stage wheat. It has long been a matter of common observation among farmers in Britain, on the continent of Europe, and in parts of the United States, where the common barberry has been introduced, that the proximity of that shrub to wheat-fields had some mysterious connection with mildew in wheat. In the state of Massachusetts a law was passed in 1760 enjoining the extirpation of the shrub, in consequence of the belief that it caused or at least intensified the wheat disease. The problem was solved by the late Professor De Bary in 1864, who, by placing the promycelial spores of the Puccinia (wheat-mildew) on the barberry produced *Æcidium berberidis*, the mildew which frequently attacks that shrub. Since that time De Bary, Hartig, Plowright, and others have demonstrated that sixty or more species of these minute parasites have this heterocismal habit, and further investigation will doubtless reveal many more.

Cures for plant diseases are as yet empirical rather than scientific. In many cases the subject affected is fatally smitten before evidence of disease is visible. Mildew, which is one of the most common phenomena of plant disease, is the fructification, the final stage, of the parasite. The mycelium, whence the mildew springs, is working its deadly function on the plant in parts which external remedial applications cannot effectively reach. In many cases of plant disease the affected subject dies without any apparent cause; investigation after death may discover it, but too often also it reveals the fact that our knowledge does not enable us to prescribe a cure. Internal remedies and the means of exhibiting them are yet undiscovered. Soot, sulphur, soap are safe external remedies for mildew—that is, they destroy the pest without injuring the foliage on which it preys—but do not always eradicate the disease. *London Purple* and *Paris Green*, both having copper for their base, are very effectual external remedies, but require to be used with great caution, as they are dangerous to plant-life. There are many other preparations and compounds obtainable which are more or less effectual in destroying parasitic fungi, but the only safeguard against attack appears to be the maintenance of the plant in perfect health. By intelligent culture—that is, by surrounding the plant with those conditions of soil and atmosphere essential to its healthy existence—disease may be prevented, except it is epidemic or all-pervading, as in the case of the potato disease.

There are separate articles in this work on plant-diseases at Anbury, Ergot, Raphania, Rust, and under the names of the plants affected—e.g. Potato; and on the various insect-pests which induce diseased conditions, such as the Aphides and Phylloxera. See also Parasitic Plants; Sorauer, *Handbuch der Pflanzenkrankheiten* (2d ed. 1886); Frank, *Die Krankheiten der Pflanzen* (1880); Hartig, *Lehrbuch der Baumkrankheiten* (1882); Coste, *Phytotomie Pathologique* (1877); J. Paget, *Elemental Pathology* (1880); Professor H. Marshall Ward, *The Diseases of Plants* (1889); and Professor Plowright in the *Gardeners' Chronicle* for 1891.

Plant-lore. Apart altogether from the more or less vague and valueless symbolism, direct or indirect, understood as the Language of Flowers (q.v.), there is an abundant store of traditionary lore associated with all kinds of trees, plants, and flowers. The study of this throws much light on many puzzling survivals in popular folklore, and Mannhardt (1831–80) and Mr J. G. Frazer have shown its importance for part of the problem of primitive religion. It is not infrequent among Australians and Red Indians to find the Totem (q.v.) taking the form of a plant or tree, and for these the individual shows his reverence by refusing to gather or destroy them. We find the worship of trees widely prevalent among savages everywhere, and we have ample evidence that it was an important element in the religion of all the families of the Aryan stock. Grimm thinks the oldest sanctuaries of the Germans were natural woods, and hints at a historical connection between the ancient sacred inviolate wood and the later royal forest—a ludicrous descent from the god to the game-preserver. The oak-worship of the ancient Druids, the sacred fig-tree of Romulus in the centre of Rome, the *Ficus religiosa* of India, and the sacred groves of the Semitic and pre-Semitic races still surviving at Carthage a century after Augustine are ready examples of tree-worship from sufficiently wide centres of civilisation. The primitive mind of the savage readily conceives of a tree as animated by a conscious soul cognate with his own, and he may regard the tree either as its permanent outward organism or merely its characteristic dwelling-place. Hence trees have their place in the doctrine of fetichism, of idolatry, and the upward development of religion. Buddhists do not include trees among sentient beings possessing mind, but recognise the existence of the genius of the tree, and Buddha himself was such as often as forty-three times during his transmigrations. The reverence paid to the famous Bo-tree (q.v.) shows how fundamental a fact is tree-worship, which undoubtedly formed a large part of the old indigenous religion amalgamated by the new philosophical faith. But none the less are the sacred tree and grove to be found within the range of Semitic and Aryan influences, and the obstinate revival, even under the shadow of purer rites, of the Canaanitish Ashera worship proves how deeply they were rooted in the old religion of the land. From all sides we find evidence at once of the great antiquity and uniformity of the worship of trees, whether for the services they render to man, for their venerable antiquity, their form, for particular qualities ascribed to them as containing the seeds of fire, for their situation, as on sombre and lonely mountain-tops, or for their association with certain phenomena, as plagues and pestilences, or certain events in the history of the homestead. In the growth, life, decay, and death of the plant the primitive man easily sees an analogue to his own life-history, and herein we may find the philosophy of the widespread rustic rites associated with marriage and with the birth of children. The custom of scattering flowers and the fruits of the field over the footsteps of a newly-married pair conveys an obvious reference to the belief in the reproductive powers of vegetation and to the fundamental postulate of all sympathetic magic that any effect may be produced by imitating it. Primitive ideas of the fertilising and fruit-bearing powers of nature led easily, according to Mannhardt, to the belief that each tree or plant possesses spiritual as well as physical life, being tenanted either by semi-divine spirits or by the ghosts of the dead; and a natural generalisation of this notion made plants and trees collectively the abode of particular inhabitants—an example of animism developing into polytheism. A forest-god has been deduced from a mere tree-soul, both alike regarded as powerful to produce rain or sunshine, to cause fruits to spring and cattle to easily bring forth their young. A still higher generalisation gave a belief in a genius of plant-life or forest-life, or, higher still, a genius of growth or fertility in general. This universal genius of growth was symbolised by a bush or tree, brought in triumph from the forest, gaily decked, and solemnly planted near the homestead or in the village. We have thus seen both the spirit incorporate in the tree, suffering and dying with it, and the tree considered as the mere dwelling-place of the god; but still further in many cases we find the tree-spirit regarded as detached from the tree, and, through a confusion of his vegetable and anthropomorphic representations, clothed in human form as a man or a girl decked with flowers—the May King, Queen of the May, the Old Woman or Corn-mother of German harvest-fields, the Jack in the Green of young London sweeps, and the like. The existence of those Corn-spirits which especially haunted and protected the waving corn we see dimly recognised in characteristic ceremonies of an English harvest-home, and in the German custom of leaving the last sheaf of rye in the field as a tribute to the Roggenwulf. The French and German custom of the Harvest May, in which a branch or tree decked with ears of corn is carried home in the last wagon from the harvest-field and hung on the roof of the farmhouse till next year, is closely cognate with the *eiresione* of ancient Greece, and suggests a parallel with some of our own old harvest customs.

Sympathetic affinities between plant and animal life strongly impress the primitive imagination; we find them playing an important part in many cosmogonies, as in the Iranian account of how the first human pair grew up as a single tree, the fingers or twigs of each one folded over the other's ears, till the time came when they were separated, and infused by Ahuramazda with distinct human souls. Other mythical cosmogonic trees that need only be named are the heavenly fig-tree of the Vedas, and the ash-tree Yggdrasil of Norse mythology. In some places trees are informed when their owner dies, and an apology formally made to them by the woodcutter before he fells them; and every one is familiar with the custom of planting a tree at the birth of a child, and the notion of a sympathetic relation subsisting throughout life betwixt the two. The trees planted by Queen Victoria on her visit to an English town, and the Trees of Liberty planted to mark a new political régime, convey unconsciously a survival of the same sympathetic symbolism. The belief that a child's rickets can be cured by passing him through a cleft ash-tree still lingers obstinately in corners of England, and stories of trees giving forth human groans and exuding human blood are common in folk-tales everywhere. Even so late as 1870, in Oxfordshire, a gypsy woman told how Fair Rosamond was changed into a 'Holy Briar,' which bleeds if one plucks a twig. Families, as well as individuals, have tutelary or guardian trees, and Hytén-Cavallius, for example, tells us that the three families of Linnæus (or Linné), Lindelius, and Tiliander were all called after the same tree, an ancient linden or lime which grew at Jonsboda Lindergord. When the Lindelius family died out one of the old lime's chief boughs withered; after the death of the daughter of the great Linnæus the second main bough fittingly bore leaves no more; and when the last of the Tiliander family expired the tree's active life came to an end, though the dead trunk still exists and is highly honoured.

We see then how natural is the notion of symbolising the genius of vegetation under the form of a tree, and thus, as has been shown, we find some hint at the real philosophy underlying the joyous old-world May-day usages, the Maypole decked with streamers, round which young men and maidens danced in chorus, and not less the high ceremonies attending the harvest-home. Even our Christmas-tree, which originally made its way into England and France principally through the influence of Prince Albert and the Duchess Helen of Orleans, is really nothing but a survival of an ancient German custom of heathen origin, and we may safely disregard the foolish theory of its being Christian because the 24th of December chances to be consecrated to Adam and Eve. One legend relates how Adam brought from Paradise a fruit or slip from the Tree of Knowledge, from which sprang the tree from which the Cross was made—an example of a process of myth-making after the fact to which we owe not a few beliefs and customs not understood. But many plants have received a kind of religious consecration from the name of some saint whose festival fell on the day on which they were gathered. And Christianity, like Buddhism, early showed a marvellous adaptability in the way in which it adopted popular rites of an earlier religion, and subtly rebaptised them as its own. Many remnants of primitive superstitions survive in the local English names of plants and flowers, chiefly in connection with the fairies, the devil, the Virgin, and the Cross, and we have a great wealth of association from one cause or other between saints and flowers, as St Agnes with the Christmas rose, St Joseph of Arimathea with the Glastonbury thorn, St Patrick with the shamrock, the Virgin with the white lily, just as Thor had his oak-tree, Venus her myrtle, the Indians the lotus, and the Druids the mistletoe. Again, historical personages and families are frequently associated with particular flowers—it is enough merely to name the orange-lily, the red and white roses, the fleur-de-lis, the *planta genista*, and the violet. Family and clan crests frequently take this form, as the fir, holly, juniper; also national badges, as the rose, thistle, shamrock. More curious and interesting, although obscure, are the notions of magical properties connected as persistently with some plants as medicinal properties are with others. Most prominent in European folklore are the elder, the thorn, and the rowan or mountain-ash; but strange properties are still ascribed to the rosemary, vervain, St John's wort, mandrake, asphodel, and to fern-seed; and many flowers lend themselves through some obscure inherent fitness to special methods of divination. The doctrine of Signatures (q.v.), of such importance in the history of medicine, opens up a special chapter of sympathetic magic, involving the belief that plants bore by nature marks indicating plainly for what diseases they were medicinally useful. The trees of Paradise, of Chaldæan and other cosmogonies, the oracular oaks of Dodona, those trees of healing spiritually allegorised in the Apocalypse, the trees of Liberty of the French Revolution, and the trees round which an Indian bride and bridegroom walk hand in hand, point as unmistakably to a real sympathetic affinity between the human and the vegetable world as did the Dryads, Fauns, and Satyrs of the ancient Hellenic mythology, with their analogues our own elves and fairies of the woods, the transformation-myths, the Orpheus whose lyre laid its charm on beasts and trees alike, or the Pan at the report of whose death all nature mourned aloud.

See W. Mannhardt, *Roggenwulf und Roggenhund* (Danzig, 1865), *Die Korndämonen* (Berl. 1868), *Der Baumkultus der Germanen und ihrer Nachbarstämme* (Berl. 1875), *Antike Wald- und Feldkulte* (Berl. 1877), and the posthumous *Mythologische Forschungen* (Strassb. 1884); A. de Gubernatis, *La Mythologie des Plantes* (2 vols. Paris, 1878–82); M. von Strantz, *Die Blumen in Sage und Geschichte* (Berl. 1875); H. Pfannenschmid, *Germanische Erntefeste im heidn. u. Christl. Cultus* (Hanover, 1878); Rev. Hilderic Friend, *Flowers and Flower-lore* (1884); V. Jahn, *Die Deutschen Opfergebräuche bei Ackerbau und Viehzucht* (Breslau, 1884); and J. G. Frazer, *The Golden Bough* (2 vols. 1890). The last work contains a distinct contribution of the greatest value to a scientific knowledge of the worship of vegetation, but it seems probable that a serviceable enough theory has been carried too far, and at any rate many of its conclusions remain to be tested by the fresh generalisations of a later day. Its starting-point is the mysterious story of the Arician lake, well known through Turner's picture and the allusion in Macaulay's *Lay of the Battle of Lake Regillus*. The lake occupies the site of the ancient sanctuary of Diana Nemorensis. In its grove grew a sacred tree, from which whoever succeeded in breaking off 'the Golden Bough' had the right to challenge the priest of the sanctuary to single combat, and, if victorious, to reign in his stead. Mr Frazer sees here a survival of ancient tree-worship, the priest being an incarnation of the spirit of the tree, which passed continuously on his being killed into a new and more vigorous incarnation. He finds it also an evidence of primitive human sacrifice, and identifies the Golden Bough with the mistletoe growing on the oak—the only thing in nature which could bring Balder to his doom. He has with unequalled learning and ingenuity traced many cognate customs in classical antiquity, as well as parallels in our modern rustic spring and midsummer customs, and finds the same significance of the death and resurrection of vegetation under the various forms of the Greek myth of Demeter and Persephone, the Syrian Astarte and Adonis, the Phrygian Cybele and Attis, the Egyptian Isis and Osiris.

Planudes, MAXIMUS. See ANTHOLOGY.

Planula. See HYDROZOA.

Plasencia, a decayed town of Spain, in Estremadura, 130 miles W. by S. of Madrid and 43 NE. of Caceres, is surrounded with double walls (1197), has a fine Gothic cathedral (1498), and a pop. of 7090. The monastery of San Yuste, to which Charles V. retired after his abdication, lies 24 miles to the east of Plasencia.

Plasma, a rare siliceous mineral, a variety of quartz or chalcedony, of a dark-green colour, black when unpolished and seen by reflected light, but very translucent when held between the eye and the light. It is very nearly allied to heliotrope or bloodstone, but has no red spots, is more translucent, and is not susceptible of so brilliant a polish. The name is also used in biology for the simplest form of organised matter in vegetable and animal bodies, out of which the tissues are formed, especially of the blood-plasma. See BLOOD.

Plasmodia. See CELL, MYXOMYCETES.

Plassey (*Palási*), a battlefield on the Bhágirathi River, 96 miles N. of Calcutta. The river has now eaten away the scene of the struggle. Plassey is celebrated in the history of India for the great victory gained by Clive over Suraj ud Dowlah, subahdar of Bengal, 23d June 1757, a victory which really laid the foundation of British supremacy in India. See CLIVE.

Plaster. See CAST, GYPSUM, BUILDING.

Plastering, the art of covering the internal faces of walls, the partitions, and the ceilings of a house or other building with plaster. It is difficult to get plaster to keep completely dry on the inside faces of external walls unless they are first covered with lathing (narrow strips of wood, see LATH). Ceilings and wooden partitions are always lathed so as to hold or key the plaster. Plastering is sometimes done in two, but most usually in three coats. The first or foundation coat is formed of lime and sand (mortar) mixed with hair. This is called *pricking* if done upon lath, and *rendering* if it is spread on a bare brick or stone wall. It is crossed with deep incised lines to key the second coat, which consists of fine lime mixed with some coarse plaster of Paris (see GYPSUM) *floated* on. The first coat should be completely dry before the second is added, but the latter is generally still a little damp when the third coat or *set* is put on. This last coat is usually composed of a mixture of fine lime, plaster of Paris, and a little size, and is worked so as to produce a very smooth surface. The implements used by the plasterer are chiefly trowels and floating tools, with running moulds for mouldings. Ceiling ornaments and other enrichments are formed of plaster of Paris cast in moulds. Mouldings are run in the same material.

Plaster of Paris. See GYPSUM.

Plasters are a class of medicinal agents consisting of 'adhesive substances, spread upon leather or cloth, so as to stick to the part of the body to which they are applied.' The plasters of the British Pharmacopœia owe their adhesiveness either to a combination of oxide of lead with fatty acids, or to the presence of a tenacious resin, or to both. The most important are lead plaster, or diachylon, which enters into the composition of many of the others; resin and pitch plasters; belladonna and opium plasters; mercury and ammoniacum and mercury plasters; and cantharides or blistering plaster. Some of the most tenaciously adhesive of plasters (not in the Pharmacopœia) are made with preparations of india-rubber. Court or sticking plaster, for dressing slight wounds, consists of a thin layer of isinglass spread upon silk, and differs from the others mentioned in requiring to be softened with warm water before it will adhere; Goldbeater's Skin (q.v.) is also used for the same purpose. They are employed with two distinct aims—viz. to act *mechanically*, as by affording artificial support to weak muscular structures, by preventing threatened or tedious excoriations, by protecting parts already excoriated from the action of the air, &c.; and to act *medicinally* as counter-irritant, stimulant, discutient, alterative, anodyne, &c.

Plastilina. See CLAY.

Plata, LA. See ARGENTINE REPUBLIC, LA PLATA, LA PLATA (RIO DE).

Platæa (Gr. *Plataiai*), a city in the western part of Bœotia, on the borders of Attica, and at the foot of Mount Cithæron, 6 miles from Thebes. In 480 B.C. it was destroyed by the Persians, because the inhabitants had taken part with Athens in the battle of Marathon; but in the following year it was the scene of the glorious victory won by the Lacedæmonian Greeks, under Pausanias and Aristides, over the Persian hordes commanded by Mardonius. In the third year of the Peloponnesian war (429) it was attacked by a Theban-Lacedæmonian force, and heroically defended itself for more than two years, until it was starved into surrender; the little garrison of about 200 men were put to the sword, and the city was razed to the ground. Such of the Platæans as escaped were hospitably received at Athens. By the treaty of Antalcidas (387) their children were allowed to go back again, and rebuild their city, after an exile of forty years; but they were again driven out by their implacable enemies the Thebans; and half a century elapsed before the victory of Philip of Macedon at Chæronea enabled the Platæans to finally return to their homes. After this the city remained inhabited, probably till the latest days of the empire. It is mentioned in the 6th century A.D.

Plate-marks. See HALL-MARKS.

Plate-powder, a composition of Rouge (q.v.) and prepared chalk used for cleaning gold and silver plate and plated articles. A gray plate-powder is also sometimes made by levigating quicksilver with twelve times its weight of prepared chalk; it puts a remarkable brilliancy on silver-plate, but is very injurious to it.

Plating signifies the covering of an inferior metal with one of the precious metals, the object being to give the appearance of silver or gold to articles chiefly intended for table use. Previous to the introduction of electro-plating (see ELECTRO-METALLURGY) the method generally pursued was *Sheffield-plating*—by means of a plating furnace—soldering on to one or both sides of an ingot of the baser metal a thin plate of silver. See also TIN-PLATE, GALVANISED IRON.

Platinotype. See PHOTOGRAPHY.

Platinum (sym. Pt; atom. wt. 197·4; sp. gr. 21·48 to 21·50) is one of the 'noble metals.' It is found only in the native state, usually occurring in small glistening granules of a steel-gray colour, which always contain, along with some gold, copper, iron, and sand, an admixture, in varying proportions, of several metals—iridium, rhodium, palladium, osmium, ruthenium—most of which are rarely found except in association with platinum. Sometimes, however, it is found in masses of the size of a pigeon's egg, and pieces weighing ten or even twenty pounds have occasionally been found. It was originally found in the Spanish gold-mines of Darien, but is now chiefly obtained from the Ural Mountains, though it has also been found in Brazil, Colombia, San Domingo, California, Oregon, Canada, and Borneo.

There are two modes of obtaining platinum in the form of ingots from the crude native metal, both of which require notice. The earlier method—Cocks's, usually attributed to Wollaston (*c.* 1800–28)—was to precipitate a solution in *aqua regia* by a solution of sal ammoniac; the precipitate on incineration gave spongy platinum, which was pressed into form and hammered hot, so as to form an ingot, which it happens to be able to do, since platinum welds like wrought-iron when not too highly polished.

Deville and Debray's method is first to form a fusible alloy of this metal with lead, by exposing the platinum ore—2 cwt. being used in a single experiment, with equal weights of galena and litharge gradually added, and a little glass to act as a flux—to full redness in a reverberatory furnace lined with clay. The sulphur of the galena is oxidised and expelled, and the liquid alloy of lead and platinum is allowed to rest for some time, to allow the osmide of iridium, which is not affected by the preceding operations, to sink to the bottom. The upper portions of the alloy are then decanted, and cast into ingot-moulds, which are submitted to cupellation: and the metallic platinum which is left after the cupellation is melted and refined in a furnace of lime—which is employed in consequence of its being a very bad conductor of heat—by means of the oxyhydrogen blowpipe. The platinum obtained in this manner is nearly pure, and very ductile and malleable.

Platinum exhibits a bluish-white metallic lustre; it is exceedingly malleable and ductile, and is very infusible, melting only before the oxyhydrogen blowpipe, or in a very powerful blast-furnace, such as that used by Deville and Debray (fusing-point, 1779° C.). It expands less by heat than any other metal, and it is the heaviest form of matter known, with the exception of iridium (sp. gr. = 22·42) and osmium (22·48). It is unaffected by atmospheric action, and does not undergo oxidation in the air at even the highest temperatures. It is not acted on by nitric, hydrochloric, sulphuric, or hydrofluoric acid, or, in short, by any single acid; but in aqua regia it slowly dissolves, and forms a soluble tetrachloride. In consequence of its power of resisting the action of acids it is of great service in experimental and manufacturing chemical processes, platinum spatulas, capsules, crucibles, &c. being employed in every laboratory. Platinum is, however, corroded if heated with the alkalies or alkaline earths, and especially with a mixture of nitrate of potash and hydrated potash, an oxide being formed which combines with the alkaline bases. In consequence of its infusibility and its non-oxidisability by atmospheric action, it is in great demand for electrical as well as for chemical apparatus; and the recent introduction of platinotype processes in Photography (q.v.) has caused such a run upon platinum that its price has gone up from about 35s. per oz. in 1880 to 55s. in 1889, and 80s. in 1890.

The form of the metal known as *spongy platinum* has been already noticed. The metal may, however, be obtained in a state of subdivision much finer than that in which it is left on heating the double chloride of platinum and ammonium—viz. in the state known as *Platinum Black.* In this form it resembles soot. It may be prepared in various ways, of which one of the simplest is to boil a solution of bichloride of platinum, to which an excess of carbonate of soda and a quantity of sugar have been added, until the precipitate formed after a little time becomes perfectly black, and the supernatant liquid colourless. The black powder is then collected on a filter, washed, and dried by a gentle heat. In its finely comminuted state, either as spongy platinum or platinum black, it possesses a remarkable power of condensing and absorbing gases, one volume of platinum black being able to absorb more than 100 volumes of oxygen. This absorption appears to be accompanied by a conversion of some or all of the oxygen into the modification known as Ozone (q.v.), since the metal becomes capable of exerting the most energetic oxidising action, even at ordinary temperatures. For example, it can kindle a jet of hydrogen, can oxidise sulphurous acid into sulphuric acid, ammonia into nitric acid, and alcohol into acetic acid, the rise of temperature in the last case being often sufficiently great to cause inflammation. Platinum in the compact form, as foil or wire, possesses similar powers, but in a far lower degree.

Platinum may be easily alloyed with most of the metals, the alloys being in general much more fusible than pure platinum. Hence care must be taken not to heat the oxides of metals of easy reduction, such as lead and bismuth, in platinum crucibles, as, if any reduction took place, the crucible would be destroyed by the fusion of the resulting alloy. An alloy of platinum, iridium, and rhodium is found, by the investigations of Deville and Debray, to be harder and capable of resisting a higher temperature than the pure metal, and hence is admirably adapted for the formation of crucibles, &c.; but it is not now in the market.

There are two *oxides* of platinum, a protoxide, PtO, and a binoxide, PtO_2. The *sulphides* and *chlorides* correspond in number and composition to the oxides. Of these compounds the tetrachloride, $PtCl_4$, alone requires notice. It is formed by dissolving platinum in aqua regia, and evaporating the solution to dryness; and it is obtained as a deliquescent, reddish-brown mass, which forms an orange-coloured solution in water, from which, on evaporation, it crystallises in prisms. It is also freely soluble in alcohol and ether. A solution of this salt is much used for the recognition and determination of potash and ammonia.

Plato, the great Athenian philosopher, was born during the early years of the Peloponnesian war, most probably in 427 B.C. Diogenes Laertius (q.v.), in his gossiping *Lives of the Philosophers,* and other writers of the Christian era have handed down a considerable amount of detail respecting his life, but most of it is of very doubtful value. As time went on, legends gathered round a famous name; and many of the authorities used by Diogenes were in all probability, like Diogenes himself, almost entirely wanting in critical capacity. According to one account Plato was born in Athens itself, according to another in the island of Ægina. He came of an aristocratic family, his father Ariston boasting descent from Codrus the last king of Athens, who was said to be descended from the god Poseidon; whilst the family of his mother, Perictione, claimed kinship with Solon, and through Solon with Neleus, a son of Poseidon. Even this double claim to superhuman ancestry was not sufficient for the admirers of the 'divine' Plato. Diogenes tells us on the alleged authority of (among others) Speusippus, Plato's own nephew and successor in the academy, that the story was current at Athens that his real father was Apollo, and that the god appeared in a vision to Ariston, who thereupon kept away from his wife till her child was born. Plato's birthday was celebrated on the same day (at the end of May) as that of Apollo himself. Bees from Hymettus are said to have fed the infant with their honey. Plato was originally named after his grandfather, Aristocles; but his gymnastic teacher is said to have called him 'Platōn,' because of his broad shoulders, though others say he got this name from the breadth of his forehead. There is a story that he wrestled at the Isthmian games. He cannot well have escaped military service during the terrible struggle of Athens in the last years of the Peloponnesian war. In youth he is said to have written poetry, and this we can easily believe: a few epigrams in the 'Anthology' are ascribed to him. With regard to his philosophical education we have the important testimony of Aristotle (*Metaph.* i. 6), that from his youth he had been familiar with Cratylus, a follower of Heraclitus, and that the other philosophic influences under which he came were those of Socrates and of the 'Italic' schools—i.e. Pythagoreans and Eleatics. Critias (afterwards one of the 'Thirty Tyrants') and Charmides were both maternal relatives of Plato, and both belonged to the Socratic circle. Possibly it was through them that Plato came under the decisive influence of Socrates. If Plato was, as Diogenes says, twenty years old when he first became companion of Socrates, his discipleship lasted for eight years. According to his own account in the *Phædo*, Plato was prevented by illness from being present at the last conversation and death of his master (399 B.C.).

Plato made no attempt to enter on a political career. Through family ties he was connected with the anti-democratic party, who admired Sparta. His youth was passed amid the disasters and failures of the Athenian democracy; and the martyrdom of the teacher who had inspired him would not tend to increase his sympathy with that form of government. After the death of Socrates he seems to have stayed some time at Megara, where Euclides, who had been one of the Socratic circle but belonged also to the Eleatic school, had established himself. Euclides developed the Eleatic philosophy in the direction which Zeno ('the father of logic') had begun—he was chiefly occupied with what, after Aristotle's time, came to be considered logical questions. His school was known as the 'Dialectical' or 'Eristic'—i.e. 'disputatious.' This sojourn at Megara was doubtless an important stage in the development of Plato's thought. How long he stayed at Megara we do not know; nor can we tell with certainty whether he was back at Athens in 394 (he is said to have taken part in a Corinthian campaign), or whether he did not return to Athens till ten or twelve years after the death of Socrates. During this period of his life he is said to have undertaken extensive travels—to have visited Cyrene, Egypt, Italy, and Sicily. The visit to Sicily is almost certain; visits to the Magi and the Persians, the Babylonians, and the Hebrews are undoubtedly fictions of a later age, which supposed that wisdom could only come out of the East. The despotism of the elder Dionysius in Syracuse probably helped to suggest the pictures of the tyrant in the *Republic* and *Gorgias*. On his way back from Sicily Plato is said to have been seized by order of Dionysius and sold as a slave in Ægina, but to have been ransomed by a certain Anniceris of Cyrene. The return to Athens has been variously assigned to the years 389 and 387. Plato now began to teach in the Academy (q.v.), a place of exercise in the western suburb of Athens, planted like a grove, and named from the hero Acadēmus. There and in his own garden, which was adjacent, he gathered round him a band of disciples, teaching them probably, like his master Socrates, mainly by conversations, and embodying the results of his thinking and teaching in his written *Dialogues*. Two more visits to Sicily interrupted the quiet of these later years. Soon after the death of the elder Dionysius (368) his friend Dion summoned him to come to Syracuse, in the hope that he might convert the younger Dionysius to philosophy, and so realise the dream of a philosopher-king. The young despot welcomed him warmly, but soon became weary of serious discussions, quarrelled with Dion, and banished him; and Plato had to give up his fruitless task. A third journey to Sicily (about 361) was undertaken in the vain attempt to reconcile Dionysius to Dion. Plato's own life, it is said, was only saved from the tyrant by the intercession of the Pythagorean Archytas. On his return to Athens (360) he again resumed his teaching and writing, till, after a peaceful old age, he died 'in his eighty-first year' at a wedding-feast (347). He was succeeded in the Academy by his sister's son, Speusippus; but his greatest disciple was Aristotle, who must have come under his influence after the return from the second Sicilian voyage.

Of Plato's philosophical writings none apparently have been lost; but along with undoubtedly genuine works there have come down to us others whose authenticity is open to question. Thrasyllus, a scholar of the time of Augustus and Tiberius, considered thirty-six of the works ascribed to Plato to be genuine, rejecting a few quite unimportant writings as spurious. This 'canon of Thrasyllus' probably represents the tradition of the Alexandrian library. Aristophanes, one of the Alexandrian librarians (about 264 B.C.), had arranged several of Plato's dialogues in 'trilogies' (groups of three), following the analogy of Attic dramas. Plato himself suggests at least two such trilogies—viz. *Republic*, *Timæus*, *Critias* (unfinished); *Sophist*, *Statesman*, *Philosopher* (never written). Thrasyllus adopted an arrangement in tetralogies, making nine groups of four, only one of which groups (viz. *Euthyphro*, *Apology*, *Crito*, *Phædo*, which give a connected picture of the trial, last days, and death of Socrates) is anything but extremely artificial. Grote accepts all the works in the 'canon of Thrasyllus,' believing that the Alexandrian library had every means of obtaining a genuine collection of Plato's writings from his successors in the Academy; but almost all other modern scholars reject the *Epistles*, some of which may, however, be very early forgeries. And the authenticity of some ten or more of the dialogues has been very much disputed. Fortunately, the more important works are the least open to question. We have Aristotle's statement that the *Laws* were written by Plato after the *Republic*. Beyond that we can only conjecture the order in which the dialogues were written; and the hypotheses of different scholars have varied greatly. We may safely put aside the theory of Schleiermacher (with whom the modern critical study of Plato begins), that Plato quite early in life had formed a complete system of philosophy in his mind, and that the dialogues were published by him in an order intended to unfold this system gradually to the world. It would be more true to say that Plato never had any completely formed system, and during a long life of speculation his opinions must have undergone modification. We cannot, indeed, with complete certainty arrange his dialogues in a series representing exactly his mental development (as K. F. Hermann and others have attempted); but the student may most profitably consider them in groups, suggested by the different influences that acted on him, and especially by his changing attitude towards the teaching of Socrates. First of all would come those short dialogues in which, so far as we can judge by comparing him with

Xenophon, Plato does not go beyond what the actual Socrates might have said. Such are the dialogues which deal with some particular virtue; thus, in the *Charmides* Socrates questions the beautiful and modest youth Charmides as to what the virtue of modesty or 'temperance' is. In the *Laches* he questions the soldier Laches about courage. The most important of this group is the *Protagoras*, in which Socrates argues against this famous sophist that all virtue is one, and that it is identical with knowledge. Some of these slighter dialogues may have been composed before the death of Socrates; Diogenes Laertius tells us that Socrates on hearing Plato read the *Lysis* (which deals with friendship) said: 'O Hercules! what a lot of lies the young fellow has told about me.' Ancient tradition made the *Phædrus* the earliest dialogue; but this almost certainly belongs to a later period, though earlier than the *Republic*. The *Apology*, or 'Defence of Socrates on his Trial,' has probably more historical accuracy than any other composition of Plato's (Plato tells us he was present at the trial), and may have been written soon after the death of Socrates. The *Euthyphro* (concerning piety) and the *Crito* (Socrates in prison) may belong to the same period. The *Phædo*, however (the last conversation of Socrates, on the immortality of the soul), is probably of later date, as it implies the theory of ideas, and may be assigned to a time after Plato's visit to Sicily—i.e. after he had come more strongly under Pythagorean influences. Some modern scholars, laying great stress on the 'Megaric' influence, assign the great metaphysical dialogues (*Parmenides*, *Theætetus*, *Sophist*, *Statesman*) to the time between 399 and 386, when Plato began his teaching at the Academy. Others, with more probability, consider these dialogues and the *Philebus* to belong to a later period than the *Republic*, and this opinion is gaining ground. The *Phædrus*, *Symposium* ('Banquet'), *Gorgias*, *Republic*, *Phædo*, in which (along with the *Theætetus*) Plato's literary skill is at its very highest, may perhaps be all assigned to the period of his life after forty, but before his old age. In these dialogues the personal characteristics ascribed to Socrates are probably represented with historical and, at least, with dramatic truth; but theories are introduced which betray strong Pythagorean influences. We must of course remember that while Plato idealises Socrates, and makes him more of a metaphysician than in all probability he was, Xenophon, who has a very unphilosophical mind, most certainly understates him, and makes him more of a commonplace moralist than he must have been in order to stimulate Greek thought as he did. In the *Timæus* Plato would have felt it inappropriate to make Socrates the exponent of theories about the physical universe, and after a short introductory conversation the dialogue form is deserted, and Timæus, a Pythagorean, expounds the cosmogony of his school. In the *Sophist* and *Statesman* 'an Eleatic stranger' is the chief speaker; in the *Parmenides* the youthful Socrates is criticised by the great Eleatic philosopher. In the *Laws* Socrates does not appear at all, the leading speaker being 'an Athenian stranger' (Plato himself?). May we not regard this as an indication that in his later years Plato felt himself farther away from his master? These later dialogues, in fact, seem like a transition from the Plato of the *Phædrus* and of the *Republic* to Aristotle.

It is customary to treat of Plato's philosophy under the three heads of dialectic (or logic), physics, and ethics. But, it must be remembered, these divisions did not exist for Plato himself, nor, in fact, had he, strictly speaking, a 'system' of philosophy. Plato's philosophy may most correctly be regarded as a development of the teaching of Socrates, but containing elements derived from the earlier philosophies from which Socrates had purposely turned away. Aristotle's philosophy is, however, a development of Plato's; and we, knowing what becomes of Plato's suggestions in the hands of his pupil, are able and apt to see a greater amount of system than Plato himself would have recognised.

The dialogue was to Plato much more than a mere literary form into which he chose to fit his thoughts. The 'conversations of Socrates' gave to Plato his conception of the method of philosophy. 'Dialectic' comes from a word which means 'to converse,' 'to discuss;' and it is significant that Athenian philosophy originated not in the meditations of the solitary recluse, but in the discussions of a city of talkers. It is said that Zeno the Eleatic used the dialogue for philosophical writing before Plato, but this is very doubtful. In many of the later dialogues the chief speaker has so much of the talking to himself that the dialogue becomes a rather empty form, and is evidently yielding place to the lecture as the vehicle of philosophical exposition.

According to a well-known sentence of Aristotle, the germs of logical doctrine which may be ascribed to Socrates are 'the inductive method' and the endeavour to get 'general definitions.' When people spoke about persons or acts as just or beautiful, Socrates would insist on asking 'What is justice?' 'What is beauty?' and would test every definition brought forward by applying it to particular instances, content to remove error even where complete truth could not be obtained. This is the procedure of Plato in the earlier dialogues. In the *Theætetus*, however, the Platonic Socrates asks the profounder question, 'What is knowledge?'—i.e. true or scientific knowledge. It is not 'sensation' (or 'perception'), as Protagoras and his followers suggest: sensation alone gives us no objective certainty, valid for every one. Nor is it 'opinion.' Opinion may be true, but has no certainty. A man only 'knows' when he has got at the reasons or causes of things, when he sees facts not in an isolated way, but connected by the 'chain of causation' (*Meno*): he must be dealing with what is permanent and universal. What then is this? Plato's answer comes to be found in the theory of 'Ideas.' (The word means properly 'forms' or 'shapes,' and so 'kinds.' The analogy of sculpture may help one to understand how the Greeks came to regard 'the form,' in contrast to the 'material,' as the essential element.) This theory, following Aristotle's guidance, we may consider a development of the Socratic 'universal conception,' and also of the Pythagorean doctrine of 'numbers.' By this theory Plato seeks to reconcile the opposing views of the Heracliteans and of the Eleatics (q.v.). According to Plato, both the one, the permanent, and the manifold, the changing, have their place in the universe, the former in the world of ideas, the intelligible world, with which 'science' deals, the latter in the world of sense, with which mere 'opinion' is content. In the *Republic* Plato elaborates this theory of knowledge, and gives a symbolical representation of it in the famous image or 'myth' of 'the Cave.' The majority of mankind are pictured by him as prisoners in a subterranean cavern, chained with their backs to a fire, looking at the shadows thrown by it on the rocky wall and mistaking them for realities. The turning round of some of these prisoners to the light, and the toilsome ascent up the steep slope to the mouth of the cave, and the gradual training of their eyes bewildered in the sunlight to see the real things in the upper world, and finally to look up to the sun itself—this represents the education of the philosopher. Education is 'a turning round of the eye of the soul.' Learning, according to the more startling language of the *Meno* and *Phædrus*, is 'recollecting:' the soul in a previous existence has beheld the 'ideas,' and knowledge is possible just because the mind does not acquire something alien to it, but recovers what is its own. The way from the life of the senses and of mere vague opinion to the highest or philosophical knowledge is through the mathematical sciences. Mathematics, being the only science which had then outgrown the merest infancy, is to the Greeks the type of science in general. (Plato is said to have had the words 'Let no one ignorant of geometry enter' inscribed on the door of his school.) In the conceptions of mathematics we have a clue to the understanding of Plato's theory of ideas. The geometrician looks at a particular triangle, but he speaks not of *this*, but of *the* triangle. The triangles we see are triangles only by 'participating in' ('imitating,' the Pythagoreans would have said) *the* triangle. And it remains true for us still that we can only scientifically know anything in so far as we can find in it a universal element, which manifests itself or 'is present' (in Platonic language) in the particular. The botanist, for example, knows a particular plant only as a specimen of a *species* (the Latin equivalent of Plato's 'idea'). But the philosopher must not remain in the region of the various special sciences: he has the passion for unity and universality. Plato has a vision of the true science which is above all particular sciences, and is the unity and 'coping-stone' of them all: and this he calls in a special sense 'dialectic,' which does not like mathematical thinking need the help of sensible images, but deals with 'ideas' alone in their relation to one another and to the highest of all, 'the idea of the good.' These ideas are not mere concepts of our minds: they are, in Plato's phrase, 'the most real existences.' The extreme form of mediæval 'Realism,' according to which universals are prior to and more real than particular things, is a crude version of Plato's doctrine. It is indeed an adaptation of Platonic philosophy to Christian theology, for which Plato gives no sanction, if the ideas are called 'the thoughts of God;' but the phrase is perhaps less misleading than many others which have been used about them. Plato does speak (in *Republic*, x.) of God having 'made' the ideas, as a human artificer makes things in imitation of them; but he is there talking in pictorial language. God in Plato's system is rather the 'idea of the good,' the good-in-itself, which is the cause alike of knowing and of being, as the sun in the visible world is the cause both of light and of life. In the *Timæus* the world is said to be fashioned by the Creator or Artificer after the pattern of the ideas; but here also the language is figurative. Plato's 'ideas' must, however, be thought of both as 'real kinds' and as archetypes. Plato's presentation of his theory varies: most probably the theory itself underwent modification. In the *Parmenides* some of the objections made to it are the same as were afterwards urged by Aristotle—a remarkable instance of a philosopher criticising himself.

The relation of the hierarchy of the ideas to the supreme idea of the good is nowhere worked out by Plato. Dialectic remains only an ideal science. The true dialectician is he who will see things in their unity (compare Mr Herbert Spencer's definition of philosophy as 'completely unified knowledge'): he will also 'divide things rightly according to their kinds.' The method of philosophy is a bringing together and a dividing (*synagōgē* and *diairesis*). In this we may recognise the germ of Aristotle's 'induction and deduction.'

The *Timæus* is the one work which Plato has devoted to the philosophy of nature; and though it has exercised directly and indirectly an enormous influence over the ancient and mediæval world, as it has specially attracted mystical and theosophical commentators, in Plato's own view it occupies a very subordinate position. We are again and again warned by him not to expect strict truth, but only approximations and figurative statements ('myths') in dealing with such subjects. The notion of 'emanations,' which plays so great a part in later philosophy is latent in the *Timæus*. The Cosmos, or order of the universe, is the 'one only-begotten' image of God, its father and creator (*Demiourgos*—i.e. 'artificer'). The Creator was good, and wished to make the world as like himself as possible; but no created or visible thing can be perfect. The material out of which the orderly world is made introduces imperfection into it. (This conception of matter as evil had a potent influence in later times, especially when combined with Oriental ideas—e.g. in Gnosticism, q.v.) So, too, the eternal Creator could not make the world eternal like himself, and in making it made Time, 'the moving image of eternity.' To the obscure details of Plato's cosmology and physics it would be unprofitable to refer here. Cosmology is again introduced, but briefly, and with similar warnings that it is to be treated as mythical, in connection with the immortality of the soul in the *Phædo* and *Republic*. The soul of man (like the 'soul of the universe') is intermediate between the ideas and the corporeal. The human soul, as it exists in the body, has three parts or elements: (1) the rational; (2) the spirited element; (3) the appetitive. The rational element alone, which is the soul in its true being as it is apart from mixture with body, is properly immortal. The doctrine of immortality (i.e. the pre-existence of the soul as well as its existence after death) is introduced in the *Phædrus*, *Republic*, and *Phædo*, and is the main subject of the third. In all Plato makes use of the Pythagorean notion of transmigration. What he says must be taken as largely mythical and figurative. His whole philosophical thinking implies the eternity of Reason, but how far he believed in what is now understood by personal immortality has been and may be doubted. Wordsworth's famous *Ode on Immortality* is generally considered 'Platonic;' but it turns on a misapplication of Plato's doctrine of 'recollection.' Plato would certainly not hold that the new-born infant is nearer perfection than the aged philosopher.

Plato is so far true to the example of Socrates that, though he has metaphysical interests which were alien to his master, yet the practical interest always predominates. Philosophy is to him not mere intellectual speculation, but a habit of mind and a manner of living. As we have seen, the highest of the ideas is 'the good.' He cannot accept the Cyrenaic view that pleasure is the good; but neither does he agree with the Cynics that all pleasure is evil. Pleasures are good or bad, high or low, according to the part of the soul to which they belong. Socrates had identified virtue and knowledge, had asserted that virtue was one, and that virtue could be taught. All these doctrines Plato accepted; but modifications gradually appear. In the *Republic*, the dialogue in which all the various elements of his philosophy are united more than in any other, Plato accepts without proof the popular distinction of four 'cardinal virtues' (as they afterwards came to be called), and fits them in with his psychology. Wisdom is the virtue of the reason, Courage of the spirited element, Temperance (i.e. Moderation, Self-control in general) is the virtue of the lower parts in their relation to the higher, while Justice

('Righteousness' would perhaps be a better word) is not the virtue of any special part, but of the whole soul, and is defined as 'every part doing its own work and not interfering with the others.' To arrive at the nature of Justice (the professed object of the discussion) the Platonic Socrates has turned 'from the small to the large letters'—i.e. from the individual to the state, where human nature can be seen 'writ large.' Wisdom is the virtue of the rulers, Courage of the warriors, Temperance or Moderation is the harmony resulting from the obedience of the lower to the higher, and Justice is the virtue of the whole state. A perfect state would require a special ruling caste, and the only true rulers in Plato's opinion are philosophers. Plato allows that there may be ordinary virtues resulting from custom or right opinion (cf. *Meno* and *Phædo*), but the highest type of conduct must be bound up with the highest type of knowledge. Those alone who have the philosophic nature (which is sometimes described by him as the passionate love of truth) are the proper rulers in a perfect state, and in the philosophic nature all virtues are united. In this ideal commonwealth (the parent of so many 'Utopias'), besides the paradox of the philosopher-king, the other paradoxes by which Plato startled his contemporaries were (1) that men and women should have the same education and the same pursuits, and (2) that private property and the family should be abolished. All things were to be in common; and the breeding and rearing of the citizens was to be entirely under the control of the philosopher-rulers. Just as in his theory of knowledge Plato's ideal is unity, so his political ideal is that the state should be as much as possible one, one as a family is one, or rather as one individual is. All are to be 'members of one body.' Some of the features in Plato's ideal state were doubtless suggested to him by the Pythagorean brotherhoods, many of them by the actual institutions of Sparta. In fact, Plato's ideal state might be described as a combination of philosophy with Spartan military discipline. Without the philosophy we have an inferior form—the Spartan state, or 'timocracy,' in which not philosophy but military *honour* is the ruling principle. Inferior to that comes oligarchy, of which the ruling principle is *wealth*. Lower still is democracy, the *equality* of good and bad alike; and worst of all is tyranny, the rule of the 'wild-beast element in man.' In the *Statesman* Plato gives a rather different classification of constitutions, recognising both a better and a worse form of democracy, and placing both below aristocracy, but above oligarchy: in the true state the number of the rulers matters not, if only they have 'the science of ruling.' In the *Laws* he elaborates a second-best state, giving up communism as too difficult of attainment, and proposing a complete equalisation of property. In the *Laws* also he praises 'mixed government.'

In the earlier part of the *Republic* Plato discusses the place of art in education. Homer and Hesiod were the Greek 'Bible;' but Plato objects to much in the poets and in the popular religion as false and immoral. Music and poetry should be simple (here again the complex, the manifold, is of the nature of evil), and should imitate only what is good, hence dramatic art is especially objected to. Towards the end of the dialogue he goes further, and objects to all 'imitation,' whether in painting or in words, as being only a copy of the so-called real things, which are themselves only a copy of the true reality—the ideas: and so he drives the poets from his ideal state. Aristotle's *Poetics* may be regarded as in part a 'Defence of Poesy' against Plato's criticism. Why, it has often been asked, has Plato, himself so great an artist, dealt so Puritanically and so unsympathetically with art? Partly, perhaps, because the first steps in reflection about art, as about religion, imply a certain withdrawal from the sway of that which is to be criticised and understood. But the *Republic* gives only one side of Plato's thought on art. In the *Symposium* (in which the banqueters praise Love in turn) and in the *Phædrus* 'the beautiful' occupies the same place that 'the good' does in the *Republic*. Plato is after all a true Athenian, and thinks of the good under the form of the beautiful. ('Beautiful-and-good' is the Greek equivalent of 'noble' or 'gentleman' in its best sense.) 'All that is good is beautiful,' he says in the *Timæus*. The true lover is akin to the philosopher, and loves the beauty of the soul rather than the beauty of the body, and ascends from the love of the many beautiful to the love of absolute beauty. There is indeed a strain of asceticism in Plato's view of life; but there is none of the Cynic contempt for the beauty of the human form and for the graces of social intercourse. In the *Phædo* Socrates speaks of the body as 'the prison-house of the soul,' and of philosophy as 'the practising of death.' But Socrates at the banquet speaks somewhat differently from Socrates awaiting his end: and in the *Republic* the body has to be carefully trained that it may be a fit servant of the soul, and the young are to grow up amid fair sights and sounds.

Plato's influence on human thought has been even more widely diffused, but is more difficult to measure than that of Aristotle. The various schools of the Old, Middle, and New Academy caught only a small portion of his spirit. The Stoics, especially the later Stoics, borrowed much from him. Perhaps no school of Greek philosophy was unaffected by him. In Alexandria Jewish thinkers fell under his fascination (see PHILO); and Christian theology is largely Platonic. But the Alexandrian Platonists and the Neoplatonists (q.v.) differ from Plato himself in making the *Timæus* the centre of his system. The writings ascribed to Hermes Trismegistus and Dionysius the Areopagite belong to the Neoplatonic period. The latter was translated by Erigena in the 9th century, and Platonism reached the western world in the middle ages through the medium of those mystical writers. The Italian Renaissance and the revolt against Scholastic Aristotelianism revived the study of Plato's own writings; but the enthusiasm for Plato in the 15th century at Florence and the less important 'Cambridge Platonism' of the 17th century were both after the Neoplatonic manner, and, like the mediæval 'Aristotelianism,' brought more veneration than understanding to the interpretation of the philosopher. Of all Plato's disciples (to adapt a famous saying) perhaps only one had understood him—Aristotle—and he did not. His criticisms are often strangely unsympathetic. Yet Aristotle's whole system gives a more trustworthy clue to Plato's real philosophical significance than is to be got from mystical interpreters whose zeal was not always according to knowledge (see ARISTOTLE).

The first printed edition of the Greek text of Plato is the Aldine (Venice, 1513). Plato is constantly cited according to the pages of the edition printed by H. Stephanus (Paris, 1578). The best and most convenient texts are those of Stallbaum, of Baiter, Orelli and Winckelmann, and of K. F. Hermann. The critical edition by Schanz is not yet completed (1891). Plato was first printed in the Latin translation by Ficino (Flor. 1483), which was the best outcome of the Platonic revival, and is the basis of the ordinary Latin versions. A complete English translation was published by Thomas Taylor, 'the Platonist'—i.e. Neoplatonist, in 1804 (including nine dialogues translated by Sydenham about 1759). The poet Shelley translated the *Symposium* (included along with other fragments of Platonic translations in Mr Buxton Forman's edition of his *Works*). Professor Jowett has made Plato an English classic (*Trans. with Introductions*, 2d ed. 5 vols. 1875; *The Republic*, separately, 3d ed. revised 1888). In the 'Golden Treasury' series are included translations of *The Republic* by Davies and Vaughan, of the *Euthyphro*, *Apology*, *Crito*, *Phædo* (under title *Trial and Death of Socrates*), by F. J. Church, and of the *Phædrus*, *Lysis*, *and Protagoras*, by Josiah Wright. Among more important English editions of separate dialogues may be named the *Apology*, by Riddell; *Phædrus* and *Gorgias*, by Thompson; *Philebus*, by Badham and by Poste; *Theætetus*, *Sophist*, *Statesman*, by Campbell; *Phædo* and *Timæus*, by Archer-Hind; and *Phædo*, by Geddes. Among works on Plato's philosophy, besides Jowett's 'Introductions,' may be named Grote's *Plato* (containing analyses of all the dialogues); Whewell's *Platonic Dialogues for English Readers* (1860); Zeller's *Plato* (Eng. trans.); and the sections dealing with Plato in the Histories of Philosophy by Schwegler, Ueberweg, Erdmann (all now accessible in English). The development of the theory of ideas is discussed by H. Jackson in *Journal of Philology* (1882–86). On the Platonic influence on Christian theology, see Hatch's Hibbert Lectures (1888); Bigg, *Christian Platonists of Alexandria* (Bampton Lectures, 1886). For the Cambridge Platonists, see the articles LATITUDINARIANS, CUDWORTH, MORE, SMITH (JOHN), WHICHCOTE, with books cited under these names.

Platoff, MATVEI IVANOVICH, COUNT, a famous Cossack Hetman, was born at Azov on the Don, 17th August 1757. He began his service in the Turkish campaign of 1770–71, and throughout subsequent wars showed such capacity and courage that he was named by Alexander I. in 1801 Hetman of the Cossacks of the Don. As such he took part in the campaigns against the French, 1805–7, and, after the enemy had evacuated Moscow, hung upon their rear with pitiless pertinacity, wearing them out by incessant attacks, cutting off straggling parties, and capturing their convoys of provisions. He defeated Lefebvre at Altenburg, 28th May 1813. After the French disaster at Leipzig he harassed their retreat on French soil, gained a victory at Laon, and made his name memorable by the devastations of his hordes of semi-savages. He was enthusiastically welcomed, and presented with a sword of honour on the occasion of his visit to London in company with Blücher. The czar gave him the title of Count in 1812. After the war he retired to his own country, and died near Tcherkask, 15th January 1818.

Platonic Love, the love of soul for soul, a love into which sensual desire is supposed not to enter at all. See the last paragraph but one in the article PLATO.

Platt-Deutsch, or LOW GERMAN, the direct descendant of Old Saxon, and a sister-tongue of High German, is spoken to-day in different dialects by the peasantry of north Germany from the Rhine to Pomerania. It belongs to the same group as Dutch, Flemish, and Frisian. Low German softens the consonants, but avoids the deep sibilants of High German as spoken in the south, and has simple grammatical rules. It is very appropriate in the mouths of the people who use it, their chief characteristics being naïveté, a childlike good-nature, and sturdy honesty; and it lends itself readily as a vehicle for fairy-tales, folk-tales, and simple folk-songs, such as those collected in Firmenich's *Germaniens Völkerstimmen*. Klaus Groth (q.v.) and Fritz Reuter (q.v.) have given it a high literary standing. Minor writers in Low German are Bornemann, Burmeister, Giesebrecht, and Brinckmann.

See Groth, *Briefe über Hochdeutsch und Plattdeutsch* (1858); and Gaedertz, *Das Niederdeutsche Schauspiel* (2 vols. 1884). See also the articles GERMANY (LANGUAGE AND LITERATURE), GRIMM'S LAW, EULENSPIEGEL, REYNARD THE FOX.

Platte, or NEBRASKA, an affluent of the Missouri River, is formed by the junction in west central Nebraska of the North and South Forks, which rise among the Rocky Mountains, in Colorado, are respectively some 800 and 550 miles long, and are neither of them navigable. The general course of the Platte is eastward, in a wide shallow stream, over the treeless plains of Nebraska, till it reaches the Missouri after a winding course of about 450 miles. With its forks it drains some 300,000 sq. m., but like them it is not navigable.

Platten-See. See BALATON.

Plattsburg, capital of Clinton county, New York, on Lake Champlain, at the mouth of the river Saranac, 73 miles by rail S. of Montreal. It has planing-mills, machine-shops, and an iron-furnace, and manufactures wagons and sewing-machines. In Plattsburg Bay, on September 11, 1814, a British flotilla of sixteen vessels was defeated and partly captured by Commander Thomas Macdonough, with fourteen vessels; while a large land force, under Sir George Prevost, was repulsed by General Macomb, with 1500 men. Pop. (1880) 5250; (1890) 7010.

Plattsmouth, capital of Cass county, Nebraska, is on the Missouri, about a mile below the mouth of the Platte, and 21 miles by rail S. of Omaha. It manufactures flour, wagons, engines, reed-organs, &c. Pop. (1880) 4175; (1890) 8392.

Platypus. See ORNITHORHYNCHUS.

Plauen, one of the most important manufacturing towns of Saxony, stands in the south-west corner, on the Elster, 78 miles S. of Leipzig by rail. Its chief industries are the manufacture of cotton goods, muslin, cambric, jaconet, and embroidered fabrics, with in a secondary degree cigars, paper, machinery. Pop. (1875) 28,756; (1890) 46,899.

Plautus, M. ACCIUS (or more correctly *T. Maccius*), the chief comic poet of Rome, and probably among his own countrymen the most popular Roman author of any age, was born about 250 B.C. at Sarsina, a village in Umbria, a district which must at this time have been thoroughly Latinised. We have no knowledge of his early life and education, but it is probable that he came into Rome while still young, and acquired there his complete mastery of the most idiomatic Latin. Though born in the country, he introduces countrymen chiefly as subjects for ridicule; he always writes as a townsman, familiar with city life, especially among freedmen, craftsmen, and the middle classes. At Rome he found employment in connection with the stage, of what kind precisely we do not know. In this position he saved money enough to enable him to leave Rome and start in business on his own account in the way of foreign trade; and such early thrift shows strong character and determination to rise in the world. His plays evince close familiarity with seafaring life and adventure, and an intimate knowledge of all the details of buying and selling and keeping accounts—experience probably acquired during this period. We know that he failed in business, and returned to Rome in such poverty that he had to earn his livelihood in the service of a baker by turning a hand-mill, work generally performed by slaves. At this time, shortly before the second Punic war broke out, he was probably about thirty years of age, and while in this humble occupation he composed three plays which he sold to the managers of the public games. The price paid him enabled him to leave the mill, and he spent the rest of his life at Rome. Probably he commenced to write about 224 B.C., and for forty years, until his death in 184, he continued to produce comedies with wonderful fecundity. Most of the plays we have belong to the last ten years of his life. It is not certain whether Plautus ever obtained the Roman franchise. He was the contemporary of Nævius and of Ennius.

His plays appear not to have been published during his lifetime, but to have been left in the hands of the actors, who probably both interpolated and omitted passages to suit them for the stage. Almost all the prologues were written after his death. About 130 plays were attributed to him in the time of Gellius, who held most of them to be the work of earlier dramatists, revised and improved by Plautus. Roman critics considered most of them to be spurious. Varro in his treatise *Quæstiones Plautinæ* limited the genuine comedies to twenty-one; and these so-called 'Varronian comedies' are the same which we now possess, only one, the *Vidularia*, being lost. Plautus' plays were immensely popular on the stage, not only with the people, but with the educated classes, and were acted, as Arnobius tells us, in the time of Diocletian, five centuries later. Plautus borrowed his plots to a large extent from the New Attic Comedy, which dealt with social life to the exclusion of politics; he doubtless imitated its general types of character, but he 'adapted' very freely, and infused into his borrowed framework a new and robuster life, which was Roman to the very core. His perfect spontaneity, vivacity, and vigour of language, and the comic power of his dialogues, show that these are the genuine fruit of his own genius. The scenes of his comedies are always laid in Athens or in some Greek town. Had he depicted the family life of Romans as so corrupt, the magistrates would no doubt have interfered; but the Greek personages of his plays speak and act in every respect like Romans; they refer familiarly to places in Italy, to streets, magistrates, and customs at Rome. Not even Shakespeare is more careless about inconsistency of this kind. It is probable that Plautus wrote with great rapidity; some of his finest comedies are spoilt through the action being too hurried towards the close. Roman comedy expressed 'a rebound from the severer duties of life;' Plautus' audience were in holiday mood, and did not expect to be admonished as to duty or entertained with serious reflection. His leading characters possess boundless animal spirits, infinite resource in difficulty, and but small conscience. His heroines show that, as Sellar says, Plautus was more familiar with the ways of 'libertinæ' than of Roman ladies. His favourite subject is a plot by which a slave, on behalf of his young master and the mistress of the latter, cheats a father or some one else. Plautus shows no feeling for nature, though he is fond of describing the sea in calm and storm; his lack of any sense of natural beauty and of high imagination makes a deep gulf between him and Aristophanes. Yet he shows distinct creative power, as in the character of Euclio the miser in the *Aulularia*, who, though entirely possessed by his one idea, is still honest and independent and not contemptible. Fine touches are not wanting. In the *Captivi* the slave Tyndarus, cheerfully willing to sacrifice all for his young master, shows that Plautus had the power to conceive a really noble character. The charm of Plautus, lying in his genuine humour and powerful grasp of character, goes deep down to the roots of human nature; he delights his readers to-day as truly as when he made Roman theatres ring with applause, or when St Jerome solaced himself in his cell by reading the well-loved comedies. His joyous sense in all circumstances of the gladness of life is the sign of a strong and manly nature; he makes his reader look involuntarily at the bright side of things. According to Sellar, the five best plays are *Aulularia, Captivi, Menæchmi, Pseudolus, Rudens.* Shakespeare has imitated the plot of the *Menæchmi*, entirely recasting it, in his *Comedy of Errors.* Molière's *L'Avare* is borrowed from the *Aulularia.*

English translations are by Thornton and Warner (1767–74), and H. T. Riley (1880). Ritschl has shown great acuteness in restoring Plautus' text, which is very corrupt (2d ed. 1871). The complete edition which he contemplated was continued by his pupils, G. Goetz and others (1878 *et seq.*). See also Sellar, *Roman Poets of the Republic.*

Playfair, JOHN, mathematician and natural philosopher, was born at Benvie manse, near Dundee, March 10, 1748, and studied at St Andrews. In 1773 he succeeded his father as minister of Liff and Benvie. During his leisure hours he still prosecuted his favourite mathematical and geological studies, and communicated to the Royal Society of London two memoirs, *On the Arithmetic of Impossible Quantities* and *Account of the Lithological Survey of Schiehallion.* In 1785 he became joint-professor of Mathematics in Edinburgh University, but exchanged his chair for that of Natural Philosophy in 1805. He became a strenuous supporter of the 'Huttonian theory' in geology, and, after publishing in 1802 his *Illustrations of the Huttonian Theory of the Earth* (see GEOLOGY, Vol. V. p. 148), he made many journeys for the sake of more extensive observations, particularly in 1815, when he visited France, Switzerland, and Italy. He died at Edinburgh, 19th July 1819. Playfair was during the later part of his life secretary to the Royal Society of Edinburgh. From 1804 he was a contributor to the *Edinburgh Review* and to the *Transactions of the Royal Society of Edinburgh*, and wrote many important articles for the *Encyclopædia Britannica.* His separate works are the *Elements of Geometry* (1795) and *Outlines of Natural Philosophy* (1812–16).

Plays. See DRAMA, THEATRE. A relic of the censorship of the press survives in Britain in the licensing of stage plays. By an Act of 1843 no plays may be acted for hire till they have been submitted to the Lord Chamberlain, who may refuse to license them in whole or in parts; the official who reads them for this purpose being the 'examiner of stage plays.' A penalty of £50 attaches to the offence of acting an unlicensed or prohibited play; and the theatre in which it is represented forfeits its license. In the United States there is no general censor, but local authorities have power to forbid the representation of plays which they consider to be hurtful to morality.

Plea, the answer of the defendant to the plaintiff's demand or charge. Pleas were divided formerly into pleas dilatory (where the party seeks to break down the conclusion of the action without entering into the merits of the case) and peremptory, Demurrers (q.v.), in Abatement (q.v.), special in bar, &c.; now the plea is usually Guilty or Not Guilty (see CRIMINAL LAW). In Scots law, plea means also a written statement by counsel of the legal grounds on which the party bases his case. In English civil procedure this is called *Pleading;* a term applied in criminal law to the accusation of the prosecutor or the answer of the accused. Pleadings have been much simplified by the Judicature Acts (1873–76). In the United States the New York legislature established a uniform procedure which has been adopted by most of the states. 'Pleas of the Crown' is an old term for criminal cases. In the Houses of Parliament pleading, as in the superior courts of law, must be conducted at the Bar (q.v.).

Plebeians. See ROME, TRIBUNE.

Plebiscite, the name given, in the political phraseology of modern France, to a decree of the nation obtained by an appeal to universal suffrage. Thus, Louis Napoleon was chosen president, and subsequently emperor, by a plebiscite, and in 1870 obtained the sanction of still a third one (7½ million votes). The word is borrowed from the Latin; but the *plebiscitum* of the Romans properly meant only a law passed at the *Comitia Tributa*—i.e. assembly of the *plebs*, or 'commons,' as distinguished from the nobles. The word is often used in Britain for an attempt to secure an expression of opinion on some special point of local interest by all the inhabitants of a district—often by means of return post-cards.

Plectognathi, an order of Bony Fishes (q.v.).

Pledge. See PAWNBROKING.

Pleiades, in Greek Mythology, were, according to the most general account, the seven daughters of Atlas and Pleione, the daughter of Oceanus. Their history is differently related by the Greek mythologists: according to some authorities, they committed suicide from grief, either at the death of their sisters, the Hyades, or at the fate of their father, Atlas (q.v.); according to others, they were companions of Artemis (Diana), and, being pursued by Orion (q.v.), were rescued from him by the gods by being translated to the sky; all authorities, however, agree that after their death or translation they were transformed into stars. Their names are Electra, Maia, Taygete, Alcyone, Celæno, Sterope (the invisible one), and Merope. The group or constellation of the Pleiades, called the 'Seven Stars,' is placed on the shoulder of Taurus, the second sign of the Zodiac, and form, with the pole-star and the twin Castor and Pollux, the three angular points of a figure which is nearly an equilateral triangle. But, if looked at directly, only six stars are visible to the eye, though, if the eye is turned sideways, more can be seen; a good telescope shows fifty or sixty in the area. The photographic chart produced by M.M. Henry in 1888 shows 2326 stars, with nebulæ intermixed.

The name *Pleiad* is frequently applied to reunions of poets in septenary groups; and this use of the word dates from the time of Ptolemy Philadelphus at Alexandria, who treated seven Greek poets with special distinction, and denominated them his *pleiad*. His example was followed by Charlemagne. But the name *Pléiade* is specially associated with a group of 16th-century French writers, of whom Ronsard (q.v.) and Du Bellay (q.v.) are the most notable, who endeavoured with marked result to reform the French language and literature after classical models. The other names are Lazare de Baïf, ambassador at the diet of Spires; Jean Dorat, a celebrated Hellenist; Amadis Jamin; Etienne Jodelle; and Pontus de Thiard. In place of the two last, other authorities give Scévole de Saint Marthe and Marc Antoine Muret (q.v.); and instead of Jamin, Belleau.

Pleiocene. See PLIOCENE.

Pleiochroism. In some crystals, such as some specimens of topaz, three distinct colours may be observed on looking through them along three rectangular axes. In intermediate directions intermediate tints may be observed; and this property is that of pleiochroism or polychroism. In some other cases a similar range of intermediate tints may be observed, lying between two extreme tints visible along two axes (dichroic crystals—e.g. iolite or *sapphire d'eau*, and some specimens of mica).

Pleiosaurus. See PLESIOSAURUS.

Pleistocene (Gr., 'most recent') or GLACIAL SYSTEM. This system comprises the older accumulations belonging to the Quaternary or Post-Tertiary division. Almost all the molluscs met with in beds of this age are existing species. The system is termed Pleistocene or Glacial according as we have reference to the character of its organic remains or to the physical conditions under which the greater portion of its deposits were accumulated. These deposits are of very diverse nature and origin, and are subject to endless modifications, but nevertheless they show certain well-marked phases which are persistent over wide areas. Thus, throughout all northern Europe and the hilly and mountainous districts of the central and southern regions of the continent they exhibit the same general character and succession. The deposits of these regions consist for the most part of glacial and fluvio-glacial detritus, which betoken the former presence of a great ice-sheet in northern Europe, and of extensive snowfields and glaciers in the mountain districts farther south. For an account of these deposits and glaciation generally, see GLACIAL PERIOD. In the regions outside of the glaciated areas the Pleistocene system is represented principally by fluviatile accumulations, calcareous tufas, peat, and deposits in caves. The old river-gravels, &c. are well seen in the valleys of southern England, France, Belgium, central Europe, Spain and Portugal, Italy, &c., where they occur at the surface. But when they are followed into regions in which glacial and fluvio-glacial accumulations are well developed they disappear underneath these or are dovetailed with them. Cave-deposits are of course met with even in glaciated regions, but in such countries no Pleistocene accumulations overlie the glacial and fluvio-glacial detritus of the latest cold stage of the glacial period.

Thus, in general terms, the Pleistocene deposits of northern Europe and the mountainous regions of the central and southern parts of the continent are of glacial origin, while the accumulations outside of those areas are chiefly fluviatile. The latter were for some time believed to be upon the whole younger than the former, but the two series are now generally recognised to be contemporaneous. The occurrence of fossiliferous beds intercalated between sheets of morainic matter (boulder-clay, &c.) proves that the so-called glacial period was interrupted more than once by epochs of milder climatic conditions, during which the inland ice of the north retired from all the low grounds, while the great glaciers of the Alps, &c. shrank back to the inner recesses of the mountains. The organic remains obtained from fresh-water interglacial deposits have been correlated with those which occur in the river-accumulations of the non-glaciated tracts, and the result is that these accumulations are now admitted to be for the most part of interglacial age also. In short, the peat, river-deposits, tufas, and cave-accumulations are the equivalents in time of the glacial and interglacial deposits.

Life of the Period.—The plants and animals of the Pleistocene betoken great changes of climate—one series indicating an extremely cold or Arctic climate, while the other could only have flourished under extremely clement and uniform conditions. While a cold climate prevailed, such plants as *Dryas octopetala*, *Betula nana*, *Salix polaris*, &c. flourished in the plains of Germany, and similar northern and Arctic forms clothed the low grounds of Switzerland. In northern France grew birch, alder, larch, spruce, juniper, and yew, while in Northern Italy the Cembran pine flourished in the neighbourhood of Ivrea, and the Scotch fir on the shores of Lake Varese, positions in which it is needless to say they could not live now. Contemporaneous with this flora we meet with land and fresh-water shells which are equally indicative of cold and ungenial conditions. And the same tale is told by the boreal and Arctic species of molluscs which occur more or less abundantly in the shelly clays of north Germany, Scandinavia, and the British Islands, and by the presence of northern forms in the Pleistocene marine beds of the Mediterranean area. The character of the land animals is quite in keeping with this evidence. Living in the low grounds of central and southern Europe at this time were reindeer, glutton, musk-sheep, Arctic fox, Alpine hare, marmot, snowy vole, mammoth, woolly rhinoceros, &c. The remains of these northern and Arctic plants and animals are met with both in glaciated countries and in the caves and fluviatile deposits that occur in regions that never were covered with glacier-ice. The relics and remains of man himself also accompany the same flora and fauna. In strong contrast with such an assemblage of plants and animals is that of which we find abundant traces in interglacial beds and cave- and river-deposits. In northern France grew willows, hazels, ash, dwarf elder, sycamore, spindle-trees, perfumed cherry-tree, box, clematis, common ivy, judas-tree, Canary laurel, &c. The presence of that laurel, which flowers in winter, proves that the winters must have been very clement, and the other plants are indicative of a genial humid climate. The summers were not so hot and dry as they now are in France, and the winters were not so cold; and similar conditions obtained in Germany and the Mediterranean region—although the floras of those different zones were distinguished from each other by the presence of certain forms and the absence of others. The land and fresh-water shells associated with this flora are equally indicative of genial conditions, and similar evidence is supplied by the mammalia. Thus, we find a strange commingling of southern and temperate forms which is quite in keeping with the similar association in one and the same place of various plants which no longer live together in Europe. Amongst the animals were hippopotamus, African elephant, hyæna, serval, lion, leopard, various extinct species of elephant and rhinoceros, an extinct dwarf hippopotamus and machairodus. Contemporaneous with these were urus, bison, horse, stag, roe, saiga, beaver, hare, rabbit, otter, weasel, wild-cat, fox, wild-boar, brown bear, grizzly bear, cave-bear, Irish deer, &c. The relics and remains of Palæolithic man likewise accompany this flora and fauna.

It is obvious, therefore, that the Pleistocene period was distinguished by great climatic oscillations. At one time the whole of northern and north-western Europe, down to the 50th parallel N. lat., was covered with a vast *mer de glace*, while from the Alps and all the considerable mountain-ranges of middle and southern Europe great glaciers descended to the low grounds. From ice-sheet and glaciers mighty rivers flowed all the year round, but in summer they rose in flood and inundated wide tracts, which in time became overspread with sand and loam. It was under such conditions that a boreal and Arctic vegetation clothed the low grounds of middle Europe. Considerable tracts of that region, during the last cold stage of the glacial period, appear to have resembled steppes, and to have been inhabited by jerboas (jumping hare), spermophiles, &c. The same lands, which in some places were clothed with pine-forests, were roamed over by great herds of reindeer, mammoths, &c.—the bones of which sometimes occur together in such large numbers as to lead to the belief that the animals may have perished in snow-storms or 'blizzards.' It was then, too, that the reindeer and its associates flourished in the low grounds of southern France, where they were hunted by Palæolithic man. With the advent of interglacial times such ungenial conditions of climate passed gradually away—the ice-sheet vanishing from the low grounds of north-western Europe, while the mountain-glaciers of central and southern regions dwindled to insignificance. Great migrations of plants and animals accompanied these changing conditions, the Arctic-alpine flora and northern and alpine fauna retreating northwards and retiring to mountain elevations. At the climax of interglacial times an extremely mild and genial climate, recalling that of the Pliocene, prevailed in Europe. The Canary laurel, the fig-tree, the judas-tree, and many others flourished then as far north as Paris, in which region frost in winter was rarely or never experienced. Elephants, hippopotamuses, rhinoceroses, &c., and vast herds of bovine and cervine animals then wandered over all temperate Europe—the British area included. How often such changes of climate were repeated has not yet been ascertained, but interglacial beds occur on at least two horizons—as in France and the alpine lands of central Europe. Hence there would appear to have been at least three glacial epochs separated by two intervening epochs of genial climatic conditions. In northern Europe only one well-marked interglacial epoch is generally admitted by geologists. But the evidence is not conclusive. It is obvious, indeed, that the preservation of interglacial accumulations must have been exceptional within regions which have been severely glaciated. With the return of ice-sheet and glaciers, fluviatile and other deposits which had been laid down during interglacial times would be ploughed up and commingled with other morainic material. It is only here and there, therefore, that patches of such deposits have escaped destruction. The relics of interglacial times are most abundantly met with in countries which were beyond the reach of the ice. The closing stage of the Pleistocene was a glacial one; so that in the valleys of central and western Europe the ossiferous river-gravels of the last interglacial period are more or less buried under the fluvio-glacial gravels and loams of the latest glacial epoch. The latest Pleistocene deposits in the British area are marine clays containing Arctic and boreal shells. These deposits go up to 100 feet or so in Scotland.

Considerable geographical changes supervened during Pleistocene times. The proofs are seen in certain raised beaches in the maritime districts of north-western Europe, in the marine clays with their Arctic and boreal shells, and the marine sands, &c. of glacial and interglacial age, which are well developed in the British area. Again, the distribution of the mammalian fauna of the Pleistocene points in like manner to considerable changes in the relative level of land and sea. Thus it would appear that in interglacial times Europe was connected, across the Mediterranean, by one or more land passages with north Africa; while at the same time the British area was continental. Indeed, certain evidence leads to the belief that the European lands stretched out into the Atlantic as far as what is now the line of 100 fathoms. Towards the close of the last interglacial epoch, however, a considerable submergence of the British area supervened—for undisturbed interglacial shell-beds have been met with up to heights of several hundred feet. It is noteworthy also that the low grounds of north Germany were likewise submerged just before the invasion of that region by the last great *mer de glace*. The cause of such changes of level has been much canvassed by geologists. From the fact that evidence of submergence so frequently accompanies proofs of severe glaciation, it has been inferred that the subsidence may have been due to the presence of the ice. It has been suggested, for example, that the weight of the great ice-sheets which covered such vast regions in our hemisphere during glacial times may have displaced the earth's centre of gravity, and thus caused a rise of the sea in the north. Others, again, think it probable that under the pressure of a great ice-sheet the earth's crust may have yielded and sunk down more or less gradually. Some, again, have thought that a thick ice-sheet would exercise sufficient attraction upon the sea to cause it to rise upon the land. It must be admitted, however, that some of the oscillations of level which took place in Pleistocene times were on much too considerable a scale to be explained by any of the hypotheses referred to. If, for example, the considerable submergence which happened just before the advent in the British area of the last *mer de glace* was due to the pressure of an ice-sheet covering some region farther north, it is hard to understand how great confluent glaciers afterwards succeeded in covering an area lying several hundred feet below the surface of the sea. Again, if the crust of the earth were so readily deformed under the weight of an ice-sheet, how shall we explain the absence of any traces of contemporaneous marine action in those low-lying regions of south England and the Continent which were invaded by the great northern ice-sheet? Whatever influence the ice-sheets of the glacial period may have had upon the sea-level, it seems most probable that the greater oscillations were the result of considerable earth-movements, such as have taken place at many different stages of the world's history.

Pleistocene in other Continents.—In North America deposits of the same character and showing the same general succession as those of Europe are encountered—the glacial and interglacial conditions that characterised the latter continent having been equally characteristic of the former. The Pleistocene fauna of North America embraced Mastodon, a true elephant, species of horse, bison, beaver, peccary, bear, &c., and gigantic extinct forms of sloth, such as Megatherium, Mylodon, and Megalonyx. In South America the Pampa deposits have yielded a large number of remains of the great sloths and armadillos (Glyptodon), besides other mammals. There is abundant evidence also to show that snow-fields and glaciers had in Quaternary times a considerable development in the Cordilleras, while in Fuegia ice seems to have overflowed much of the low grounds. In South Africa former snow-fields and glaciers have left their traces in the Kaga and Krome mountains. So, again, New Zealand and Australia seem to have had a glacial period. Little is known of the mountains of central Asia, but old moraines and erratics have frequently been observed in the Chinese ranges, while, as is well known, the glaciers of the Himalayas had formerly a very great development.

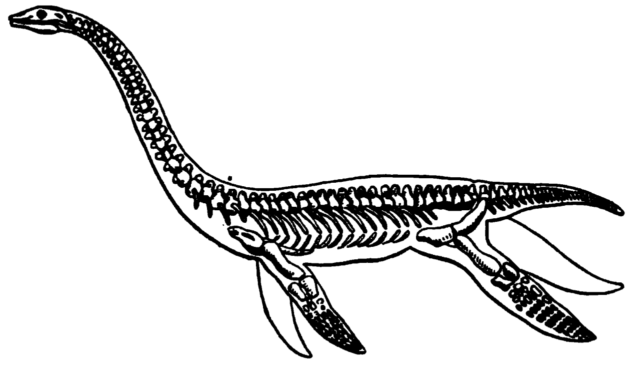
Cause of the Pleistocene Climatic Changes.—Many speculations as to the cause of the climatic changes of Pleistocene times have been indulged in. It must be admitted, however, that none of these explanations is without its difficulties. But the theory which best accounts for the facts and has gained the widest acceptance is that advanced by the late Dr Croll. According to him, the strongly contrasted climates of the Pleistocene period were the indirect result of the increased eccentricity of the earth's orbit, combined with the precession of the equinox. During a period of high eccentricity that hemisphere which had its winter in aphelion would be subject to severe cold, and its snows would not disappear during the succeeding short summer, the temperature of which would be lowered by its presence. Thus in time that hemisphere would be subjected to severe glacial conditions. In the opposite hemisphere the state of things would be very different, for the winter would be short and mild and snow would not accumulate. Under such widely contrasted conditions between the northern and southern hemispheres, the trade-winds, and through them the great equatorial ocean-currents, would be powerfully affected. The winds blowing from the glaciated hemisphere would be much stronger than those coming from the other, and the equatorial oceanic currents would thus be impelled across the equator into that hemisphere whose summer happened in aphelion. This influx of warm water would necessarily increase the temperature of that hemisphere, while the other would have its temperature correspondingly lowered. Owing to the precession of the equinox, however, the conditions of the two hemispheres would tend to be reversed every 11,000 years or so; so that during a cycle of great eccentricity each hemisphere would experience an alternation of extremely cold and very genial climatic conditions. The last period of high eccentricity commenced some 240,000 years ago and lasted for about 160,000 years. Some geologists have objected that the glacial period cannot be carried so far back in time. Thus, from an examination of the rate of erosion in the postglacial gorges of some rivers in North America (Falls of Niagara, Falls of St Anthony), some observers conclude that only 7000 or 8000 years have elapsed since the close of the ice age. But in all such measurements and estimates there are elements of uncertainty which render the conclusions based upon them of little value.

Antiquity of Man in Europe.—All the human relics met with in Pleistocene deposits belong to what is known as the Palæolithic stage. Hitherto no indubitable evidence is forthcoming to show that man was an occupant of Europe before the glacial period. It is quite possible he may have been, but we lack evidence sufficient to prove this. He certainly lived, however, throughout the glacial and interglacial conditions described above. It is remarkable that no trace of his occupation has been met with in beds of later date than those pertaining to the close of the last interglacial epoch. If we were to judge from negative evidence (which it is always unsafe to do) we should infer that he vanished from Europe during the last glacial epoch. The oldest human relics hitherto discovered in postglacial beds are Neolithic.

See Croll's *Climate and Time* (1875). Various objections which have been urged against this theory have been answered by its author in his *Climate and Cosmology* (1886). See also G. F. Wright, *The Ice Age in North America* (1889), and the articles in this work on GEOLOGY, ANTHROPOLOGY, MAN, EUROPE, STONE AGE.

Plenipotentiary. See AMBASSADOR.

Plesiosaurus (Gr. *plesios*, 'near to,' *sauros*, 'a lizard'), the type or leading genus of a family (Plesiosauridæ) of fossil sea-reptiles, which are characteristic of the Mesozoic systems. The skull of Plesiosaurus is small and depressed, with a short mandibular symphysis. The teeth (sunk in distinct sockets) are long, slender, and cylindrical, and show fine longitudinal ridges on the enamel. The most striking peculiarity of the vertebræ is the great length of the neck portion, which was composed of from 24 to 41 vertebræ—the anterior ones being generally very small. The cervical vertebræ consist of a centrum, neural arch, and two ribs, which are firmly articulated to the centra of the vertebræ, the terminal faces of which are more or less biconcave. In the dorsal vertebræ the ribs are articulated to diapophyses from the neural arch; and in the tail they gradually descend again to the sides of the centrum. The tail is much shorter than in Ichthyosaurus (q.v.). In the abdominal region the extremities of each pair of ribs are connected below by the development of the hæmal spine. The scapulæ are of moderate size and widely separated. The two pairs of limbs correspond closely in structure. The humerus and femur are comparatively short and distally much expanded; the radius and ulna, tibia and fibula are short and flat; the 'hand' and 'foot' are long, the phalangeals being increased in number beyond the normal complement. The limbs were covered with integument so as to form simple undivided paddles, as in the turtle. Plesiosaurus was undoubtedly aquatic, and probably haunted the shallow seas and estuaries of Mesozoic times. Its remains have been met with frequently in a fine state of preservation, some almost perfect skeletons having been obtained from the Lias of England. Several genera of Plesiosauridæ have been determined. One of these, Cimoliosaurus, met with in the Jurassic and Cretaceous strata of Europe, North and South America, and New Zealand, attained a length of between 30 and 45 feet. Pliosaurus was another genus, with a shorter neck (the vertebræ twelve in number) and a comparatively larger head than Plesiosaurus. In this genus the lower jaw was sometimes nearly 6 feet long. See the *Manual of Palæontology,* by Nicholson and Lydekker (1889).



Plesiosaurus dolichodeirus.

Plessis-les-Tours. See TOURS, LOUIS XI.

Plethon, GEORGIOS GEMISTOS, a Greek scholar, was most probably a native of Byzantium, and found employment in the Peloponnesus under the tyrant Manuel and Theodore Palæologus. He was sent as a deputy to the council held at Florence in 1439, and here, if he did little for the union of the Eastern and Western Churches, he did much to spread a taste for Plato. He returned to Constantinople, and died there about 1455. See vol. i. of F. Schultze's *Geschichte der Philosophie der Renaissance* (Jena, 1874).

Pleth'ora (Gr., 'fullness') designates a general excess of blood in the system. It may arise either from too much blood being made or from too little being expended. The persons who become plethoric are usually those in thorough health, who eat heartily and digest readily, but who do not take sufficient bodily exercise, and do not duly attend to the action of the excreting organs. With them the process of blood-making is always on the increase, and the vessels become more and more filled, as is seen in the red face, distended veins, and full pulse. The heart is excited and overworked, and hence palpitation, shortness of breath, and probably a sleepy feeling may arise; but these symptoms, instead of acting as a warning, too often cause the abandonment of all exercise, by which the morbid condition is aggravated. The state of plethora thus gradually induced may be extreme without any functions materially failing, and yet the subject is on the verge of some dangerous malady, such as apoplexy, or structural disease of the heart or great vessels, or of the lungs, kidneys, or liver.

Pleurisy, or inflammation of the investing membrane of the lung (*pleura*), is one of the most serious diseases of the chest. It is very often, but by no means invariably, associated with inflammation of the *substance* of the lung, commonly known as *Pneumonia* (q.v.). Pleurisy without pneumonia is much more common than pneumonia without pleurisy. When both are present, but pneumonia preponderates, the correct term for the affection is *pleuro-pneumonia*, although it is frequently spoken of simply as pneumonia, probably in consequence of the remedies being applied mainly to it, as the more important of the two elements in the compound malady.

The pleura being a serous membrane, its inflammation is attended by the same course of events as have been already described in our remarks on the two allied diseases, *Pericarditis* and *Peritonitis*. The inflammation is of the adhesive kind, and is accompanied by pain, and by the effusion of serum, of fibrinous exudation, or of pus into the pleural cavity. In the last case it is called *empyema*. In consequence of the anatomical relations of the pleura—one part of the membrane (the parietal) lining the firm walls of the chest, while the other part (the visceral) envelops the soft and compressible lung, and these opposed surfaces being freely movable on one another—it follows that very different effects may be produced by its inflammation. For example, the visceral layer may be glued to the parietal layer, so as to prevent all gliding movement between them, and to obliterate the pleural cavity, similarly to what often happens in *Pericarditis* (see article PERICARDIUM); or the two surfaces which are naturally in contact may be abnormally separated by an effusion of serum between them; or, from a combination of these results, the opposite surfaces of the pleuræ may be abnormally united at some points, and abnormally separated at others.

The general symptoms of pleurisy are rigors, pain in the side, fever, difficulty and rapidity of breathing, cough, and an impossibility of assuming certain positions; and of these the most marked is the pain or *stitch in the side*, the *Point de côte* of the French writers. The pain, often very severe, and often limited to one small spot, is usually at the lower part of the affected side; but is occasionally felt in other parts—as in the shoulders, in the hollow of the armpit, beneath the collar-bone, along the breast-bone, even in the loins, simulating lumbago; or, in the abdomen, so as to suggest peritonitis or hepatitis. In some cases it is altogether absent. The pain is increased by percussion, by pressure between the ribs, by a deep inspiration, by cough, &c.; and the patient is often observed never to draw more than a short and imperfect inspiration. Cough is not invariably present, although it is an ordinary symptom. It is small, suppressed as far as possible by the patient, and is either dry or accompanied by the expectoration of slight catarrh. If much frothy mucus is brought up it is a sign that Bronchitis (q.v.) is also present, and the appearance of rust-coloured sputa indicates the co-existence of pneumonia. Although the above-named symptoms, especially when most of them occur together, afford almost certain evidence of the existence of pleurisy, yet to the physician the physical signs are still more valuable, especially those furnished by auscultation and percussion. The *friction-sound*, characteristic of pleurisy in the dry stage in its most marked form, resembles the creaking of leather: the patient is often himself conscious of the grating sensation produced by the rubbing of the pleural surfaces; and it may sometimes be felt by a hand laid on the affected part. If fluid effusion be present the friction-sound is lost; but dullness on percussion replaces the normal resonance over the area which it occupies.

Pleurisy far more commonly arises from exposure to cold than from any other cause, especially if a poisoned condition of the blood, predisposing to inflammation of the serous membrane, is present; thus it often complicates rheumatic fever and Bright's disease; but it may be occasioned by mechanical violence (as by a penetrating wound of the thorax, by the splintered ends of a broken rib, &c.), or by the accidental extension of disease from adjacent parts. The disease may terminate in resolution and complete recovery; or in adhesion, which often only causes slight embarrassment of breathing; or it may end with such a retraction of one side of the chest as to render the corresponding lung almost or totally useless; or it may cause death either directly by actual suffocation, if the effusion is very copious, and is not removed by tapping, or indirectly, by exhaustion. It is seldom that simple pleurisy proves fatal; but empyema in adults is a very fatal disease.

In the treatment of pleurisy rest in bed, careful nursing, and light diet are essential. In acute cases in the early stage cupping, leeching, or blistering is generally indicated. When effusion has taken place, purgatives, diuretics, and absorbents should be given. But when fluid is present in large amount and is not diminishing from day to day, it is usually desirable to draw it off by tapping. If the fluid be serous this usually greatly hastens recovery. Even when it is purulent (empyema) aspiration, repeated when necessary, is often successful in the case of children; but more generally, especially in adults, free antiseptic opening and drainage of the cavity alone affords any hope of cure.

Pleurisy Root. See Butterfly Weed.

Pleurodynia is the name sometimes applied to neuralgia of the chest-wall, which may simulate closely the pain of pleurisy.

Pleuronectidæ. See Flat-fish.

Pleuro-pneumonia. The disease of this name in the human subject is mentioned at Pleurisy; the following article deals with the disease in cattle so called. Pleuro-pneumonia Contagiosa is a contagious febrile disease peculiar to horned cattle, supposed to have originated in central Europe and thence to have been conveyed to all parts of the world. It cannot be certainly traced further back than 1769, when it was known in eastern France as *Murie*. Not till 1802 was it seen in Germany, 1824 in Russia, 1841 in Great Britain and Ireland, 1843 in the United States, 1858 in Australia, and 1864 in New Zealand. It is due to a contagium which gains access to the system by the lungs, and which, after an incubative period of from two or three weeks to as many months, induces extensive inflammatory exudations in the substance of the lungs and surfaces of the pleura, finally resulting in consolidation of some portions of the lungs, occlusion of the air-tubes, plugging of the blood-vessels, and, generally, adhesion of the pleural surfaces.

It is now clearly demonstrated that pleuro-pneumonia never occurs independently of infection, that it is not fostered by overcrowding, exposure, wet, damp, dirty hovels: these influences may predispose an animal to succumb more readily, or, in other words, to become a more suitable soil for the increase of the specific organism to which undoubtedly the disease is due, as stated by the writer in 1886. He stated that the organism was a micrococcus. It has since been discovered that there are three kinds of micrococci—viz. 1st, *pneumococcus gutta-cerci*, whose colonies, when grown in artificial media, resemble drops of wax; 2d, *pneumococcus lichenoides*, which grows in a thin white layer; and 3d, *pneumococcus flaveus*, whose colonies are elongated or round in shape, and assume a beautiful orange tint. In addition to these cocci a bacillus is found, called by Arloing the *pneumobacillus liquefaciens*, and supposed by that observer to be the pathogenic organism causing the disease.

There is much variety in the manifestation of the disease. In some instances, especially during its first outbreak in a district, it runs a rapid course, destroying life in the course of a few days; in other cases, and these are the most numerous, its onset, course, and termination occupy a period of from two to eight weeks, or even longer; some animals recovering after the shorter periods, whilst others become emaciated, finally succumbing to an exhaustive diarrhœa, imperfect aeration of the blood, hydrothorax or water in the chest, the depressing influence of degenerated animal materials absorbed into the blood, and anæmia. The more prominent symptoms are slight rigors or shiverings, elevation of temperature, loss of appetite, secretion of milk diminished, an occasional cough is heard which is dry and hard in character, rumination becomes irregular, the bowels rather constipated, and the urine is scanty and high-coloured. In cases that do not begin to recover at this stage the signs of general disturbance more or less rapidly increase: the cough becomes more persistent, the respiratory movements increase in frequency, when the animal stands the elbows are turned out, and whilst recumbent the weight of the body is thrown upon the sternum or breast-bone—a posture in which, owing to the anatomical conformation of this bone, the animal can most readily expand the chest. The breathing is often but not always accompanied by a moan or grunt resembling the bleating of a goat.

Experience has led the great majority of professional men to the conclusion that the disease is not influenced by medicinal remedies; it runs a course. If the dose of the contagium is small, or the animal able to withstand a larger one, it terminates spontaneously in apparent recovery; but an animal which has thus apparently recovered still contains the germs and products of the disease, and remains a source of danger to others for an indefinite period, probably during the remainder of its existence. If, on the other hand, the dose of the specific cause be strong or the animal weak, death soon occurs. By the provisions of the Pleuro-pneumonia Act, 1889, all cattle suffering from the disease as well as those in contact with them have to be slaughtered, part of the loss being borne by the local authority.

Inoculation.—Experienced and successful inoculators are all agreed that inoculation with carefully selected lymph—and the non-success of the operation has been proved to be due to a careless selection of the inoculating fluid, and ignorance on the part of the operator—exerts a preservative influence and invests the economy of animals subject to its influence with an immunity which protects them from the contagion during a period not yet determined. Lymph for inoculation should be removed as soon as possible after the slaughter of an animal not too severely affected with pleuro. It should be a very light straw colour, the paler the better, and free from all blood and frothy mucus. It is removed from the borders of the diseased portion, collected with a porcelain spoon rendered aseptic, and conveyed into vials containing pieces of worsted thread a few inches long, which, as well as the bottles, have been aseptised. One of these worsted threads is inserted, by means of a needle made for the purpose, under the skin of the tip of the tail of each animal. Inoculation is practised to an enormous extent in Australia, many stockowners there now believing that but for this it would be impossible to rear cattle successfully.

Plevna, a town of Bulgaria, 19 miles S. of the Danube and 85 NE. of Sophia, with 14,307 inhabitants. Here in 1877 Osman Pasha, the Turkish general, after defeating the Russians in several engagements, entrenched himself against their reinforced and superior numbers early in September, and repulsed their endeavours to take the place by storm; but, after making an unsuccessful attempt to cut his way through the investing Russian army, he was compelled, provisions and ammunition running short, to capitulate (10th December) with 42,000 men and 77 guns. See *Défense de Plevna*, by Muschawer Pasha and Talaat Bey (Paris, 1889).

Pleximeter. See PERCUSSION.

Pleyel, IGNAZ JOSEPH, a musical composer, born on 1st June 1757, at Ruppertsthal, near Vienna, studied under Haydn and in Italy, and in 1783 was made Kapellmeister of Strasburg Cathedral. In 1791 he visited London, and composed there three symphonies. At Strasburg, during the frenzy of the French Revolution, he fell under suspicion of sympathy with the royalists, and barely escaped with his life. In 1795 he opened a large music shop in Paris, and in 1807 joined thereto a pianoforte manufactory. He died in Paris, 14th November 1831. His compositions, which were in their day very popular, consist of quartets, concertas, and sonatas, and are now almost wholly forgotten.

Plica Polonica is the name given to a disease of the scalp, in which the hairs become matted together by an adhesive and often fetid secretion, and which is especially prevalent in Poland, although it occasionally occurs in other countries. The hair is found, on microscopic investigation, to be infested with a fungus of the genus Trichophyton. The only treatment that is beneficial is the removal of the hair, and strict attention to cleanliness; but, as it is popularly believed in Poland that this affection affords a security from all other sickness and misfortune, it is often difficult to persuade patients to have recourse to these means.

Plimsoll, SAMUEL, 'the sailors' friend,' was born at Bristol on 10th February 1824. In his seventeenth year he became clerk in a Sheffield brewery, and rose to a position of trust in the firm. In 1854 he started business on his own account, in the coal trade, in London. Shortly afterwards he began to interest himself in the sailors of the mercantile marine, and the dangers to which they were exposed. He accumulated a mass of facts proving that the gravest evils resulted from the wilful employment of unseaworthy ships, from overloading them, and under-manning them, from bad stowage, and from over-insurance; unscrupulous owners insured rotten or 'coffin' ships at a value greatly exceeding their real value, and sent them to sea, hoping they would founder, by which means they would make bigger profits than they could make by legitimate carrying of merchandise. Failing to induce parliament to take legislative steps to put an end to these evils, Mr Plimsoll himself entered parliament, for Derby, in 1868; but it was not until he had published *Our Seamen* (1873) and had made an appeal to the general public that he succeeded in getting passed the Merchant Shipping Act in 1876, to supersede temporary measures passed during three preceding sessions. By this act the Board of Trade was empowered to detain, either for survey or permanently, any vessel deemed unsafe, either on account of defective hull, machinery, or equipments, or improper loading, or overloading; a penalty not exceeding £300 was incurred by any owner who should ship a cargo of grain in bulk exceeding two-thirds of the entire cargo, grain in bulk being especially liable to shift on the voyage; the amount of timber that might be carried as deck cargo was defined, and enforced by penalties; finally, every owner was ordered to mark (often called the 'Plimsoll Mark') upon the sides of his ships, amidships, a circular disc, 12 inches in diameter, with a horizontal line 18 inches long drawn through its centre, this line and the centre of the disc to mark the maximum load-line—i.e. the line down to which the vessel might be loaded, in salt water. Failure to comply with this last regulation exposed the owner to a fine not exceeding £100 for each offence. In 1890 this act was amended, the fixing of the load-line being taken out of the owner's discretion and made a duty of the Board of Trade. Mr Plimsoll retired from parliamentary life in 1880. But he did not slacken his efforts to make the sailors' calling safer: in 1890 he published a work on *Cattle-ships*, exposing the cruelties and great dangers connected with the shipping of live cattle across the ocean to British ports. See Japp, *Good Men and True* (1890).

Plinlimmon, or PLYNLIMMON, a large mountain-mass (2469 feet) of Wales with three summits, on the boundary between Montgomery and Cardigan, 10 miles W. of Llanidloes. The name is said to be a corruption of a Celtic word signifying Five Rivers, five rivers having their sources on its slopes; one is the Severn, another the Wye.

Plinth, the square member at the bottom of the base of a Column (q.v.). Also the plain projecting band forming a base of a wall.

Pliny (GAIUS PLINIUS SECUNDUS), called the Elder, to distinguish him from his nephew, came of a North Italian stock possessing estates at Novum Comum (*Como*), where he was born 23 A.D. He claimed to be a compatriot of Catullus, but the reference is too vague to warrant the assumption that their common birthplace was Verona. His education was carried on in Rome, under every advantage of wealth and family connection, till, when about twenty-three years old, he entered the army, serving on the staff of L. Pomponius Secundus, then conducting a campaign in Germany. He became colonel of his regiment (a cavalry one), and while attentive enough to his military duties to make a special study of the throwing of missiles from horseback, on which he wrote a treatise (*De Jaculatione Equestri*), and to compile a history (afterwards published in twenty books) of the Germanic wars, he gratified his thirst for miscellaneous knowledge by a series of scientific tours, investigating the region between the Ems, the Elbe, and the Weser, and the sources of the Danube. Returning to Rome in 52 with Pomponius, he studied for the bar, at which he practised just long enough to satisfy himself that his aptitudes were not of the forensic order. Accordingly he withdrew to his native Como, and there, during the greater part of Nero's reign, devoted himself to reading and authorship encyclopædic in their range. Apparently for the guidance of his nephew he wrote in three books his *Studiosus*, a treatise defining the culture necessary for the orator before entering on his career, and also for his nephew the grammatical work, *Dubius Sermo*, in eight books. About the close of Nero's life he was appointed procurator (collector of the imperial revenues) in Spain, where in 71 he heard of his brother-in-law's death, by which he became guardian of his sister's son, Pliny the Younger, whom, on his return to Rome two years after, he adopted. Vespasian, by this time emperor, whom he had known in the German campaign, was henceforth his most intimate friend, but court favour did not wean him from study, and so we find him bringing down to his own time, in thirty-one books, the history of Rome, by Aufidius Bassus. A model student, amid metropolitan distraction, he began work by candle-light, in autumn before the day was spent, and in winter by 1 or 2 A.M. Ere dawn he would wait on the emperor and discharge the imperial commissions imposed on him, after which he returned home once more to his books. A slight repast intervening, he resumed work, in summer lying in the sunshine while he took notes or extracts from what was read to him. True to his maxim that no book was so bad but some information might be got from it, he seized every opportunity of jotting down all that interested him either as reader or auditor. A cold bath, followed by a slender meal and a brief siesta, preceded the next spell of work, at which he continued till *cena*, the Roman dinner, at 3 P.M. Even then he listened to the reading of some book, on which he commented. Such was his life when at court; but at his country seat his studies were uninterrupted—an attendant reading to him even in the bath, or writing to his dictation while he was under the *masseur* or anointer (*aliptas*). On his journeys by land or water his secretary with book and tablets was always at hand. By this lifelong application he amassed materials enough to fill the 160 volumes of manuscript written very small on both sides which, after using them for his *Historia Naturalis* (published 77), he bequeathed to his nephew. His life, uneventful and studious, was quite dramatic in its ending. In 79 he was in command of the Roman fleet stationed off Misenum when the great eruption of Vesuvius was at its height. Eager to witness the phenomenon as closely as possible, he landed at Stabiæ (*Castellamare*), but had not gone far when his frame, corpulent and asthmatic as his nephew tells us, succumbed to the stifling vapours rolling down the hill.

His *Historia Naturalis* alone of his many writings survives. Under that title the ancients classified everything of natural or non-artificial origin—not only botany, zoology, and mineralogy, but geography, meteorology, and astronomy. Pliny, however, extends even this elastic definition, and adds to his work by digressions on human inventions and institutions, devoting two books to a very valuable, if misplaced, history of fine art. He dedicates the whole to Titus, in a turgid, ill-composed epistle, the low literary level of which is maintained throughout. Nor is his inartistic, sometimes obscure, style redeemed by much scientific faculty in handling his theme. He did not pretend to original research, but the philosophical method which sometimes distinguishes the mere compiler is equally foreign to his pages. His observations, made at second-hand, are presented with no discrimination between the true and the manifestly false, between the probable and the simply marvellous. He can even be convicted of having misunderstood the authorities on whom he relies. But with every deduction made from it as to matter and form, his compilation is a praiseworthy monument of reading at once extensive and minute, and supplies us with information on an immense variety of subjects as to which, but for him, we should have remained in the dark.

The most convenient text for the student is that of Jan and Mayhoff (6 vols. Leip. 1857–75), which embodies the best results of the recensions by Sillig and Detlefsen. The *Chrestomathia Pliniana* (Berlin, 1857) of the great archæologist Urlichs is particularly valuable for its comments on fine art; while of translations the soundest and most readable is that of Littré, in French, published along with the original Latin (Paris, 1848–50).

Pliny (GAIUS PLINIUS CÆCILIUS SECUNDUS), the Younger, was born at Novum Comum, 62 A.D. His education, after his tenth year, when his father died, was conducted under the eye of his mother, Plinia, of his tutor Virginius Rufus, of whose worth, intellectual and moral, he has left a beautiful memorial, and of his uncle who adopted him. He early displayed high literary aptitude, wrote a Greek tragedy in his fourteenth year, and made such progress under Quintilian that, like his friend Tacitus, he became noted as one of the most accomplished men of his time. His proficiency as an orator enabled him, when not more than eighteen, to plead in the Forum, and brought him much practice, not only at the Centumviral bar, chiefly in will-cases, but also before the senate. Official appointments came to him in quick succession. Then, still young, he served as military tribune in Syria, where he frequented the schools of the Stoic Euphrates, and of Artemidorus; at twenty-five, the earliest possible age, he was *quæstor Cæsaris*, then prætor, and afterwards consul in 100 A.D., in which year he wrote his laboured panegyric of the Emperor Trajan. In 103 he became proprætor of the Provincia Pontica, but vacated the post in two years, and, among other offices, held that of curator of the Tiber, chiefly for the prevention of floods. He married twice; his second wife, Calpurnia, granddaughter of Calpurnius Fabatus, is fondly referred to in one of his most charming letters for the many gifts and accomplishments with which she sweetened his rather invalid life. He died without issue, but in what year is unknown.

It is to his letters that Pliny owes his assured place in literature as one of the masters of the epistolary style. An avowed imitator of Cicero, he has caught much of the charm of his model, while his Latinity is hardly, if at all, inferior in purity and ease. His meaning, though never obscure, is generally fuller than his expression, and, reading between the lines, we discern the features of a truly lovable man, quite aware of his strong as of his weak points, much given to hospitality, and always pleased to help a less favoured brother, such as Suetonius or Martial. We derive from him not a few of our distinctest impressions of the public and private life of the upper class in the 1st century; above all, it is from his correspondence with Trajan that we get our clearest knowledge of how even the most enlightened of the Romans regarded the then obscure sect of the Christians. It appears that a person acknowledging himself a Christian was liable to punishment, even to death. When under examination, however, no Christian would admit anything further than his practice of meeting with his co-religionists on an appointed day before it was light; singing a hymn to Christ as God (or 'as to a God'—*quasi deo*); and taking an oath which bound him to no crime, but never to commit theft, robbery, adultery, and malfeasance, and never to deny a deposit. Even when put to the torture, two female slaves, said to be deaconesses, confessed nothing more to Pliny, who thereupon consulted the emperor as to how he might stop the spread of what he could only call 'a depraved and extravagant superstition.' Trajan declined to lay down a general rule for dealing with the Christians; he recommended that they should not be sought out on suspicion, but that, if accused and convicted of holding that faith, they should be punished. Accusations unsupported by an accuser were not to be received, while suspected cases were to have an opportunity of clearing themselves by offering prayers to the Roman gods (*diis nostris*).

Keil's text of the *Epistles* and *Panegyricus* (Leip. 1853) is the best, while a useful selection with a good commentary has been published by Church and Brodribb (1871). Melmoth's translation (1746) is free and eminently readable; Orrery's, of the *Epistles* (1751), is still esteemed.

Pliocene System. Strata belonging to this system are restricted in Britain to a limited area in Essex, Suffolk, and Norfolk; but a few isolated patches occur also in Cornwall and Kent. They consist of irregular lenticular beds of sands and shelly gravels, &c., which never occur altogether in one place. The whole series probably does not exceed 120 feet in thickness, and comprises the following groups arranged in descending order:

CROMER FOREST-BED: fresh-water or estuarine silts, clays, and sands, with layers of peat; 10 to 70 feet thick. The fossils are land and fresh-water molluscs, many land-plants, and numerous mammalian remains.

CHILLESFORD BEDS: sands and clays; 6 to 16 feet thick; contain marine shells, some two-thirds of which are existing Arctic species.

NORWICH CRAG: fluvio-marine gravel, sand, and loam; 5 to 10 feet thick. Fossils, chiefly marine molluscs; several land and fresh-water shells; and numerous mammalian remains—hence the name of 'mammaliferous crag' sometimes applied to this group. Of the shells 93 per cent. are living species—14·6 per cent. being northern forms.

RED CRAG: red ferruginous shelly sand, 25 feet thick, but local and inconstant. About 90 per cent. of the numerous shells occurring in this deposit are existing species—10·7 per cent. being northern forms.

LENHAM BEDS: sands, &c., occupying 'pipes' or hollows in the chalk of the North Downs, some 600 feet above the sea.

ST ERTH BEDS: clays and gravels, near St Erth, Cornwall; many shells, about 40 per cent. being of extinct species.

WHITE OR CORALLINE CRAG: shelly sands and clays; fossils abundant; 84 per cent. of the shells are living species, and of these 5 per cent. are northern forms. Polyzoa (popularly called *corals*) are numerous, hence the name sometimes applied to this group.

On the Continent Pliocene marine deposits are met with in various countries, usually in maritime regions, as at Antwerp and in the west of France in the Cotentin, Morbihan, and Aquitaine. But it is in the Mediterranean basin that this system attains its greatest development. Thus, at various points along the foot of the Alps in North Italy Pliocene beds appear, and they likewise occur along both sides of the Apennines, forming the sub-Apennine formation; while in Sicily they attain a thickness of 2000 feet. In middle Europe the most important Pliocene strata are the fresh-water beds of the Mayence basin, and the fresh and brackish water beds of the Tertiary basin of Vienna. The calcareous tufas of France and Italy belonging to this system are notable for their plant-remains.

Life of the Period.—The flora of Pliocene times indicates a more temperate climate than that of the preceding Miocene. Many Miocene forms still lived in Europe, but the palms and other characteristic Miocene plants had disappeared. Ivy, platanus, liquidambar, various maples, many walnut trees, elms, hornbeams, magnolia, tulip-tree, Canary laurel, oleander, vine, glyptostrobus, sassafras, and others ranged from Tuscany to the heart of France—such plants as beech, poplar, lime, oak, sassafras, maples, bamboos, vines, &c. growing amongst the mountains of Cantal. The general character of the flora recalls the floras of distant regions—North America, the Canary Islands, eastern Asia, and Japan. The abundant evergreen plants of the period seem to have grown chiefly on the low grounds; at higher elevations pines and deciduous trees were the prevailing forms. The flora of the Norwich Crag shows that towards the close of the period the British area was clothed with a vegetation somewhat similar to that of the present. The molluscan fauna includes an increasing number of living species. In the lower groups of the system the general facies of the shells is southern, but in the upper groups the southern types decrease in importance and are gradually replaced by temperate and northern forms. Amongst land animals we find several survivors from earlier times, such as Dinotherium and Mastodon, with which co-existed many other pachyderms—elephants, rhinoceroses, hippopotamuses, and tapirs. Herbivorous quadrupeds also abounded—horses, giraffes, and various cervine and bovine forms. Carnivores (panthers, bears, wolves, &c.) were well represented, and apes and monkeys also formed a marked portion of the fauna. The Pliocene beds of Pikermi in Attica, and of India (Siwalik group), have yielded a large number of extinct and living types. At Pikermi occur the remains of many ruminants, amongst which are species of giraffe, Helladotherium, and various cervine and bovine forms, together with Mastodon, rhinoceros, Dinotherium, hyæna, and others. The Siwalik beds contain Hyænarctos, Machairodus, and other Miocene forms, and Sivatherium and Bramatherium, gigantic four-horned animals allied to antelopes. With these are associated many living genera, such as Felis, Hyæna, Canis, Bos, Bison, Capra, Ovis, &c. It may be noted that from the Pliocene of the Upper Missouri region of North America remains of an abundant mammalian fauna have also been obtained—a fauna which had a strikingly oriental aspect.

In Pliocene times the Mediterranean covered many tracts which are now dry land. The valley of the Po then formed a great arm of the sea which penetrated into the mountain-valleys of the Alps, while Italy and Sicily were largely submerged. Considerable tracts in the maritime districts of southern and western France were likewise under water. The sea also overflowed some part of the south of England (Cornwall and Kent) and encroached upon the low grounds of Belgium and East Anglia. The long arms of the sea, which in the Miocene period had stretched from the Mediterranean through France into Switzerland and the valley of the Rhine, had vanished, while fresh-water and saline lakes occupied part of the area in Austro-Hungary which had been more or less open sea in Miocene times. Much of south-eastern Europe, however, continued submerged—the sea extending through the Aralo-Caspian depression into Asia. One of the most notable events of the Pliocene was the birth of Etna, Vesuvius, and the now extinct volcanoes of Central Italy. In early Pliocene times the climate was mild and genial, but the conditions became less so during the closing stages of the period. This change is evidenced particularly by the increasing number of northern molluscs and the occurrence of ice-floated erratics in the English Pliocene.

Pliosaurus. See PLESIOSAURUS.

Plock (Ger. *Plozk*), a town of Russian Poland, on the right bank of the Vistula, 60 miles NW. of Warsaw. Its principal building is the cathedral, built in the 11th century. One of the oldest towns in Poland, Plock was the capital of ancient Masovia, and was severely ravaged by the heathen Prussians, the Lithuanians, and the Swedes. Pop. (1885) 20,660, including many Jews.

Plojeshti, or PLOESCI, a town of Roumania, 37 miles by rail N. of Bucharest, with petroleum-refineries and a large trade in wool. Pop. 33,691.

Plombières, a spa in the French department of Vosges, 14 miles S. of Épinal, sprang into fashion through the favour of Napoleon III., though the virtues of its waters were known ever since the times of the Romans. There are nearly thirty springs, ranging in temperature from 66° to 150° F.; their waters are helpful against skin diseases, gout, rheumatism, dyspepsia, female complaints, &c. A handsome casino was opened in 1876, and there are picturesque walks and a park in the valley in which the village stands. Pop. 1971.

Ploti'nus, the most original and important philosopher of the Neoplatonic school, was born at Lycopolis in Egypt in 205 A.D., and studied philosophy under Ammonius Saccas. In 242 he joined Gordianus' expedition to Persia, in order to study the philosophy of India and Persia; but the emperor being murdered in Mesopotamia, he returned hurriedly to Antioch, whence, in 244, he went to Rome. His lectures here were attended not only by crowds of eager youths, but men and women of the highest circles flocked to hear him. Not only Neopythagorean and Neoplatonic wisdom, but asceticism and the charm of a purely contemplative life were the themes on which he, in ever new variations, and with an extraordinary depth and brilliancy, held forth; and such was the impression his earnestness made upon his hearers that some of them really gave up their fortune to the poor, set their slaves free, and devoted themselves to a life of study and ascetic piety. It is hardly surprising to find that his contemporaries coupled with his rare virtues the gift of working miracles. Sixty years old, he thought of realising Plato's 'Republic,' by founding an aristocratical and communistic commonwealth; and the Emperor Gallienus was ready to grant a site in Campania for his 'Platonopolis;' but he died near Minturnæ in 270. Although he began to write very late in life, he yet left fifty-four books of very different size and contents to the editorial care of his pupil Porphyry, who arranged them in six principal divisions, each subdivided again into nine books or *Enneads*.

Plotinus' system was based chiefly on Plato's, combined with Neopythagoreanism and the oriental theory of Emanation—i.e. the constant transmission of powers from the Absolute to the Creation, through several agencies, the first of which is 'Pure Intelligence,' whence flows the 'Soul of the World,' whence, again, the souls of 'men' and 'animals,' and finally 'matter' itself. Men thus belong to two worlds, that of the senses and that of Pure Intelligence. It depends upon ourselves, however, to which of the two worlds we direct our thoughts most and belong to finally. The ordinary virtues, as, justice, moderation, valour, and the like, are only the beginning and very first preparation for our elevation into the spiritual realm; purification is a further step, to which we attain partly through mathematics and dialectic; and the abandonment of all earthly interests for those of intellectual meditation is the nearest approach to the goal. The higher our soul rises in this sphere of intellect, the deeper it sinks into the ocean of the good and the pure, until at last its union with God is complete, and it is no longer thought but vision and the ecstasy which pervades it. These are a few snatches of Plotinus' philosophical rhapsodies, to which may be added his mysterious belief in a kind of metempsychosis, by which souls not sufficiently purified during life return after death, and inhabit, according to their bent, men, animals, and even plants. He further held somewhat fantastic views as to gods and demons, and professed faith in astrology and magic. His was the last attempt by the ancient world to solve the great problems not by ratiocination, but through introspective mysticism; and his mode of thought had very unmistakable influence on early Christian philosophy, modern theosophy, and various German idealistic systems.

See NEOPLATONISM and works there cited, and works on Plotinus by Kirchner (1854), Brenning (1864), and Kleist (1884).

Plots must be distinguished on the one hand from Assassinations (q.v.) and on the other from Rebellions (q.v.). They involve the elements of secrecy and conspiracy, but have not always political assassination for their object, nor do those who carry them through, or attempt to do so, put arms in the hands of a great number of men. The subjoined list only professes to give a selection of the more noteworthy plots of history, intended to supplement the lists given under ASSASSINATION and REBELLION. Details of most of them will be found under separate articles.

Catiline's Conspiracy, 63 B.C.
Quirini-Tiepolo in Venice, 1310.
Marino Falieri's Plot in Venice, 1355.
Plot of Fieschi against Andrea Doria at Genoa, 1547.
Raid of Ruthven in Scotland, 1582.
Babington's Plot against Elizabeth, 1586.
Death of Prince Demetrius in Russia, 1591.
Gowrie Conspiracy in Scotland, 1600.
Gunpowder Plot in England, 1605.
Titus Oates' pretended Popish Plot, 1678.
Meal-tub Plot, 1679.
Rye-house Plot against Charles II., 1683.
Assassination Plot to kill William III. of England, 1696.
Plot of Catharine against Peter III. of Russia. 1762.
Colonel Despard's Plot against George III., 1802.
Plot of Cadoudal and Pichegru against Napoleon, 1802.
Malet's Plot against Napoleon, 1812.
Cato Street Conspiracy, 1820.
Orsini's attempt upon Napoleon III., 1858.
Numerous Nihilist plots in Russia, 1881-91.
Abduction of Alexander of Bulgaria, 1886.

Plough. The first in order and importance of agricultural operations is the breaking up of the soil, and the implement employed most largely for this purpose is the *plough*. The general form of the plough is known to every one, and to the unobservant eye it appears to be a very simple and even primitive tool; nevertheless, much mechanical skill and ingenuity have been expended in perfectly adapting it to its work. It is a combination of instruments (fig. 1) fastened to a beam, GBL; the *coulter*, K, is an iron knife-blade, for cutting the sod vertically; the *share*, CFD, which is merely a socket fitted on and not fastened to the body of the plough, has a sharp point, C, and a projecting horizontal edge, CO, on its right-hand side, its part of the work being to separate the under surface of the sod from the subsoil; by means of the *mould-board*, H, the slice, now wholly separated from the firm ground, is raised up and turned over by the forward motion of the plough; and the *stilts*, or handles, one of which, BL, is a continuation of the beam, the other, M, being fastened partly to the former by rods, and partly to the lower portion of the framework (fig. 2, which also shows the point of the plough with the share

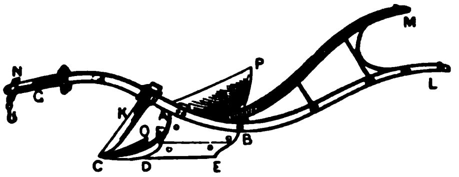


Fig. 1.

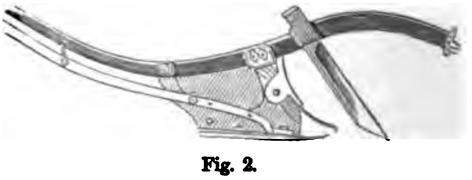


Fig. 2.

removed), are for the purpose of guiding the implement. The front part of the beam is formed with an upward curve; at its extremity is placed the *bridle*, N, to which the horses are attached by means of swing-trees and chains or traces, and the object of which is to enable the workman to elevate or depress the line of draught, or move it to the right hand or the left, as may be found necessary. The left sides of the coulter, share, and framework ADEB should evidently be in the same vertical plane. The form of the mould-board is of the utmost importance, and has chiefly attracted the attention of agricultural machinists since the time when improvements on the plough were first projected. Its office being to raise and turn the sod, it is necessary that the surface should slope upwards and outwards from the front, so as to apply a pressure in both directions, and, accordingly, the surface is so shaped that from the point of the share, where it is horizontal, it gradually curves upwards, till, at the extremity, P, it inclines over away from the body of the plough. The gradual change produced on the position of the furrow-slice is seen in fig. 3, where ABCD on the left-hand side represents the slice untouched by the plough, AD being the line of section by the coulter, DC by the share, BC the open side from which the previous furrow (E) to the right hand side has been separated, and the four successive rectangles, ABCD to the right, illustrate the successive changes of position of the furrow as the mould-board is pushed forward under and on its left side, till it is finally left, as represented in ABCD, on the right hand; E, F, G are furrows which have previously been laid in their proper position. The modern plough is wholly formed of iron, and in nearly all the English and several of the Scotch and Irish made ploughs wheels are attached at or near the front end of the beam, a contrivance which renders the implement more steady in its motion, more easily managed, and capable of doing better work in the hands of an inferior workman. The usual dimensions of the furrow-slice in lea or hay-stubble are 8 or 9 inches in breadth by 6 in depth, and in land for green crop 10 or 11 inches in breadth, and 7 to 9 in depth. Shallower ploughing is not unfrequently adopted, especially on thin soils, and in various parts of England. Nor is it uncommon to plough stubble-land 10 inches or more in depth.

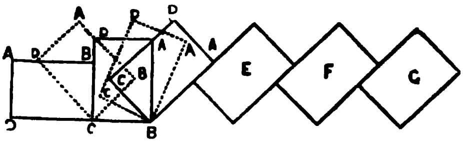


Fig. 3.

Other kinds of ploughs are used for special purposes, such as *trench-ploughs*, which are made on the same principle as the common plough, but larger and stronger, so as to bring up a portion of the subsoil to the surface; *subsoil ploughs*, some patterns of which have no mould-board, and merely stir and break up the subsoil, thus facilitating drainage; *double mould-board ploughs*, which are merely common ploughs with a mould-board on each side, and are employed for drilling turnip or potato land, for water-furrowing, and for earthing up potatoes; *turn-wrest ploughs*, which have the mould-board so arranged that in going in both directions the furrow is turned to the side; American *Chill ploughs*, which are exceptionally light in draught, go over the ground rapidly, and break up the surface soil more finely than the ordinary plough; the *double-furrow plough*, which turns two furrows at one operation, and which, although used on many farms, has not become so popular as was at one time expected. Of each of these ploughs there are many varieties, each maker having generally some peculiar views regarding the form and proportion of some parts of the instrument. For those who wish to study minutely the best form of plough it will be necessary to consult works on agriculture and agricultural implements.

The operation of ploughing can only be briefly referred to. Wherever the soil has been efficiently drained the ridges can be made wider and ploughed on the flat, high ridges being no longer necessary for carrying off the water. It is found in practice that the fewer the open furrows the better, particularly when the land is intended for a grain crop which is to be sown by drill or broadcast with machinery, and when the crop is to be cut with a reaping-machine, as is now almost universally the case. It is curious to notice how one improvement in farm practice leads on to another. The most common mode of ploughing with horses is now simply by casting the soil two ridges in and the next two out, beginning always with the two ridges where last time was left the open furrow.

The process of feering or commencing a ridge differs according to the state of the land to be turned over. If there exists an old furrow or hollow, as is generally the case in lea, two shallow furrows are turned, the one against the other, and so on; along each side of this commencement the plough moves, adding furrow after furrow, and increasing in depth until the third or fourth round is reached. This constitutes what is technically called the gathering system. In newly-cleaned land, or where a hollow does not appear to turn the first furrows into, two furrows are thrown out and then turned lightly in. The most common system, however, is what is known as *casting* or *cleaving*. That is, after one feering is accomplished, another is made at the other side of the ridge, and furrow after furrow is turned towards the inside of each of these feerings until the whole ridge is ploughed, and then in the centre is formed the *finish* or *mids*—a furrow or trench into which the feering is turned the next time the land is ploughed.

The plough is one of the most ancient of implements, and is mentioned in the Old Testament at a very early period, iron shares being also incidentally noticed more than seven centuries B.C. Dr E. B. Tylor has in his *Anthropology* clearly shown how the plough arose by gradual development out of the hoe, and that out of the pick or hatchet.

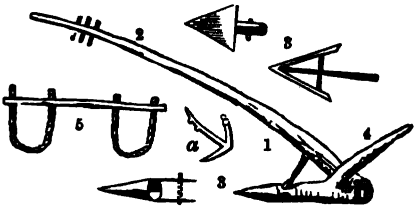


Fig. 4.

1, Plough still used in Asia Minor; 2, its pole, where the oxen are attached; 3, shares of various forms; 4, the tail or handle; 5, the yoke; *a*, early Greek plough.

The fields of Sweden were formerly tilled with the 'hack,' of which specimens were still seen in the 19th century. The hack was simply a 'stake of spruce-fir with a bough sticking out at the lower end cut short and pointed.' This implement was gradually made heavier, and dragged by men through the ground, so as to make a simple furrow. Next it 'was made in two pieces, with a handle for the ploughman and a pole for the men to drag by, the share was shod with an iron point, and at last a pair of cows or mares were yoked on instead of the men.' The development of the Egyptian plough was similar. The ancient Egyptian plough was wholly of wood, and in some instances consisted of little more than a pointed stick, which was forced into the ground as it was drawn forward; though there seems to have been ploughs with handles, and with metal socks. The Aryan peoples took pride in their being the ploughing (*arare;* see Agriculture, Vol. I. p. 98) peoples. The earliest form of the Greek plough, the *autoguon* (fig. 4, *a*), is an example of this; it was merely the trunk of a small tree, which had two branches opposite to each other, one branch forming the share and the other the handle, while the trunk formed the pole or beam. The more improved form, the *pekton*, in use among the Greeks, was not substantially different from the modern form in use in some parts of Asia Minor (fig. 4). The ancient Egyptian plough in one of its early stages is represented in fig. 5. The Romans, an essentially practical nation, largely improved on the plough, adding to it the coulter and mould-board, and occasionally attaching wheels to the beam to prevent the share from going too deep into the earth (fig. 6). The plough was almost unknown among the American aborigines, though Prescott describes a mode of ploughing practised among the Peruvians, which consisted in the dragging forward a sharp-pointed stake by six or eight men, its sharp point, which was in front, being kept down in the ground by the pressure of the foot of another man who directed it. The ancient heavy plough dragged by eight oxen was still in use in Aberdeenshire well into the 18th century. In Britain the most important amendments on the plough are not two centuries old, and some of them were doubtless borrowed from the careful agriculture of Holland. England took the lead in improvement, followed some time later by Scotland, in which the chief improvers were James Small (the inventor of the Scotch *swing* plough), Wilkie, Gray, and Sellar. In England the improvers have chiefly been Ransome of Ipswich (the patentee in 1785 of the cast-iron share), Howard of Bedford, Hornsby of Grantham, and Busby of Bedale, the last of whom gained a medal for his mould-boards at the Great Exhibition of 1851. Ransome's wheel-plough has long finely-made mould-boards, rather short broad shares, straight coulters, and with the two wheels on level land can almost move unattended. Ancient types, however, still survive; the East Anglian plough has only one (wooden) stilt, and is very heavy, but makes good work. There are many specially American types of plough. In the Sulki plough wheels support the weight of the plough and of the furrow-slice, decreasing friction, and saving labour to the ploughman, who has a seat on the implement; the disadvantage is the much greater cost of this kind of plough, and the cumbrous size. The Double Michigan plough has a small paring plough on the beam in front of the other; the small plough pares off the surface and throws it into the previous furrow, and the large one completely buries it under a heavy furrow-slice. Reversible ploughs, like the Oneonta Clipper, have the share and mould-board, so that they can be easily changed from one side to the other; these are also called swivel ploughs or side-hill ploughs.

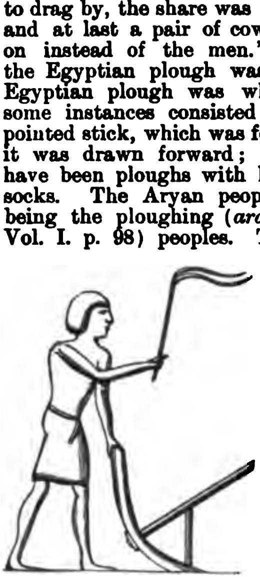


Fig. 5.

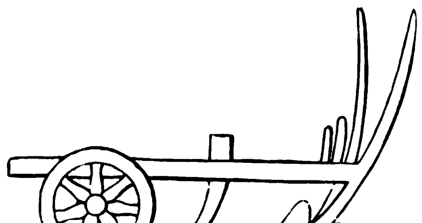


Fig. 6.

Steam-ploughing.—It has been alleged that the cultivation of the land by steam had been contemplated as far back as the 17th century. So long ago as 1618 David Ramsey and Thomas Wildgosse took out letters-patent for engines and machinery to plough the ground without the aid of oxen or horses, and the attempt has been made to show that steam was the motive power intended to be employed; but, as the first patent was taken out nearly forty years before the Marquis of Worcester described the steam-engine in his *Century of Inventions*, the grounds for such an opinion do not seem quite satisfactory. In 1769, however, after the steam-engine had been applied to other purposes, there was lodged in the Patent Office a specification for a new machine or engine, to plough, harrow, and do every other branch of husbandry, without the aid of horses. The patentee was Francis Moore; and so confident was he of the merits of his plan that he sold all his own horses, and persuaded his friends to do the same; 'because the price of that noble and useful animal will be so affected by the new invention that its value will not be one-fourth of what it is at present.' Moore, like many who followed in his wake, was much too sanguine. The truth is that even yet steam-power has only to a very small extent supplanted horse labour in the cultivation of the soil. Early English patentees were Pratt in 1810, and Heathcote in 1832. But the first steam cultivating apparatus which gave anything like satisfac-

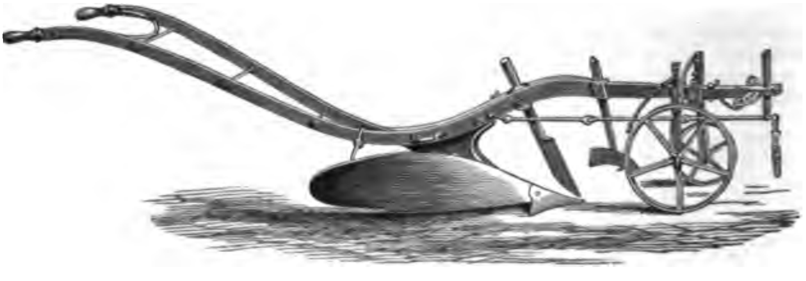


Fig. 7.—Ransome's Wheel Plough.

tory promise of success was that for which Messrs Fisken of Stamfordham, Newcastle-upon-Tyne, took out a patent in 1855. Mr Fowler of Leeds, and Messrs Howard of Bedford, and others followed with apparatuses of various patterns. The different inventions brought into notice from time to time have included plans for engines travelling over the surface of the ground, drawing ploughs or other cultivating implements along with them; engines working on tramways and drawing implements after them; engines moving along opposite headlands, and working implements between them by means of wire-ropes, and stationary engines driving implements also by means of wire-ropes. Only two of these systems got beyond the experimental stage. These are what are called the direct and round-about—the former where the pull of the implement is directly to and from the engine, or between two engines, one at each end of the furrow; and the latter where the implement is drawn at right angles. The best known of the apparatuses now in use are those made by Fowler, Howard, and Barford and Perkins, of Peterborough.

The ploughs used in the various systems are very similar in construction, some taking four and others six furrows at each time. Fowler's apparatus is shown at work in figs. 8 and 9.

It has to be noted, however, that, with all the ingenuity and capital expended on the perfecting of the appliances, steam-power has not been employed in the cultivation of the soil anything like so advantageously or extensively as was at one time expected by the advocates of the practice. The great agricultural depression following the disastrous year of 1879 gave the system its first serious check. The injury unwittingly done to large extents of land by excessively deep-ploughing—by burying the good soil and bringing bad material to the surface—also tended to discredit steam-cultivation. It has as a rule been found in practice that moderate ploughing and deep stirring are preferable to deep ploughing, and steam-power is now more largely employed in stirring and harrowing the soil than in turning it over in furrows. Upon extensive farms, where the fields are large and conveniently shaped, steam-tillage may be pursued with excellent results, if the farmer is careful to adapt the operations to the particular character of the soil. Steam-tillage, if wisely directed, is more thorough than tillage by any other power, and the great speed attainable is also an important consideration, especially in precarious seasons, when the soil is not long in a favourable condition for being worked.

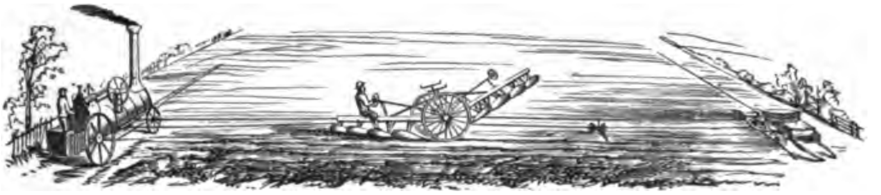


Fig. 8.—Fowler's Anchor, Engine, and Plough at work.

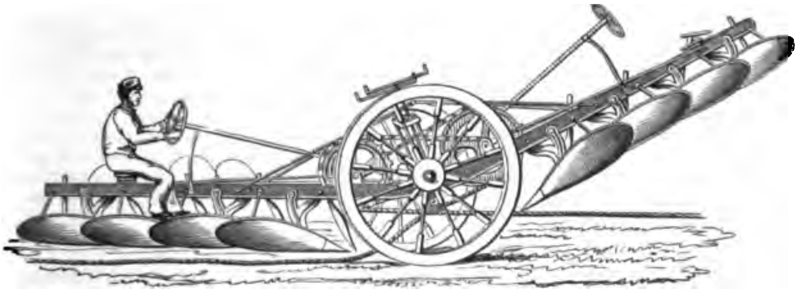


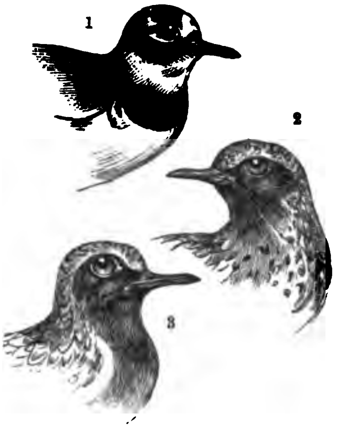
Fig. 9.—Fowler's Plough.

See Morton's *Cyclopædia of Agriculture* (1856); Stephens' *Book of the Farm* (new ed. by present writer, 1890); and the *Book of Farm Implements*, by Slight and Scott Burn (1858); Professor J. Scott's *Farm Engineering* (1884); and Scott Burn's *Text-book of Farm Engineering* (1885).

Ploughgate, in the law of Scotland, is an expression denoting a quantity of land of the extent of 100 acres Scots. See CARUCATE.

Plough-Monday, or PLOW-MONDAY, the Monday after Twelfth Day, and termination of the Christmas holidays, when, according to the old usage, the plough should be set to work again. On Plough-Monday ploughmen were wont to drag a plough from door to door, begging money for the usual antics and ruder festivities.

Plover, a name given to numerous species of birds belonging to several genera of the family Charadriadæ. They have a straight compressed bill, but the upper jaw is slightly inflated and slightly bent at the point; the nasal groove extends about two-thirds of the length of the bill, the nostrils are longitudinally cleft near the base; the legs, which are not very long, are naked a little above the tarsal joint; with one exception there is no hind-toe; the wings are rather long and pointed, the first quill-feather is the longest. The species are numerous, and are found in every quarter of the globe; many of them are birds of passage. They chiefly frequent low, moist grounds, where they congregate in large flocks, and feed on worms, molluscs, insects, &c.; but some of them visit mountainous regions in the breeding season. They fly with great strength and rapidity, and run with much swiftness. The flesh and eggs of many of them are esteemed delicacies. A common British species is the Golden Plover (*Charadrius pluvialis*), a handsome bird, of a blackish colour, speckled with yellow at the tips and edges of the feathers; the throat, breast, and belly black in summer, whitish in winter. The golden plover is a bird of passage, visiting in summer the northern parts of Europe, of the west of Asia, and of North America, and migrating to the south in winter. It is known in most parts of Europe, and is common in many districts of Britain, breeding in the northern counties. Great numbers frequent the sandy pastures and shores of the Hebrides and of the Orkney and Shetland Islands. It makes an artless nest, little more than a slight depression in the ground, and lays four eggs. The parent birds show great anxiety for the protection of their young, and use various stratagems to divert the attention of an enemy. The golden plover exhibits great restlessness on the approach of wet and stormy weather, whence its specific name *pluvialis*. The Ringed Plover (*Ægialitis hiaticula*), locally called Stonehatch or Sandlark, a much smaller bird, not so large as a song thrush, is found at almost all seasons on the shores of the British Islands, frequenting sandy and shingly flats, from which the sea retires at ebb-tide. It is often to be seen also on the banks of large rivers, and not unfrequently by lakes and ponds. It is found in most of the northern parts of Europe and Asia, and in Iceland and Greenland. It is grayish brown above, whitish beneath, with a collar of white round the neck, and below it a black—in winter a brown—collar; the head marked with black and white; a white bar on the wing. Very similar, but smaller, and with an incomplete collar, is the Kentish Plover (*Æ. cantiana*); and also similar in form and habits is the smallest of the British species, the Little Ringed Plover (*Æ. curonica*). Both of these are rare in Britain. The Gray Plover (*Squatarola helvetica*), a species somewhat larger than the golden plover, is distinguished by black axillaries, white tail-coverts, and the presence of a hind-toe. North America has a number of species of plovers, such as the Kildeer Plover (*Æ. vocifera*), abundant on the great western prairies, and not unfrequent in the Atlantic states. It utters, when approached by man, a querulous or plaintive cry, like the lapwing, the Green Plover. See Dotterel, and Lapwing; and for the so-called Stilt Plover, see Stilt.



1, Ringed Plover; 2, Gray Plover; 3, Golden Plover.

Plover's eggs are sold in enormous quantities in London and other large towns, and command an extraordinary price, eighteen shillings a dozen or even more, being sometimes given for them, and the cost is seldom less than threepence or sixpence per egg. These are supposed all to be plover's eggs, or, really, lapwing's eggs; but doubtless the eggs of many other birds are substituted, those of the red-shank being very similar in appearance and flavour. Rook's eggs are too decidedly unlike the plover's to be put in their place. Some sea-birds' eggs are occasionally passed off under the name; and it is said that eggs outwardly unlike plover's have been skilfully painted by hand in order to deceive. Scotland, Ireland, and Holland are all laid under contribution to produce the tens of thousands of dozens of genuine plover's eggs which it is computed are annually consumed in London.

Plum (*Prunus communis* or *P. domestica*), a species of fruit-tree of the natural order Rosaceæ. The plum is so familiar as a fruit in all temperate countries as to need no description here. The Wild Plum, or Blackthorn, or Sloe (q.v.), is common in English hedgerows, thickets, and open woods, and occurs more sparingly in similar places in Scotland. It is abundant in Europe generally, and in Russia and central Asia. From the sloe all cultivated varieties of the plum are supposed to be derived, but some conjecture that *P. insititia* (Bullace, q.v.) and *P. spinosa* are the parents of some of the types of these varieties. The most reasonable probability is that the several forms of wild plum found in England and in other countries where they abound are merely varieties of one species—*P. domestica*. Other varieties of plum, besides the Sloe, Bullace, and Damson found wild in England, are the Mussel and the Wine Sour, which are used in cooking and in confectionery, and are regarded as primary varieties of the wild plum. The cultivated varieties of the plum are very numerous; there are larger and smaller kinds, but their value in the dessert is reckoned by their sweetness and flavour rather than by their size. Thus, the Green Gage, a kind with only moderate-sized fruit, is the most esteemed of all. It is the *Reine Claude* of the French, and the *Regina Claudio* of the Italians. *Magnum Bonum*, a very large white variety, though one of the handsomest, is accounted only of second-rate quality. The uses of the plum for dessert in the making of pies, tarts, preserves, and sweetmeats are familiarly known. *Prunes* are the dried fruit of certain kinds of plum. The finest of all the French prunes are made at Brignole in Provence of the varieties of plum called *Perdrigon blanc* and *Perdrigon violette*, which are hence named *Pruneaux de Brignole* or *Brignoles*. The manner of converting these plums into prunes is by drying in a slow oven. The fruit is allowed to remain on the tree till it is so ripe that a little shaking would cause it to fall. They are then carefully picked and spread out in the sun on sieves made of lath or wickerwork, till they become soft. Afterwards they are put in a spent oven, and shut up close in it for twenty-four hours, and then taken out. The oven is again heated, somewhat warmer than before, and the plums returned to it till the following day, when they are taken out and turned by slightly shaking the sieve. Again the oven is re-heated, rather warmer than before, and the fruit returned to it for twenty-four hours, and so on till the operation of drying is finished, a point which only experience can nicely determine when reached. Other kinds of prunes of inferior quality are made from the fruit of the *Petit Damas*, and from the *Quetsche*, the latter being made in Germany. From this also is distilled a kind of brandy. In Bosnia and Herzegovina nearly 50,000 tons of prunes are produced in a good season. Prunes are nutritious and laxative, and stewed in water are excellent diet in cases of costiveness, and during convalescence from fevers and inflammatory complaints. They impart their laxative quality to the water in which they have been stewed, and thus a pleasant and beneficial decoction may be prepared for those who through impairment of the digestive organs cannot eat the fruit. The plum is grown in orchards as standard and bush trees, or they are in the case of the choicer varieties trained to walls. It is not fastidious as to soil, but the finest fruit is produced on strong but well-drained loam. The superior kinds are propagated chiefly by budding and by grafting, the inferior by layers or by cuttings of the roots, the latter being a common method in rearing Damsons in some parts; but the quickest and best method of increasing all is by budding. The wood of the plum-tree is hard and fine-grained, and is used in cabinet-work, in turnery, and for making musical instruments. The Cashmere Plum (*P.*

Bokharensis), cultivated in Cashmere and Bokhara, is regarded as a distinct species. The Cherry Plum, or Myrobalan Plum (*P. cerasifera* or *Myrobalanus*), is a bush very similar to the sloe, with pendulous globular red fruit. It is a native of North America, but is often cultivated for its fruit on the continent of Europe. In Britain it seldom produces fruit. *P. maritima* is a shrub, indigenous to sandy soils on the seacoast of North America from Massachusetts to Alabama. It has a dark-purple agreeable fruit, about the size of a pigeon's egg. Other native American species are *P. chickasa*, the Chickasaw Plum, a shrub or small tree of the southern states; *P. americana*, a bushy tree ranging from Canada to Georgia; and *P. glandulosa*, of Texas, which is less than a foot high, and has crooked thorny branches.

The Cocoa Plum or Icaco of the West Indies is the fruit of *Chrysobalanus icaco*, a tree of the natural order Rosaceæ, sub-order Chrysobalaneæ. The fruit resembles a plum, has a sweet although slightly austere taste, and is eaten both raw and preserved. The fruit of *Parinarium excelsum*, another of the Chrysobalaneæ, is called Gray Plum at Sierra Leone.—The term plum is used loosely for the Date Plum (q.v.); and plum or plumb was a word once current for £100,000.

Plumage. See BIRD, and FEATHERS.

Plumbagineæ, or PLUMBAGINACEÆ, a natural order of exogenous plants, herbaceous or half-shrubby, to which belong about 160 known species, chiefly found on the seashores and in the salt marshes of temperate regions. Some are found also in elevated regions in all zones. Many have flowers of great beauty, and are therefore favourites in gardens. Some are occasionally used in medicine as tonics and astringents; others, being exceedingly acrid, as vesicants, particularly species of Plumbago. Thrift, or Sea-pink (q.v.), is the most familiar British example of the order. *Statice caroliniana*, a native of the United States, and there known by the name 'Marsh Rosemary,' is extremely bitter and astringent, and is used in domestic medicine for ulcerations of the mouth. Its most abundant principle is tannic acid, of which it contains 12·4 per cent. Along with this it gives a peculiar gum and extractive volatile oil, resin, caoutchouc, colouring matter, lignin, and various salts. Sea-lavender (*Statice Limonium*)—an inhabitant of the coasts of England, generally, but rather rarely so, of the Scottish coasts, common, however, on the western coasts of Europe, the Mediterranean, and western Asia, appearing also on the seashore of South America and of the Carolinas—has the same qualities as the preceding.

Plumbago. See BLACK LEAD.

Plumber-work. See BUILDING, SANITATION, SEWAGE, WATER-SUPPLY.

Plume-bird, a term sometimes given to the Epimachidæ or Long-billed Birds of Paradise (q.v.).

Plummer's Pills. See GUAIACUM.

Plumptre, EDWARD HAYES, was born in London, August 6, 1821, and educated privately and at University College, Oxford, graduating with a double first-class in 1844. The same year he was elected fellow of Brasenose College. He became chaplain at King's College, London, in 1847, and afterwards professor of New Testament Exegesis there. In 1863 he was given a prebend of St Paul's, and from 1875 to 1877 he was principal of Queen's College, Harley Street. He was select preacher at both universities, Boyle Lecturer in 1866–67, and one of the Old Testament Company for the Revision of the Bible. In 1869 he was presented to the rectory of Pluckley in Kent, which four years after he exchanged for the vicarage of Bickley, and in 1881 he was installed Dean of Wells. He received the D.D. degree from Glasgow in 1875. He died after a short illness, February 1, 1891. Of his numerous contributions to theology may here be named *King's College Sermons* (1860), his Boyle Lectures, *Christ and Christendom* (1867), *Biblical Studies* (1870), *Exposition of the Epistles to the Seven Churches of Asia* (1877), *Introduction to the New Testament* (1883), and *The Spirits in Prison* (1884), in which he spoke out eloquently his belief in the Wider Hope and an Intermediate State of Probation. He contributed Proverbs to the *Speaker's Commentary*; Matthew, Mark, Luke, Acts, and 2 Corinthians to Bishop Ellicott's *New Testament Commentary for English Readers*, as well as Isaiah, Jeremiah, and Lamentations to the same editor's *Old Testament Commentary*; Ecclesiastes, James, 1 and 2 Peter, and Jude to the *Cambridge Bible for Schools*; and 1 and 2 Timothy to Dr Schaff's *Popular Commentary on the New Testament*. Besides these, his contributions to Smith's Dictionaries and the theological and literary journals were numberless. Dean Plumptre's name is also widely known by his admirable verse translations of *Sophocles* (1865), *Æschylus* (1868), and the *Commedia* of Dante in the metres of the original (1886); as well as by several volumes of original verse, among them *Lazarus* (1864), *Master and Scholar* (1866), and *Things New and Old* (1884). His *Life and Letters of Bishop Ken* (1886) is less happy.

Plum-pudding. This national English dish is an example of the happy results of the law of evolution. The 'plumb-porridge' which delighted our ancestors has been drained and dried and squeezed into the moulds of civilisation, and few will doubt the 'survival of the fittest' among its ingredients. It is not known when the change from porridge to pudding actually took place. In *Hudibras* we find a mention of 'minced pies and plumb-porridge.' Addison in the *Tatler* speaks of both as the 'first parts of the dinner;' and in the *Spectator*, No. 269, plumb-porridge is mentioned as eaten on Christmas Day. Southey in his *Omniana*, vol. i. p. 7, quotes a recipe for plum-pudding as given in French by the Chevalier d'Arvieux, who in 1658 made a voyage in an English forty-gun ship. This pudding was directed to be boiled in meat broth, and when dished up to be covered with grated cheese. In the earlier collections of recipes we find nothing of the kind, unless a hint of plum-porridge be discerned in the mixture called *Rape*, a *posset* of 'raissins of corans' with 'swet wyne' and 'crustes of bred.' A recipe for .this is given in *A Noble Boke off Cookry* (ed. Napier, p. 109), which must have been written out in the 15th century, but was then probably copied from one of a much earlier date. For a modern recipe the following may be taken: Plum-pudding—½ lb. beef suet, ½ lb. raisins, ½ lb. currants, ½ lb. sultanas, ¼ lb. mixed peel, ¼ lb. bread-crumbs, ¼ lb. flour, one lemon, ½ lb. moist sugar, four eggs, one gill of milk, one wineglass of brandy, two oz. almonds, half a nutmeg, a little salt. Chop the suet finely, stone the raisins, clean and pick the currants, blanch and chop the almonds, cut the candied peel in thin shreds, peel, core, and chop the apples. Mix all very well together. Turn into a well-greased basin, cover with a cloth, and boil for four hours. Serve with brandy or sweet sauce.

Plumstead. See ERITH.

Plumularia, a genus of Hydrozoa (q.v.) belonging to the division Hydroidea.

Plumule. See SEED.

Pluralism, the holding of more than one office at the same time. Persons in power have often added to their wealth and consequence by holding several appointments; but such pluralism is forbidden by the constitutional practice of many modern states. In England a minister who holds two political offices (e.g. those of First Lord of the Treasury and Chancellor of the Exchequer) receives only half the salary of the second. Pluralism in the church has been held unlawful from the earliest times, and is forbidden by many ancient councils, as Chalcedon (451 A.D.), 2d Nicæa (787 A.D.). This prohibition, however, was not regarded as absolute; canonists distinguish 'compatible' and 'incompatible' benefices or dignities. Two benefices may be incompatible in three ways—(1) if each requires residence; (2) if the duties of both fall to be discharged at one and the same time; or (3) if the revenue of either fully suffices for the becoming maintenance of the incumbent. In other cases benefices or dignities are considered compatible, and with the due dispensation, granted by the pope, may be held by the same person. In England the law of the church has been made more stringent by acts of parliament passed in 1837, 1850, and 1885. The effect of these acts seems to be that no person can now hold two benefices unless the churches are within two miles of each other and one of them is not worth more than £200 a year. A benefice of 3,000 population is not to be held along with a benefice of 500 population. In order to hold two benefices a clergyman must obtain a dispensation from the Archbishop of Canterbury, and on applying for the dispensation he must forward to his bishop a full statement of particulars in regard to the two cases. Acceptance of a second preferment, except in the cases provided for in the acts, will vacate any preferment previously held. The practice of granting livings to be held *in commendam* with a bishopric has been abolished. In Scotland it is contrary to the old Scotch statute of 1581 for a minister of the Established Church to hold two or more charges, and the rule has been regularly enforced in the case of two pastoral charges. The question has, however, sometimes arisen with reference to clergymen appointed professors before or after an appointment to a pastoral charge, in which case a resignation is now necessary of one of the offices within a certain time after the appointment. Non-established churches, in Great Britain and elsewhere, are guided by the rules of their respective constitutions. See, for England, Cripps, *Laws of the Church and Clergy;* and for Scotland, Duncan, *Parochial Law.*

Plush (Fr. *peluche*), a variety of cloth woven like velvet, but differing from it in having a longer and more open pile. Formerly this pile was of goat's hair or worsted, but now it is largely made of silk, with a cotton backing, and sometimes the whole fabric is of silk. Silk plush is the material used for the outside of gentlemen's 'silk' hats, and is called hatter's plush. It is also worked in coloured silks for articles of ladies' attire and for covering furniture; but plush is used *par excellence* for livery knee-breeches.

Plutarch (*Ploutarchos*), a prolific writer of the Græco-Roman period, was born about 46 A.D. at Chæroneia in Bœotia, where his family was one of good standing. Nothing is known of his personal history but what may be gathered from his own writings. His higher education was commenced at Athens under the academic philosopher Ammonius in 66, the year of the Emperor Nero's progress through Greece. He paid more than one visit to Rome, the then metropolis of the world—on the first occasion in the reign of Vespasian as *chargé d'affaires* of his native town. There he enjoyed the friendship of several men of mark, such as Gaius Sossius Senecio, who was four times consul, while he devoted himself to a course of study and gave public lectures in philosophy, so that he had but little leisure left for learning the Latin language, and never attained a full knowledge of its niceties and idioms or a correct notion of Roman institutions. The story that he became Trajan's preceptor, and was raised by that emperor to the consulship is a legend of doubtful credit. Life at Rome, however, was not altogether to his taste; he preferred the quiet of his native place, and there he spent all his mature life until his death about 120, discharging the civil and religious duties which fell to his station, liberally disbursing his stores of learning, and offering himself as a sort of spiritual guide and physician of the soul to those who needed moral hygiene and desired to rule their lives by some higher standard in a corrupt and effete age, when the old faiths were dead and the objects of modern life as yet below the horizon. The extant writings of Plutarch fall into two principal classes—(*a*) his historical works, (*b*) those which are grouped under the general head of *Opera Moralia* (ἠθικά). To the former belong his *Parallel Lives*—the work by which he is best known. These contain a gallery of portraits of the great characters of the ages preceding his own. They were published in successive books, each pair forming one book (*biblion*), a Greek and Roman, with some resemblance between their respective careers, being chosen for the subject of each. The forty-six extant *Lives* were contained in twenty-two books, probably in the following sequence (that in which they are usually arranged being purely arbitrary): (2) *Sertorius—Eumenes*, (3) *Cimon—Lucullus*, (4) *Lysander—Sulla*, (5) *Demosthenes—Cicero*, (6) *Agis* and *Cleomenes—Gracchi*, (7) *Pelopidas—Marcellus*, (8) *Phocion—Cato mi.*, (9) *Aristides—Cato ma.*, (10) *Pericles—Fabius Maximus*, (11) *Nicias—Crassus*, (12) *Dion—Brutus*, (13) *Timoleon—Æmilius Paulus*, (14) *Philopœmen—Titus Flaminius*, (15) *Themistocles—Camillus*, (16) *Alexander—Cæsar*, (17) *Agesilaus—Pompeius*, (18) *Pyrrhus—Marius*, (19) *Solon—Valerius Publicola*, (20) *Demetrius—Antonius*, (21) *Alcibiades—Coriolanus*, (22) *Theseus—Romulus*, (23) *Lycurgus—Numa*. The first series, which includes (2) to (9), was written at the suggestion of some personal friends. The biographies in this series partake more of a historical than of an ethical character. The second, (10) to (19), was composed for the writer's own satisfaction and moral improvement; the third, (20) and (21), professed to teach virtue by painting its opposite; the fourth, (22) and (23), dealt with prehistoric characters. The single biographies of *Aratus*, *Artaxerxes*, *Galba*, and *Otho* do not come under the category of *Parallel Lives*. The sequels which comes after most of the Lives, giving a detailed comparison (*synkrisis*) of each warrior, statesman, legislator, or hero, as the case may be, and of the exact points of resemblance between them, hardly accord with the design of Plutarch, and are therefore regarded as spurious by some critics.

Plutarch's *Biographies* are not merely popular compilations, but monuments of great literary value for the precious materials which they contain, based as they are upon lost records. The author adheres throughout to his professed purpose—viz. portraiture of character; he either omits or briefly touches upon the most famous actions or events which distinguish the career of each subject of his biography, holding that these do not show a man's virtues or failings so well as some trifling incident, word, or jest. 'C'est la verité morale,' says Gréard, 'non la verité historique, qu'il poursuit; l'une n'est pour lui que le moyen, l'autre est le but.' For this reason the *Parallel Lives* are and will remain the book of all ages, for no book of classical antiquity has had more influence upon the leading men of the world, so that Plutarch may almost be called the interpreter of Greece and Rome to modern Europe. They form indeed a complement to the other and less known half of his writings—the *Morals*—a collection of short treatises, sixty or more (though certainly not all from Plutarch's hand), upon various subjects—*Ethics*, *Politics*, *History*, *Health*, *Facetiæ*, *Love-stories*, and *Philosophy*. The last comprise dissertations *On the nature of the unseen world and spiritual beings*, *On the creation and government of the Universe*, *On the human soul*, and similar speculations, classed by the ancients under the head of *Theosophy*. 'The treatise upon *Isis and Osiris* in this series,' says its most recent translator, Mr C. W. King, 'is the only complete account of the religion of Egypt that has come down to us—written too by one who had been initiated in its deepest mysteries. The three treatises upon the *Oracles* also are of the highest value, and that on *Superstition* is one of the most eloquent and closely reasoned compositions of antiquity.' Some of the essays, especially those *On Brotherly Love*, *On gradual advance in virtue*, *On the benefit to be got out of enemies*, breathe quite a Christian spirit, although the writer probably never heard of Christianity or its divine founder. One of the most interesting is that *On the apparent delays in divine justice*; another, *On the conduct proper to young men at Lectures*, which is partly moral, partly social in its tone. The nine books of his *Symposiaca* or Table-talk on a variety of topics exhibit him in the light of the most amiable and genial of boon companions, who appreciated good conversation; while his dialogue *Gryllus* reveals a remarkable sense of humour.

Though not a profound thinker, Plutarch was a man of rare gifts, and occupies quite a unique place in literature as the encyclopædist of antiquity. He was not master of any science, but whatever was noticeable in natural, moral, or metaphysical science did not come amiss to him, and he had a universal sympathy with genius and nobility of character. As a moralist he is, as Professor Mahaffy well describes him, the spokesman of the better life that still survived in the Greek world in the 'Martinmas summer' of its history; not the exponent of any system, and only occasionally an opponent, as in the *Dialogue against Colotes*, the disciple of Epicurus, and that *Against the Stoic first conceptions*, but a man of practical views and sober judgment, a chief example of the illumination of the intellect by the power of morals. His kindly sympathy and tender-heartedness, a leading feature in his character, is well shown in his *Consolation addressed to Apollonius on the early death of his son*, and the beautiful *Letter to his wife on the death of their only daughter*. As a stylist he is picturesque, realistic and varied; his chief fault is a tendency to diffuseness and redundancy of expression. He does not, like his contemporary Lucian, affect the Attic purity and clearness of diction, and he is too fond of crowding his sentences; but occasionally he rises into eloquence, and he is almost always happy in the novelty of his illustrations and similes and the point of his anecdotes.

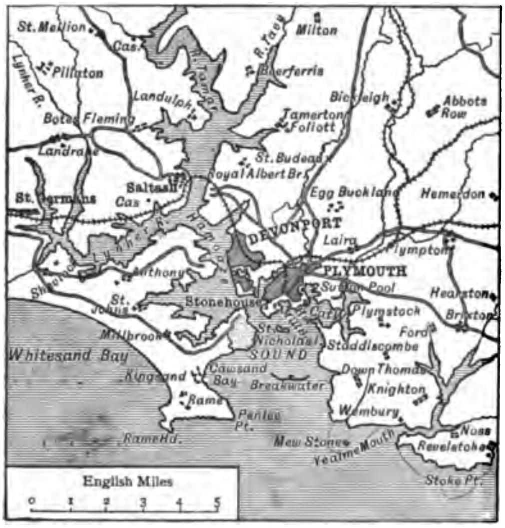
The best editions of Plutarch's entire works are those of J. J. Reiske (12 vols. 1774–79) and Dübner-Döhner in Didot's *Bibliotheca* (5 vols. 1846–55). The best text of the *Lives* is that of Sintenis in the Teubner series (5 vols. 1874–81); of the *Moralia*, that of D. Wyttenbach (15 vols. Oxford, 1795–1830; unfinished), and that in the Teubner series by G. N. Bernardakis (in course of publication, 1888–91). Separate annotated editions of the *Lives* have been published by Held, Leopold, Siefert-Blass, Sintenis-Fuhr in Germany, and in England by the present writer, with elaborate commentaries (*Sulla*, *Demosthenes*, *Gracchi*, *Nicias*, *Timoleon*, and *Themistocles*), and by E. G. Hardy (*Galba* and *Otho*). There are translations of the *Lives* in English by the brothers Langhorne and by Dryden and others (re-edited by A. H. Clough, 5 vols. 1874)—neither so scholar-like and correct as the French of Jacques Amyot (Paris, 1559), from which Sir Thomas North's version (1579) was made; also of the *Roman Lives* by G. Long. The best translation of the *Moralia* is that by several hands, corrected and revised by Professor W. W. Goodwin (Boston, U.S. 1874–78).

Pluto (Gr. *Ploutōn*, from *ploutein*, 'to be rich'), originally only a surname of Hades, as the giver or possessor of riches, is, in the mythology of Greece, the third son of Cronos and Rhea, and the brother of Zeus and Poseidon. On the tripartite division of the universe he obtained the sovereignty of the under-world—the realm of darkness and ghostly shades, where he sits enthroned as a 'subterranean Zeus'—to use the expression of Homer, and rules the spirits of the dead. His dwelling-place, however, is not far from the surface of the earth. Pluto is inexorable in disposition, not to be moved either by prayers or flatteries. He is borne on a car, drawn by four black steeds, whom he guides with golden reins. His helmet makes him invisible. According to some scholars, his name of *Hades* is from *a* priv., and *idein*, 'to see;' although others, with less probability, derive Hades from *hadō* or *chadō*, 'I receive or embrace,' and translate the word the 'all-receiver.' In Homer Hades never means a place, but always a person. Moreover, it is to be noticed that the poet does not divide the realm of the shades into two separate regions. All the souls of the dead—good and bad alike—mingle together. Subsequently, however, when the ethical conception of future retribution became more widely developed, the kingdom of the dead was divided into Elysium (q.v.), the abode of the good, and Tartarus (q.v.), the place of the wicked. This change also exercised an important influence on the conception of Pluto. The ruler of the underworld not only acquired additional power and majesty, but the very idea of his character was essentially modified. He was now regarded as a beneficent deity, who held the keys of the earth in his hand, and possessed its metallic treasures (whence his new name *Pluto* or *Plutus*), and who blessed the year with fruits, for out of the darkness underground come all the riches and swelling fullness of the soil. Hence, in later times, mortals prayed to him before proceeding to dig for the wealth hidden in the bowels of the earth.

Pluto married Persephone (Proserpina), the daughter of Demeter (Ceres), after carrying her off from the plains of Enna. He assisted his brothers—according to the mythological story—in their wars against the Titans, and received from the Cyclopes, as a reward for delivering them from Tartarus, the helmet that makes him invisible, which he lent to Hermes (Mercury) in the aforesaid war, to Perseus in his combat with the Gorgons, and which ultimately came to Meriones. The Erinnyes and Charon obey his behests. He sits in judgment on every open and secret act, and is assisted by three subordinate judges, Æacus, Minos, and Rhadamanthus. At Elis alone was there a formal cult of Pluto, though in many places in Greece he was worshipped conjointly with Demeter and Korē. Among trees and flowers the cypress, boxwood, narcissus, and maidenhair were sacred to him; black rams and ewes were sacrificed to him amid the shadows of night, and his priests had their brows garlanded with cypress wreaths. In works of art he resembles his brothers Zeus and Poseidon; only his hair hangs down somewhat wildly and fiercely over his brow, and his appearance, though majestic, as becomes so mighty a god, has something gloomy and terrible about it.—The Plutonian theory in Geology, otherwise called Vulcanist or Huttonian, was opposed to the Neptunist or Wernerian. See GEOLOGY, Vol. V. p. 148, and HUTTON; and for the Plutonic rocks, see also IGNEOUS ROCKS.

Pluviometer. See RAIN-GAUGE.

Plymouth, one of the most famous of English seaports, an ancient parliamentary, municipal, and county borough, lies in the extreme south-western corner of Devonshire, 246 miles by rail (216 by road) WSW. of London, 128 SW. of Bristol, and 53 SW. of Exeter. It occupies the northern shore of Plymouth Sound (see below), immediately at the mouth of the Plym. The remaining space between it and the Hamoaze, the estuary of the Tamar, is occupied by the sister but much smaller town of Stonehouse (q.v.), while still farther to the west, along the Hamoaze itself, stretches the third of the 'Three Towns,' Devonport (q.v.). They are all, however, so united now by continuous lines of houses that, with their respective suburbs, they have lost their individuality, and to the stranger appear one great community. The chief government establishments are at Devonport—the dockyard, gun-wharf, steam-factory, and principal barracks; while Stonehouse has its quota in the victualling yard, marine barracks, and naval hospital. Plymouth, which is more populous than the other two together, is at once the chief seat of commerce, trade, and manufacture, and within the 19th century displayed an enterprise which gives it a high place among provincial centres. The site is a very fine one. Between the two natural inlet harbours of Sutton Pool and Mill Bay stretches the bold rocky ridge of the Plymouth Hoe, the eastern end of which is occupied by a citadel built by Charles II. Northward the ground rises in a series of long hills, along which the town stretches until it passes into a suburban hill of singular attractiveness. From the Hoe there are magnificent views both seaward and landward. Here, according to tradition, the captains of the fleet which assembled to meet the Armada whiled away the time by playing a game of bowls, which was interrupted by the news of the approach of the enemy; and here stand a tercentenary memorial to the Armada heroes (1890), and a statue (1884) of Sir Francis Drake (one of Boehm's finest works). The upper portion of the lighthouse erected by Smeaton on the Eddystone (q.v.) was also rebuilt here in 1882–84. Old Plymouth is chiefly clustered round the shores of Sutton Pool—a dingy unattractive set of narrow streets; but of recent years miles of excellent thoroughfares and many handsome buildings have been erected, chief among them a noble Gothic guildhall, opened in 1874 by the Prince of Wales, Lord High Steward of the borough. The principal antiquity is the fine 15th-century church of St Andrew, Perpendicular in style, and restored in 1874–75 by Sir Gilbert Scott; Charles Church (1646–58) is a singularly good example of post-Reformation Gothic; the Roman Catholic cathedral is an effective Early English edifice (1858). The Cottonian collection of sketches by the leading continental masters is at the Proprietary Library; there is a good local museum at the Athenæum; and among the numerous charitable institutions the first place is taken by the South Devon Hospital, opened in 1884 at a cost of £40,000. The town is served by both the Great Western and London and South-Western Railways. In Mill Bay are the Great Western Docks, now the property of the former company, which are capable of taking the largest merchant-vessels. Sutton Pool, the ancient tidal harbour of Plymouth, in addition to a large general trade, is the seat of the fisheries of the port, which are very important. Manufactures, mainly chemical, are carried on—at Cattedown chiefly, but also at Mill Bay. There is a large foreign, and a very extensive coasting trade, and the port is used by lines of passenger-steamers to almost every quarter of the globe.



Though only a fishing-village at the Conquest, under the name of Sutton, Plymouth has for centuries played a leading part in the nautical life. It was the favourite port of the Black Prince; the chief Elizabethan rendezvous of Drake, Hawkins, Grenville, Raleigh, and their fellows; the final port of departure of the *Mayflower* with the Pilgrim Fathers. In the civil wars it sided with the parliament, and successfully endured a series of sieges and blockades extending over four years, sharing with Hull the honour of saving the parliamentary cause. It was also the first town to declare for William of Orange. In the great French war it rivalled Portsmouth in naval activities. Among its more distinguished natives are Sir John Hawkins, Sir Richard Hawkins, Sir Thomas Edmonds, Joseph Glanvill, R. S. Hawker, Lord Monkswell, Sir W. Snow Harris, F.R.S., W. Elford Leach, F.R.S., with Northcote, Haydon, S. Prout, Sir C. Eastlake, P.R.A., and S. Hart, the artists. It is now an important scientific centre in connection with the Marine Biological Laboratory (opened in 1888), which publishes a Journal. Plymouth was first incorporated by Henry VI. in 1439, and has since always returned two members to parliament. Pop. (1801) 43,194; (1851) 52,221; (1871) 70,091; (1881) 76,080; (1891) 87,307.

PLYMOUTH SOUND, on the south-west of Devonshire, near the entrance of the English Channel, is one of the famous roadsteads of the world. It is a deep inlet, into which the river Tamar falls from the west, and the river Plym from the east. The extreme seaward boundaries of the bay, from which the Sound, properly so called, opens, are Rame Head (mentioned in Ptolemy) and Stoke Point, not far within which a third river, the Yealm, debouches. The Sound, however, is practically bounded southward by a line drawn from Penlee to Wembury Points, and northward by the Plymouth Hoe. Within these limits its width varies from 2¼ to 3 miles, while its landward depth is about 3. Immediately within Penlee Point, on the western side, is Cawsand Bay, formerly one of the chief anchorages of the port and navy, but so exposed to the south-easterly gales that it was at times very dangerous; while if vessels anchored in the Sound itself they were open to the full fury of the south-westers. Hence Earl St Vincent pressed forward a scheme for the provision of artificial protection, and in 1812 the construction of the Plymouth Breakwater was begun, from plans prepared by Messrs Rennie and Whidby. This great national work is an insulated mole of stones, a mile in length, stretching across the middle of the Sound, 2 miles from the Hoe, and thoroughly protecting the inner anchorage. It was not completed until 1841, and cost £1,500,000 (see **Breakwater**). About half a mile from the Hoe is a little islet, originally called St Nicholas Island, but now more commonly Drake's Island. This is strongly fortified. A formidable stone fort has also been built on an artificial island immediately within the breakwater; while on either shore there are extensive forts and batteries—at Bovisand and Stamford on the east, and at Picklecombe, Maker, and Tregantle on the west. The estuary of the Plym is called the Cattewater, and is a capacious and important inner mercantile anchorage, opening from the Sound eastward, and protected by the Batten breakwater. The estuary of the Tamar is called the Hamoaze, and from the spot at which it enters the Sound between Devil's Point and Mount Edgecumbe to Saltash is nearly 4 miles in length—a still more valuable and thoroughly protected anchorage for vessels of the largest size, and occupied by men-of-war. In the Channel, 14 miles off the Sound, is the dangerous Eddystone Reef (q.v.), indicated since 1700 by lighthouses, and now rather a directing post to the port than a danger. Plymouth Sound is exceedingly beautiful, and has even been considered worthy of rivalship with the Bay of Naples. On its western shore is Mount Edgcumbe, the delightful seat of the Earl of Mount Edgcumbe, traditionally said to have been selected by Medina Sidonia as his share of the English spoil. Rame Head, crowned by the ruins of a mediæval chapel, is one of the most picturesque headlands on the coast; and the estuary of the Yealm, with the peaked Mewstone at its mouth, is full of romantic beauty.

See R. N. Worth's *History of Plymouth* (1871; new ed. 1891), and *The Three Towns Bibliotheca* (1873); L. Jewitt's *History of Plymouth* (1873); and four works by J. B. Rowe (1873–76).

Plymouth, (1) capital of Plymouth county, Massachusetts, on Plymouth Bay, 37 miles by rail SE. of Boston, is famous as the landing-place of the Pilgrim Fathers (q.v.). Plymouth Rock is a granite boulder at the water's edge on which they landed. It is covered by a handsome granite canopy, and there is also a national monument (1858–89) to the pilgrims; the pedestal, also of granite, stands on a hill overlooking the landing-place, and is 46 feet high, surmounted by a central figure of Faith, 36 feet high, with four immense stone figures representing Morality, Education, Freedom, and Law around the base. In Pilgrim Hall (1824–25) are preserved many relics of the first settlement of the country. The town has an iron-foundry and zinc-rolling mills, and manufactures cotton and duck, cordage, nails, tacks, and rivets. It is popular as a summer-resort, and contains a number of hotels. Pop. (1885) 7239; (1890) 7314. —(2) A mining town of Pennsylvania, on the Susquehanna River, 20 miles by rail SW. of Scranton. Pop. (1890, mostly foreigners) 9344.—(3) The capital of Monteerrat (q.v.).

Plymouth Brethren, a name given by others to a body of Christians which since 1830 has extended itself throughout the British dominions and in some parts of the continent of Europe, particularly among the Protestants of France, Switzerland, and Italy, and also in the United States of America. It originated in a reaction against exclusive High Church principles, as maintained in the Church of England, with everything of a kindred nature in other churches, and against a dead formalism associated with 'unevangelical' doctrine. Some of the first members of the new religious communities formed in Plymouth and elsewhere were retired Anglo-Indian officers, men of unquestionable zeal and piety; but these communities began to appear almost simultaneously in a number of places. Their origin is, however, very much to be ascribed to the labours and influence of John Nelson Darby (1800-82), from whom the Plymouth Brethren on the continent of Europe are very generally known as *Darbyites*. Darby was a barrister, who under deeply religious impressions became a clergyman of the Church of England, and served as a curate in Wicklow; but in 1827 he left the Church of England from conscientious scruples, and became an evangelist unconnected with any church. In this character he laboured both in England and on the continent of Europe, preaching in French, English, and German. It was in 1830 that he founded at Plymouth the congregation whence comes the name usually given to the communion; the Dublin assembly dates from the same year. He also gave utterance to his opinions in numerous pamphlets, in a quarterly periodical, and a long series of theological works. His tenets, and those of the Brethren in general, are strictly Calvinistic: original sin and predestination, the efficacy of Christ's sacrifice, the merit of His obedience, the power of His intercession, the gracious operations of the Holy Spirit in regeneration and sanctification are prominent points. Pre-Millenarian views are generally entertained by the Brethren; and they usually practise the baptism of believers without regard to previous infant baptism. Recently among a section household baptism has been practised. They partake of the Lord's Supper every Sunday, or 'first day of the week.' They utterly reject the rite of confirmation. Their most distinctive peculiarity, when contrasted with other Calvinistic churches, is their complete rejection of ecclesiastical organisation. They suppose the whole Christian body in the world to have declined from truth and duty, like Israel of old, and therefore to have been 'corporately rejected of God,' and believe that the church consists of all true believers in the Lord Jesus to whatever denomination they may belong—holding uniformly that no unbeliever or unregenerate person ought to be recognised as in the church of God. They refuse to recognise any humanly devised form of church government, or any official or salaried ministry; they insist on the privilege and responsibility of every individual to minister according to his gift and ability, in order to the edification of the whole. Practically the number of those fitted publicly to teach or minister the Word of God is very limited, and those who are not fitted for such ministry are not encouraged and sometimes restrained.

They distinguish widely between pastors, teachers, and exhorters, whose ministry is to the church, and evangelists, whose ministry of the gospel is toward the world. Whilst disowning human qualifications and ordination as generally practised, and condemning wholly as unscriptural the distinction of 'clergy and laity,' they hold that it is right to own such evangelists, pastors, and teachers as Christ the Head of the Church has bestowed and the Holy Spirit has qualified. Such as devote themselves wholly to the work of the gospel are supported by voluntary and unsolicited contributions. In their assemblies there are frequent pauses, and liberty therefore for any member to lead in prayer or praise or to exhort or teach as he may judge to be for edification, guided by spiritually enlightened understanding of what is fitting and in harmony with what has gone before. Women are not allowed to take public part in the assembly. Persons proved to have been guilty of the sins mentioned in 1 Cor. v. 11 are excluded from the fellowship, as well as those who deny foundation truths of Christian doctrine, until evidence of repentance satisfactory to all is forthcoming. The Plymouth Brethren reject every distinctive appellation but that of Christians, although a special denomination is found necessary to designate them; no one not holding their views could remain associated with them. A schism took place among them in consequence of doctrines preached at Plymouth concerning the human nature of Christ; Darby vigorously opposing what he deemed a dangerous error, and he and his adherents utterly separating from the fellowship of those who maintained it, or refused to condemn it, and also from all who, even though personally clear of the error, refused to endorse the extreme form of separation demanded by Darby. The Darbyite section since Darby's death has been more than once divided about various questions of doctrine and discipline. The less exclusive principles have attracted many earnest Christians out of all denominations, and the meetings continue to multiply and increase in Great Britain and Ireland, Canada, the United States, Australia, New Zealand, and elsewhere. The increase is mainly the result of evangelistic work. In the United Kingdom there are about 800 meetings; in Canada, over 100; in the United States, about 100; in Germany, 200; in France, 150; in Switzerland, 80; and in Holland, some 40.

See the works of Darby, Kelly, C. H. Mackintosh, and J. G. Bellett; and books for or against the doctrines of the Brethren by Trotter (1856), Groves (1867), Reid (1875), Miller (1879), Teulon (1883).

Pneumatic Despatch, the name given to a method of sending written documents, chiefly telegraphic despatches, through a comparatively narrow tube by means of compressed air and by a partial vacuum. Early in the 19th century Mr Medhurst proposed to construct a railway on this principle with carriages moving through an air-tight tunnel (see MURDOCK). But Mr Latimer Clark, C.E., was the first to carry out a plan for the transmission of telegrams by pneumatic power. In 1853 he got a tube laid between the central station of the International Telegraph Company and the Stock Exchange, London, through which a carrier containing despatches was propelled by a current of air produced by connecting the tube with a vacuum holder. An improvement on this was made in 1858 by Mr Varley, C.E., who introduced compressed air for the outward and retained the vacuum method for the inward traffic. This method is still in use.

The essentials of a pneumatic despatch are the exhausting and compressing pumps worked by a steam-engine or other motor; a metal tube, which in England is usually a lead pipe, since it is easily made air-tight by soldering the joints; a small carrier of gutta-percha or other material to contain the despatches; and a suitable arrangement of valves at the stations for connecting the tube or tubes with the compressed air or vacuum mains. It has been found by experience that with heavy traffic, such as that at the telegraphic department of the London Post-office, a lead pipe 2¼ inches in diameter is a convenient size, and this is enclosed in an iron pipe for protection. The method of working is this: At the central station end of the tube there is a double sluice valve, and when the carrier is inserted into the message chamber (the widened end of the pipe) the lower slide of the valve is drawn so as to close the mouth of the pipe, but on the rod of the slide there is a stop which actuates a lever and rack, and this opens the upper slide in front of the carrier. At the same time, by a separate arrangement, a valve is opened to admit compressed air, which forces the carrier forward. When its arrival at the other end of the tube is signalled electrically, the slide is moved so as to cut off the air from the pressure main, and then the chamber at the mouth of the pipe is ready for another carrier. From the distant end of the pipe the carrier is drawn or sucked to the central station by making a connection at that station with the vacuum main instead of the pressure main. For a distance of 1000 yards with a 2¼-inch tube the time of transit is one minute when the air pressure is 10 lb. per square inch or with an equivalent effective vacuum of 6¼ lb. per square inch. With the air pressure and vacuum usually employed, a speed of from 25 to 35 miles per hour is attained in tubes not exceeding a mile in length. The speed varies inversely as the square root of the length of the tube. According to an official statement prepared in 1887, the pneumatic service of the British post-office has been gradually increasing until the system, which in 1854 was represented in London by one 6 horse-power engine working a single tube of a few hundred yards in length, comprised, thirty-three years later, in London alone, four 50 horse-power engines (each indicating 130 horse-power), and 81 tubes of an aggregate length of nearly 34 miles. In 1887 there were in London and the provinces 128 tubes of a total length of 46 miles, requiring fifteen engines with a total of 379 horse-power nominal to work them; 86,000 messages a day were then passed through these post-office tubes. The newspaper offices in several of our large towns have pneumatic despatches in connection with the telegraphic instrument rooms of their respective post-offices. In Paris and some other towns on the Continent, instead of several tubes radiating from a central to outlying stations as in London, one tube or tubes alongside each other from the central telegraph office form a continuous circular line with intermediate stations, and several carriers linked together are sent at one time. In some of these continental pneumatic despatches the pipes are of iron instead of lead, and there are other differences of detail.

PNEUMATIC RAILWAYS AND TRAMWAYS.—It has been several times proposed to construct pneumatic railways, one plan being to propel carriages through a large tube or tunnel by means of compressed or rarefied air. A piece of railway of this kind was laid down in the Crystal Palace grounds in 1865 by Mr Rammel. It consisted of a single line of rails in a tunnel 600 yards in length, along which a carriage conveyed passengers. Motion was given to the carriage by using a fan or hollow disc 22 feet in diameter, which either condensed or rarefied the air as required according to the adjustment of certain valves. This railway did not continue long in operation. The driving of tramcars by compressed air appears more likely to be a commercial success. At the town of Nantes in France tramcars have been propelled by the Mekarski system of air pressure and local heating since 1879, and a tramway line worked on this principle was in 1889 opened at Paris. In 1890 traction by compressed air was tried at Chester, the tramcar carrying its own reservoir and engine for a 2 miles' journey, but having means of recharging the reservoir, if necessary, at intervals along the line. See TRAMWAYS.

PNEUMATIC POWER (TRANSMISSION OF).—The plan of laying down an extensive system of pipes through a city to supply compressed air for motors, elevators, cranes, and other purposes in small, and even in comparatively large, industrial establishments is now in successful operation in Paris. A complete plant to supply air pressure was first put down there in 1870 in connection with a pneumatic clock system, and about 8000 of these clocks are now kept in motion by this means. But the demand for compressed air for other purposes increased rapidly, so that for some years past only a comparatively small proportion of what is supplied by the Paris company is required for clocks. This company has compressing engines, worked by steam, which have an aggregate of 3000 horse-power. These transmit air at a pressure of from 80 to 90 lb. per square inch through 30 miles of mains. The air in the branch pipes has its pressure somewhat reduced by passing it through a regulator before being conducted to a motor, which obviates any inequality that might otherwise arise in the pressure if the air were admitted direct to the motor at what it stands in the mains. The amount of compressed air used by any individual or firm is measured by a meter. In 1889 works were established on a large scale in Birmingham to supply compressed air to that town by a system similar to that adopted at Paris. In both of these towns there is a large number of small workshops or industrial establishments where power supplied in this way can be used to drive small machines more economically than by any other method. Other applications of it are to raise water to the upper stories of a building from a well in the basement, for refrigeration, and for winding up telegraphic instruments.

Pneumatic Gun. See AIR-GUN, CANNON.

Pneumatics is a name, not very much used now, for the science that discusses the properties of gaseous fluids. It is therefore a branch of Hydrodynamics (q.v.), in the modern acceptance of that term. See also ATMOSPHERE, BAROMETER, GAS AND GASES, SOUND, VISCOSITY, WAVE, WIND.

Pneumatic Trough is a piece of chemical apparatus devised by Priestley, by means of which gases can be collected in vessels for experiments or examination. It consists of a vessel of water, provided with a ledge or shelf at the depth of two or three inches from the top. The jars in which the gas is to be collected are filled with water, and placed with their mouths downward upon the shelf, which is kept a little under water, so as to prevent the entrance of air into the jars. When the edge of the jar is brought over the extremity of the tube carrying the gas the bubbles of gas rise through the water, collect in the upper part of the jar, and displace the liquid.

Pneumogastric Nerve. See NERVOUS SYSTEM, Vol. VII. p. 441, and DIGESTION; also Habershon, *Pathology of the Pneumogastric Nerve* (2d ed. 1885).

Pneumonia, or Inflammation of the Lungs, is the name applied (with the necessary qualification) to a number of distinct pathological conditions. The catarrhal inflammation of Bronchitis (q.v.) may extend to the alveoli of the lungs, producing scattered patches of *catarrhal pneumonia.* The inflammatory changes in the lungs in consumption, including *interstitial pneumonia*, or *cirrhosis* of the lungs; in a few cases of syphilis; in wounds and injuries of the chest; in pyæmia; in the last stage of many exhausting diseases, all come under this head. But the most important form, to which the present discussion will be restricted, is that variously called *acute*, *idiopathic*, *lobar*, or *croupous pneumonia*, and is one of the most striking and definite of familiar diseases.

The changes occurring in an affected portion of lung are described in three stages. (1) *Congestion:* the lung-tissue still contains air, though less than in health, and is gorged with blood. (2) *Red hepatisation:* the lung-tissue is solid like liver (hence the name), and is much more friable than in health; it still contains much blood, but no air, as the vesicles are completely filled with firm exudation, consisting of fibrinous material, mixed with leucocytes and red blood-corpuscles. (3) *Gray hepatisation:* the tissue is still more friable and of a grayish colour, containing now little blood or blood pigment; the exudation has become much softer, as the fibrinous material has disappeared, and it oozes in part from the cut surface as a purulent fluid. It is doubtful whether recovery can take place when this third stage has been reached. When the surface of the lung is affected Pleurisy (q.v.) is always present as well as pneumonia.

The inflammation never attacks the whole of both lungs at once; the right is more often affected than the left, and the lower part than the upper. A whole lobe, or a large part of it, usually suffers; sometimes more than one.

The disease generally begins suddenly with a severe rigor or shivering-fit, and the temperature rises rapidly—usually to 103°-105° F. The pulse and respirations are both quickened, but the latter much more in proportion than in most other diseases, a most important indication of the nature of the case: instead of the usual ratio (about 4 pulse-beats to 1 respiration), the proportion becomes 3 or 2 to 1. All the usual signs of fever are present; but the patient's face presents a characteristic dusky flush; there is frequently severe pain in the affected part of the chest, and usually more or less cough, painful, but short, and suppressed as far as possible. In most cases after a few days the spit becomes very viscid and tenacious, and assumes a rusty tinge; this appearance is almost sufficient by itself to show the nature of the disease; but spit as well as cough may be absent altogether. The physical signs of the disease are very distinct. There is dullness on percussion over the affected area; and on auscultation marked and very characteristic changes in the breath-sounds. But if the inflammatory process happen not to reach a portion of the lung in contact with the chest-wall it may be impossible to detect anything abnormal.

It is always a serious disease; but the great majority of cases do recover. The circumstances which make it most alarming are the presence of other disease, especially of the heart or kidneys; previous habits of intemperance; and advanced age, as it is much less fatal in youth and middle life than after the age of sixty. Yet sometimes even cases apparently far from hopeful ultimately do well.

In favourable cases the fever usually terminates very rapidly, *by crisis*, as it is termed; in a few hours the temperature falls five or seven degrees, and the patient's discomfort becomes correspondingly relieved. In a very large proportion of cases this takes place between the sixth and the eighth day; but it may occur earlier, or it may be delayed to the fourteenth. After this has taken place the exudation in the affected portion of lung is gradually expectorated and absorbed, and as a rule perfect recovery takes place.

In a considerable number of cases pneumonia seems to be brought on by exposure to cold or wet. But in the majority no such cause can be traced. Only in very exceptional instances does it seem to be infectious; but epidemics on a small scale are of not infrequent occurrence, and sometimes assume large proportions. These facts, among others, have led many observers to believe that acute pneumonia ought really to be classed not with local inflammations, but with specific fevers; and that the inflammation in the lung has the same relation to the disease as the ulcers in the intestines to typhoid fever, or the inflamed throat to scarlet fever. In 1882 Friedländer described a form of micrococcus as occurring in the lungs in pneumonia. But it is doubtful whether it is always present in this disease, and it is sometimes found in other conditions. It must at present be regarded as an open question whether it is really a simple inflammation, with accompanying febrile disturbance, or a disease analogous to the infectious fevers, with a special local manifestation in the lungs.

The recognised treatment of pneumonia passed through curiously varied phases during the 19th century. Free and repeated bleedings, with extensive use of mercury, in vogue during the earlier decades, were superseded about the middle of the century by equally extensive administration of alcoholic stimulants. But it was gradually discovered that many cases recover perfectly with no other treatment than careful nursing; and the usual practice in recent times has been to assign to drugs only a subordinate place. Rest in bed in the recumbent position; a plentiful supply of fluid nourishment; light poultices, or a thick layer of cotton-wool, over the affected part, are often all that is necessary in a young and healthy subject. Severe pain may be combated by mustard poultices, blistering, or leeching; or it may require anodynes for its relief; sleeplessness, excessive rise of temperature, troublesome cough, or aggravation of any other symptom may require special treatment. The danger most to be feared in this disease, however, is generally weakness of the heart; and to patients of feeble constitution or advanced age stimulants —digitalis, ammonia, alcohol, &c.—are usually administered, often in large and frequent doses. See Sturges and Coupland, *History and Relations of Pneumonia* (2d ed. 1890).

Po (anc. *Eridanus* and *Padus*), the largest river of Italy, rises on Monte Viso, one of the Cottian Alps, at an altitude of 6405 feet, close to the French frontier. It flows eastward for upwards of 20 miles, when, arriving before Saluzzo, it emerges from its rocky defiles and enters upon the plain. From Saluzzo it flows north-north-east past Turin to Chivasso; there it changes its course toward the east, in which direction it flows to its embouchure in the Adriatic. Upwards of 55 miles from its mouth, above Ferrara, it begins to form its delta, 60 miles wide from north to south. The delta is growing rapidly in area. Ravenna, a city once on the seashore, now stands 4 miles inland. The Po receives from the left the Ticino, Adda, Mincio, and other streams, and from the right the Trebbia and others. It has an entire length of 360 miles, and drains an area of nearly 28,900 sq. m. Below Piacenza its stream has from ante-Roman days been artificially embanked along great stretches with double lines of embankments on each side. It has been and is at all times difficult to cross, owing to its width and, still more, the great volume of its waters; hence the strategic and commercial importance of such places as Piacenza and Turin, where the easiest fords are.

Poaceæ. See GRASSES, PASTURE.

Poaching, though not strictly a legal term, has so long been appropriated in popular speech to describe a well-known offence that it is now usually adopted in legal works. It means trespassing on another's lands in pursuit of game; and it is likewise extended to the cognate offence of unlawfully fishing in another's waters.

(1) *As to Poaching Game.*—The general law as to who is entitled to game, and in what circumstances, is stated under the head GAME-LAWS. In England there are a Day Poaching Act and a Night Poaching Act, imposing penalties on poachers. By the Day Poaching Act, 1831, whoever unlawfully goes upon lands not his own to pursue or kill Game (q.v.), rabbits, woodcocks, snipes, quails, or land-rails is liable to a penalty of £2. Any person whatever, whether interested in the lands or not, may institute the proceedings for the punishment of the poacher; and the informer is entitled to half the penalty, the other half going to the poor of the parish. When a poacher is found trespassing on lands in search of game the person entitled to the game there, or the tenant, or a gamekeeper or servant of either may demand the poacher's name and place of abode, and if it is refused may arrest such poacher, and take him before a justice of the peace; but the poacher must be taken within twelve hours before the justice, otherwise he is entitled to go at large. In such a case a penalty of £5 may be inflicted. If game be found on the poacher at the time he is caught, and it appear to have been newly caught, the party who is entitled to arrest him is entitled to seize the game also. If the poacher when convicted do not pay the penalty within the time fixed by the justices, he may be committed to the house of correction for a period not exceeding two calendar months. The party may appeal against his conviction to the Court of Quarter Sessions; but he must either remain in custody in the interval, or give security for the costs. The offence of poaching is punished more severely when five or more go out together, and in such case each is liable to a penalty of £5. Moreover, if any of these five or more persons, acting in concert, be armed with a gun, and use violence, each is liable to an additional penalty of £5. By the Night Poaching Act, 1828, which applies to the United Kingdom, it is provided that any person by night—i.e. between the first hour after sunset and the first hour before sunrise—unlawfully trespassing in search of game shall for a first offence be committed by the justices to the house of correction for a period not exceeding three months; for a second offence shall be committed for a period not exceeding six months, the convicted person being in each case liable to a further term of imprisonment on failure to give securities at the end of his sentence; and for a third offence shall be guilty of a misdemeanour, and be liable to penal servitude or two years' imprisonment. In case such night-poachers are found on the lands and in the act, the owner or occupier of the land or his servants may arrest the poachers, and take them before justices. If the night-poacher, when arrested, use firearms, sticks, or offensive weapons, he shall be guilty of a misdemeanour, and be punishable by penal servitude or two years' imprisonment. In case of three or more night-poachers being armed with guns, bludgeons, or other offensive weapons, each is guilty of a misdemeanour, and is liable to penal servitude or imprisonment for three years. The provisions of the Night Poaching Act were, by the amending Act of 1844, extended to public roads and highways, it having been found that the original act was evaded, and the risk of murder greatly increased by poachers frequenting such places.

Under the former law it was, as already mentioned, incompetent for any person except the owner or occupier of the lands or their servants to apprehend the poacher, and even this could be done only when the poacher was caught in the act on the lands; and hence even constables had no power to seize the poacher, though seen to be coming from such lands. But by the Poaching Prevention Act, 1862, which applies to the United Kingdom, if a constable meets a suspected poacher in any public place, whom he has reason to suspect of coming from land where he has been poaching, and of having in his possession game unlawfully got, or a gun or net, such constable may stop and search the poacher; and if game, or implements for taking game, be found on him, may seize and detain them, and summon the poacher before the justices. When before the justices, if it be proved by circumstantial evidence or otherwise that such game was procured by poaching, or that the implements were used for poaching, the poacher may be fined in a penalty of £5, besides forfeiture of the game, and guns, nets, and other implements which he may have so used. The constable may also stop and search any cart in which he suspects there may be such game or implements. The person convicted may appeal, if he chooses, to the next Quarter Sessions, or, in certain cases, to the Court of Queen's Bench. A conviction can be obtained only in cases of actual seizure of game or implements, but for a conviction it is not necessary that the poacher should be seen actually committing the offence. Poaching hares or rabbits by night in any warren or breeding-ground is a misdemeanour under the Larceny Consolidation Act, 1861. This act does not apply to Scotland.

As game is in the category of wild animals, in England the poacher is entitled to keep the game unless it was both started and caught on the same person's lands. But, as stated above, game may be taken from a poacher if the demand is made at the time on the land or on fresh pursuit.

The law of Scotland as to poachers does not materially differ from that of England, and the Night-poaching Acts apply to Scotland. The Scots Day Trespass Act, 1832, closely agrees with the English Act. In Scotland game is the property of the captor, and accordingly where there is no statutory forfeiture the offender is entitled to retain game found in his possession. It is not necessary under the Scots Day Trespass Act for the seizure of game in the possession of a poacher that the game should have been recently killed. A third offence of night-poaching in Scotland *must* be tried before the High Court of Justiciary, and the offender, if convicted, is liable to penal servitude. In Ireland the law as to poaching is not identical with the law of England, but substantially the provisions are the same.

The law of the United Kingdom has often been described as too severe against poachers, inasmuch as most of the penalties, except in Ireland, are cumulative. But it is answered that poaching is in reality only stealing under a milder name, game being as much the fruit of the soil, dependent upon the care and protection of the owner or occupier, as apples or turnips, and that the transition from habitual poaching to stealing is not only easy, but inevitable. The administration of the law by justices, many of whom preserve game, is also objected to. As regards Scotland this objection has been removed by the Game Laws Amendment Act, 1877, under which all summary prosecutions for poaching must be conducted before the sheriff or his substitute.

See Oke, *Game Laws* (new ed. 1881); Neville, *Game Laws* (new ed. 1884); Forbes Irvine, *Game Laws of Scotland;* A. Porter, *The Gamekeeper's Manual* (2d ed. 1889); Kent, *The Fish and Game Laws of the State of New York* (1888); and, for other sides of the subject, R. Jefferies, *The Gamekeeper at Home* (1878), and *The Amateur Poacher* (1880); John Watson, *Poachers and Poaching* (1891).

(2) *Poaching Fish* is the unlawfully entering on another's fishery in order to catch fish. *Salmon-poaching* will be found treated under the head of SALMON. The law of fisheries is not uniform in the United Kingdom. In England the general rule is that any one of the public may fish freely in the sea and in all navigable rivers as far as the tide flows; and where he can fish he can catch salmon as well as every other kind of fish. But there is an exception to this generality, which consists in this, that as the crown could before Magna Charta (which took away such right) legally grant a several or exclusive fishery in the sea or a tidal river to an individual, and as this was, in point of fact, often granted, it follows that it is not uncommon to find, even at the present day, an individual, generally the lord of an adjacent manor, still claiming a several fishery in these places. If he can prove that he has exercised this exclusive right as far back as one or two centuries it will be inferred that his right dates from before Magna Charta, and it will therefore be sustained. When such is the case the public have no right to fish even in a tidal river or the sea at the specified places, the sole fishery being vested in this individual owner. In streams not tidal the rule is that each riparian owner—i.e. the owner of the lands on the bank of the stream—has a right to a several or exclusive fishery up to the middle line of the stream. If he is owner on both sides of the stream then he has the exclusive fishery in the whole of the stream, so far as his lands extend. As to ponds, whoever is owner of the soil is the owner of a several fishery therein. As to lakes, it is not clearly ascertained how the fishery is to be divided between the owners of the lands abutting thereon; but much will depend on the title to the lands and the subsequent user. As a general rule, there is no such thing as a right in the public to fish anywhere except in a tidal river or the sea, and that is subject to the exception of an individual claiming a several fishery, as before mentioned. It is often supposed that if a highway adjoins a private stream any one may fish in the stream or angle there; but this is a delusion. Nobody is entitled to use a highway for the purpose of fishing or pursuing game, the use of the highway, so far as the public are concerned, being confined to the purposes of travelling or transport. The general rule as to all several—i.e. exclusive—fisheries is that whoever poaches the fish commits an offence, for which he may be summoned before justices and fined £5, over and above the value of the fish taken; and if the fishery where he poaches is adjoining the dwelling-house of the owner of the fishery it is a still higher offence, for it is then an indictable misdemeanour. The Fish-poaching Code of England is contained in the Larceny Act, 1861. It is immaterial what kind of fish is caught by poachers, and how they are caught. But a milder punishment is awarded to the poaching *angler*, for even though he poach in a fishery adjoining the owner's dwelling-house he incurs only a penalty of £5; and where the fishery does not adjoin a dwelling-house he incurs a penalty of only £2. Whenever a fish-poacher, other than an angler, is caught in the act of poaching he may be at once apprehended, not only by the owner of the fishery, but by anybody; but this can only be done while he is on the spot or near it, for if he escape to the highway or to other lands before being arrested he cannot then be apprehended, but can only be summoned before justices in the usual way. In this respect a privilege is given to *anglers*, for in no case can these be arrested, if angling during the daytime; they can only be summoned for the offence. The poacher, when arrested, must be taken within a reasonable time before a justice of the peace, and charged with the offence. In regard to the fish poached the rule is that whoever first catches the fish, whether legally or illegally, is entitled to keep it; so that the poacher, whatever other punishment he may incur, does not lose his fish. With regard, however, to the poaching implements, such as nets, it is

provided by an express section of the Larceny Act, 1861, that the owner of the fishery or land where the poacher is caught, or his servant, may demand, and if refused may seize, the net, rod, line, hook, or other implement used for taking the fish, but no other person can seize these. Large powers to arrest are given to water-bailiffs acting under the Fresh-water Fisheries Act, 1878.

The law of Scotland differs considerably from that of England. As regards fish other than salmon the general rule is that the riparian owner is entitled to catch all the fish he can, provided he do not interfere with the superior right of some crown grantee of the salmon-fishery. A person who poaches trout or other fresh-water fish with a net, or by double-rod fishing, or cross-line fishing, or set lines, &c., incurs a penalty of £5, besides forfeiture of the fish caught. And he may be arrested if he is net-fishing, but not if he is fishing in another way. Moreover a mere angler of trout, though a poacher, cannot be arrested nor yet punished by any penalty; though he is liable to an action of interdict. In the case of all poachers of trout (except angling poachers, who can neither be arrested nor yet have their fish or fishing-rod taken from them by force), the owner of the fishery or any person authorised by him may seize the nets, boats, and fishing implements if the poachers are found on the spot. See the Fresh-water Fisheries (Scotland) Acts of 1845 and 1860. The public have no right to angle from a highway adjoining a stream. Where a stream runs through a farm the farmer has no right to angle for trout, unless the lease expressly allows it. The Irish law is practically the same as the English.

See Paterson's *Fishery Laws* (new ed. 1873); Oke's *Fishery Laws* (new ed. 1884); and, for Scotland, Stewart on *Rights of Fishing* (1869).

Pocahontas, daughter of an Indian chief, Powhatan, born about 1595, figures prominently in the American travels of Captain John Smith (q.v.) in connection with the part she played in the history of the early English colonists in Virginia. The expedition under Captain Bartholomew Gosnold and others had landed in Chesapeake Bay in 1607. The James River was explored, and a settlement formed, but a great drawback was the lack of food-supplies. In one of the expeditions for food, and to explore the Chickahominy, Smith was taken prisoner, brought before the chief Powhatan, and his head laid on a stone preparatory to having his brains beaten out with clubs. At this juncture Pocahontas, then a young girl, 'when no entreaty could prevail, got his head in her arms, and laid her own upon his to save him from death.' She again saved Smith's life in 1609 by informing him of a plot by her father against him. She was brought a prisoner to Jamestown by Captain Argall in 1613. She married an Englishman, John Rolfe, in 1614, is said to have embraced Christianity, and came to England with her husband in 1616. During her residence of seven months in England Smith petitioned Queen Anne on her behalf. Having embarked with her husband for Virginia, she died off Gravesend in March 1617. She left one son, and a branch of the Randolphs and several other Virginia families claim descent from her (Robertson and Brock, *Pocahontas and her Descendants*, Richm. 1887). Charles Deane, in his notes to his reprint of Smith's *True Relation* (1866), first started doubts as to Smith's veracity in connection with the Pocahontas incident, and this scepticism has been shared by other writers. But Professor Edward Arber in his reprint of Smith's works (1884) holds implicitly to the truth of the story, which, after a most rigorous test, he declares is a solid historical fact.

Pochard (*Fuligula*), a genus of diving ducks which are marine during the greater part of the year. One of their distinctive structural features is a membranous lobe on the hind toe. The Common Pochard (*F. ferina*) is a winter visitor to Britain, and sometimes breeds by the shores of inland meres. The Red-crested Pochard (*F. rufina*) is a rare wanderer to Britain; so is the Ferruginous (*F. nyroca*), while the Tufted (*F. cristata*) and the Scaup (*F. marila*) are much commoner, and sometimes breed in suitable inland resorts. Nearly allied to *F. ferina* is an American species (*F. americana*), and the Canvas-back Duck (q.v.) also belongs to this genus.

Pocklington, a market-town in the East Riding of Yorkshire, 16 miles ESE. of York. It has a good Early English church (restored 1850) and a grammar-school (1514; reconstituted 1876), where Wilberforce was educated. Pop. 2733.

Pocock, Edward, a learned Orientalist, was born in 1604, and educated at Corpus Christi College, Oxford, of which he was elected fellow in 1628. He early devoted himself to oriental studies, and sailed for Aleppo in 1630 as chaplain to the English factory, but returned in 1636 to fill Laud's newly-founded Arabic chair at Oxford, and received in 1643 the college living of Childrey. His estimable character and great learning raised up for him during the troubles friends like Selden and Owen. He was appointed to the chair of Hebrew in 1648, but his inability to take the engagement of 1649 deprived him of the salary down to the Restoration. He survived till 1691. Pocock's learning was really remarkable, even apart from all allowances for his time. His *Specimen Historiæ Arabum* (1649), abridged from Abulfaraj; *Porta Mosis* (1655)—extracts from Maimonides' Arabic commentary on the Mishna; the Annals of Eutychius (1656), in Arabic and Latin; and an edition of the Arabic history of Barhebræus (1663), were followed by Commentaries on Micah (1677), Malachi (1677), Hosea (1685), and Joel (1691).

Pococke, Richard, 'the Traveller,' was born at Southampton in 1704, and educated there and at Corpus Christi College, Oxford. Precentor successively of Lismore and Waterford, then Archdeacon of Dublin (1745), in 1756 he was consecrated Bishop of Ossory, and had just been translated to Meath, when, on 15th September 1765, while on a visitation, he died very suddenly at Charleville, near Tullamore. His travels, which took up nearly nine years of his life, and in which he must have ridden some 52,000 miles, are described in two folios dealing with his four years' wanderings in Syria, Egypt, and Mesopotamia (1743–45), in a volume on his tours in Scotland (Scottish History Soc., 1887), in two on his tours through England (Camden Soc., 1888–89) and in one on Ireland (edited by J. T. Stokes, 1891)—books that are as dull as they are valuable. Pococke was, moreover, the pioneer of Alpine travel, for in 1741 he led a dozen Englishmen, all strongly armed, to the Vale of Chamouni, whose grateful inhabitants carved his name and the date on a huge granite boulder close to the Mer de Glace.

Pod. See Fruit.

Podagra. See Gout.

Podargus, a genus of birds nearly allied to the true Goatsuckers. They are at home in New Guinea and Australia, are arboreal and nocturnal in their habits, and feed on large insects, which are mostly caught about the trees. Some of them are so sleepy during the day that Gould says they may be occasionally caught by the hand, or one may be shot without waking its neighbour. They make rough nests in the eucalyptus or casuarina trees, lay two eggs of spotless white, and the work of hatching is shared by both sexes. A podargus is usually larger than a goatsucker, and has a wider gape; the oil-gland seems to be absent, and the rump bears two remarkable tufts of small brittle feathers, known as 'powder-down patches.' One of the Australian species, *P. cuvieri*, disturbs the night by a hoarse cry resembling the syllables *More Pork*, by which name it is therefore known in New South Wales.

Podestà (Lat. *potestas*, 'power'), an Italian municipal magistrate, sometimes with supreme administrative and military power, sometimes merely judicial.

Podgoritza, a fortified town of Montenegro, 16 miles E. of Cetinje, ceded by Turkey in 1879. Pop. 4000.

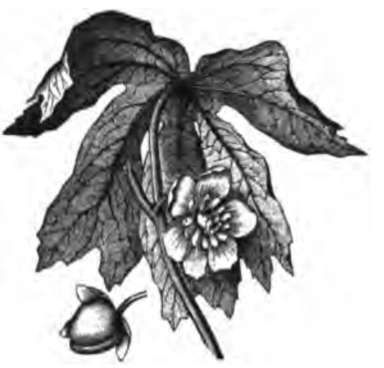
Podiebrad. GEORGE BOCZKO of Podiebrad, Bohemian king, was born of a noble family at Podiebrad on 6th April 1420, and became an adherent of the moderate party of the Hussites (q.v.). When the Catholic barons (1438) carried the election of Albert V. of Austria (II. of Germany), Podiebrad allied himself with the Utraquists in Tabor, who offered the sovereignty of Bohemia to Casimir, king of Poland. After forcing Albert to raise the siege of Tabor and retire to Prague, Podiebrad was recognised as the leader of the Utraquists; then he seized upon Prague (1448), and got himself made governor or regent of Bohemia, from 1453 to 1457, for the young king Ladislaus. On the death of Ladislaus, Podiebrad was chosen his successor, and was crowned early in 1458. By skilful management and wise policy he succeeded in allaying the bitternesses of religious zeal, but only for a while. In 1462 he decided to uphold the terms of the *compactata* of Prague (1433); this angered the pope, Pius II., and he was only prevented from excommunicating Podiebrad through the special intervention of the emperor. The next pope, however, Paul II., did in 1466 promulgate against him the ban of excommunication. Matthias Corvinus of Hungary was the only prince who took the field to enforce it; but him Podiebrad surrounded at Wilamow (1469) and forced into a truce. Nevertheless Matthias was crowned king by the Catholic barons at Olmütz immediately afterwards. Podiebrad died on 22d March 1471, having already made arrangements whereby a Polish prince should succeed him.

Podocarpus. See CONIFERÆ.

Podolia, or KAMENETZ, a government of West or 'White' Russia, north of Bessarabia, and bordering on the Austrian frontier. Area, 16,224 sq. m.; pop. (1891) 2,617,253, the majority of whom are Russniaks. The surface is a tableland, strewn with hills; nearly three-fourths is either arable or available for pasturage.

Podophthalma (Gr., 'stalk-eyed'), a name often applied to a section of Crustacea (q.v.).

Podophyllum, a genus of plants comprising two species, variously ranked by botanists in the natural order Ranunculaceæ, or made the type of a small distinct order, Podophylleæ or Podophyllaceæ, differing from Ranunculaceæ chiefly in having a solitary carpel. The genus Podophyllum has three sepals, six to nine petals, twelve to eighteen stamens, a broad round stigma, seated almost on the top of the germen, and a many-seeded berry. *P. peltatum* is a perennial plant, common in North America, growing in moist woods and on the shady banks of streams, and is known as *May-apple*, because it flowers and ripens its fruit very early in summer; also as *Hog-apple* and *Wild Lemon*. The fruit may be eaten, but is not agreeable. All the other parts are actively cathartic. The other species (*P. emodi*) is a native of the Himalayas, and has the same medicinal properties, but in 1889 was shown to yield three times as much of the valuable resin as the American plant.



Leaf, Flower, and Fruit of *Podophyllum peltatum*.

PODOPHYLLIN is the resin obtained by means of rectified spirit from the root. In the British Pharmacopœia the root is officinal, but is only used to prepare the resin (*Podophylli Resina*). The latter is an active purgative, and seems to have the power of relieving the liver by exciting copious bilious discharges. The dose is ¼ to 1 grain; its action is slow, generally taking about eight hours. It is apt to gripe, and hence is usually given along with carminatives, or in small doses combined with other purgatives.

Podura. See SPRING-TAILS.

Poe, EDGAR ALLAN, poet, critic, and romancer, was born at Boston, January 19, 1809. His mother, Elizabeth Arnold, was a young English actress; his father, David Poe, a player of loose habits, the runaway son of a revolutionary veteran at Baltimore. Orphaned at Richmond in his third year, Edgar was adopted by John Allan, a wealthy and childless merchant, who gave him more care than affection. In 1815 the family went to England, and the boy was sent to school at Stoke Newington, a suburb of London. From their return in 1820 till 1825 he attended a classical school at Richmond. The year 1826 was spent at the University of Virginia. Offended by his dissipation and gambling debts, his patron removed him to the counting-room, whence he presently absconded to Boston. Here he published *Tamerlane and other Poems*, by a Bostonian, 1827, a pamphlet of 40 pages (reprinted in London, 1884). Under the new pressure of poverty he enlisted, May 26, 1827, as Edgar A. Perry, giving his age as twenty-two. He served, apparently without fault, in the First Artillery at Forts Independence, Moultrie, and Monroe, and rose to be sergeant-major, January 1, 1829. He now effected a reconciliation with Mr Allan, who procured his discharge, April 15, and after a year's delay his admission to West Point. Meantime his second volume, *Al Aaraaf Tamerlane, and Minor Poems*, appeared with his name at Baltimore, 1829, 71 pages. He entered the Military Academy, July 1, 1830, recording his age as nineteen. Discipline and constraint did not suit him, and by deliberate neglect of duty he caused his dismissal, March 7, 1831. By this conduct he lost any remaining hope of favour from his patron, and was thrown finally on his own resources, which were probably confined to cadet subscriptions to his *Poems*. The volume appeared as a 'second edition' (it was really a third) in

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New York, 1831, 124 pages, and contained *Israfel*, his earliest poem of value, and *To Helen*, in a first draft.

Of his life in Baltimore during the next two years few records remain. Here occurred his earliest love-affair, which came to nothing (see 'Poe's Mary' in *Harper's Magazine* for March 1889). Nearly the first earnings of his pen was the $100 prize won by *A MS. found in a Bottle*, in October 1833. He declined an invitation to dinner 'for reasons of the most humiliating nature—my personal appearance.' John P. Kennedy befriended him, and even, by the testimony of both, saved him from starvation. From this time he lived with his aunt, Mrs Clemm, and wrote for the *Saturday Visitor*. Not long before Mr Allan's death in March 1834 Poe made an attempt to see his foster-father, who drove him from the room; this incident, like many others in his life, has been exaggerated. His connection with the *Southern Literary Messenger* began with its publication of his tale *Berenice* in March 1835; a few months later he went to Richmond as its assistant-editor. The Clemms soon joined him, and on May 16, 1836, he married his cousin Virginia, who was then not fourteen, though a friend swore that she was 'of the full age of twenty-one.' For more than a year he worked hard and usefully on the *Messenger*, which printed many of his tales, criticisms, and poems, gaining great repute thereby. But Poe was 'irregular, eccentric, and querulous,' and these qualities, with the aid of stimulants, cost him more than one place. He left Richmond in 1837, and after a year or less in New York, of which the chief apparent fruit was *The Narrative of Arthur Gordon Pym* (1838; 198 pages), in the summer of 1838 established himself (if he could be said at any time to be established) in Philadelphia.

Here he prepared *The Conchologist's First Book* (1839), the matter of which was taken from Cuvier, Wyatt, and Brown; procured at length the publication, without profit to himself, of *Tales of the Grotesque and Arabesque* (2 vols. 1840); was connected with Burton's *Gentleman's Magazine* (1839); projected in 1840 the *Penn Magazine*, which came to nothing, and in 1843 *The Stylus*, which he never gave up the hope of starting; and for a year (1842–43) edited *Graham's Magazine*, then in the forefront of American literature. Long periods of sobriety and patient though ill-requited labour would be interspersed with fits of reckless indulgence and months of desperate poverty. His wife's dangerous illness, caused by the rupture of a blood-vessel while singing, unnerved him, and weakened his always slight power of self-direction. A second prize of $100, won in 1843 by his wonderful story *The Gold Bug*, again saved the little household from starvation or near it.

In April 1844 he removed to New York, and from October to March following assisted Willis on *The Evening Mirror*. Here *The Raven* appeared, January 29, 1845, and won immediate fame. For a few months he was associated with C. F. Briggs in the *Broadway Journal*, which became notorious by his assaults on Longfellow as a plagiarist. In this year he published a volume of *Tales*, and *The Raven and other Poems*. In the spring of 1846 he occupied the famous cottage at Fordham. Here, January 30, 1847, in deepest poverty, Virginia Poe died, an attractive and pathetic figure, retaining her fragile and childish beauty to the last; she was but twenty-four. Her mother was more than a mother to the poet, and his home life drew out what was best in his nature, and afforded such measure as he attained of happiness.

Except for *The Bells*, *The Domain of Arnheim*, the wild psycho-astronomic 'prose poem' *Eureka* (1848), and a few minor pieces, the brief remainder of his life might to advantage be forgotten. Unable to stand alone, he sought vainly, and with an eagerness that approached insanity, to replace what he had lost. He was no libertine; his writings and his life were chaste; with women he was deferential, tender, chivalrous. He idealised them on the smallest provocation, and in these latter years he could not keep his imaginings in their proper place. Mrs Whitman was not the only object of his homage, and his frantic appeals to her, strangely intermingled with bar-room potations and an attempt at suicide (November 1848), were but the most striking and pitiable indications of a mind unhinged. Two months later he was deep in pen-work, and wrote to his 'Annie' that he was '*so, so* happy,' with 'how great a burden taken off' his heart. In the spring Mrs Clemm wrote to the same 'Annie,' 'I thought he would die several times. I wish we were both in our graves.'

Starting southward, June 30, he had an attack of delirium tremens in Philadelphia. Recovering, his ticket was furnished by friends who considered it unsafe to trust him with money. He spent over two months in Richmond, lecturing there and at Norfolk, and receiving many attentions. A physician warned him that 'another such indulgence would probably prove fatal.' He became engaged to a lady of means, and about September 30 left Richmond, intending to wind up his affairs in the north and return for his wedding in October. On the 3d of October he was found in a wretched condition at a voting-place in Baltimore and removed to a hospital, where, after expressing the most poignant remorse, he died, October 7, 1849.

Poe's character has been the subject of much heated controversy. It was malignantly vilified by R. W. Griswold, whom he had chosen as his biographer and literary executor, in a *Memoir* prefixed to vol. iii. of his collected works (1850), but since suppressed. Efforts to rehabilitate his memory have been equally far from the truth. After all allowance made for the infirmities of a sensitive spirit, bearing an inherited taint and bowed down by 'unmerciful disaster,' the fact remains that he was the main author of his misfortunes. His splendid intellect seemed to lack certain qualities bestowed on common men; his moral vision was never clear, his sympathies were narrow, his will was far weaker than a man's should be. His temperament was feminine, and the 'Imp of the Perverse' was always at his heels. At forty he was no better nor worse than at seventeen, except that his constitution was undermined by excesses. Always he was isolated, absorbed, self-centred, visionary, hopelessly unpractical. He wrote to Lowell in 1844, 'My life has been *whim*, impulse, passion, a longing for solitude, a scorn of all things present.' The kindly Briggs, after months of daily intimacy, called him 'characterless' and 'utterly deficient of high motive.' It is humiliating to know that his brilliant writings found with difficulty a slow market and poor prices, but more so that he perpetually sold and resold old things for new. He was more diligent in defeating his own ends than in seeking them, in making enemies than in keeping friends. Except Willis, he quarrelled with his employers and associates; men trusted or benefited him to turn from him in the end, and usually with speed. The direst necessity could teach him prudence only by fits and starts; he was not responsible, reliable, respectable—at least, never for two years together. He worshipped Beauty, caring little for her elder sister Truth; from youth he falsified the facts and dates of his own life, so that his history became a puzzle to be solved by slow and painful labours. Profoundly unmoral, morbid and hectic in his moods, he could bear neither prosperity nor adversity; 'any motion would upset him, and his worst falls were after successes, or with success just in sight.' A mixture of the seraph and the tramp, he oscillated between the skies and the gutter, gravitating gradually downwards, because he had no god but self. Ambition, aspiration, self-respect, and the strongest love of which he was capable—his only real love, for his devoted child-wife—could not keep him from the brandy and opium which he knew to be his poisons.

As to his genius there is little room for question. Weird, wild, fantastic, almost ghoulish (judged by its results), finding its joy in gloom and its chief inspiration in memories or imaginations of dead women, dwelling by choice and habit on themes of ruin and desolation, on the awful, the horrible, even the foul, it was yet most genuine and notable; if not of the highest order, among the most picturesque and striking gifts ever vouchsafed to man. Ideality was its strongest note, but Poe could make realism serve his turn. His ratiocinative powers, exercised about 1841 in deciphering cryptograms and detecting the plot of *Barnaby Rudge* from the opening chapters, were marvellously displayed in some of his tales, especially those of Parisian murders, which were highly praised and widely circulated in France. At home during his lifetime his amazing tales were strangely neglected, and he was known chiefly as a critic. In this capacity he perhaps deserved less praise, and certainly less blame, than has befallen him. Occasionally misled by hatred or friendship, he was usually honest, independent, and fearless—even reckless; and he was first in this field as a reformer, deriding inflated mediocrity and discerning new-born power, sometimes long before it was discovered by the public. But his proper work was poetry and imaginative prose. His parade of scholarship rested on the slightest foundation. Of humour he had no particle, and some of his tales are poor stuff: such sold more readily than his best. His verses are often strained, artificial, full of mannerisms; 'everything is subordinate to sound.' In these, and in the more personal of his tales, wherein great wit and madness mingle, he was 'the poet of a single mood.' He will be long remembered for a few poems and many masterpieces of brief, powerful, and most peculiar fiction. In his own walk he stands unsurpassed if not alone, with a halo of mystery, gloom, and terror about him.

Apart from earlier sketches, and Mrs Whitman's *Poe and his Critics* (1860), his life has been written, generally for some reprint of his works, by J. H. Ingram (1874 and 1880), R. H. Stoddard (1875; see the six-volume edition of 1884), E. L. Didier (1876), and W. F. Gill (1877). Mr G. E. Woodberry, in the 'American Men of Letters' series (1885), has unearthed some of the facts for the first time. For searching and sympathetic criticism, see also Mr E. C. Stedman's *Edgar Allan Poe* (1881). In Baltimore a monument was raised to his memory in 1875, and a memorial volume issued in 1877.

Poerio, CARLO, Italian patriot, was born on the 10th of December 1803, son of a Neapolitan lawyer who had suffered imprisonment and exile in the cause of liberty. He accompanied his father into exile, but on his return became an advocate at Naples. He was repeatedly imprisoned for his services to the liberal cause; and in 1848 he organised the famous demonstration of the 27th January, which was destined to produce the constitution of the 10th February. Under it he was successively nominated director of Police and minister of Public Instruction; but he soon resigned, and was appointed deputy for Naples to the parliament. On the 19th July 1849 he was arrested, charged with being a member of a secret society, 'the Italian Unity,' and condemned to irons. With fifteen others he was confined in one small chamber in the island-prison of Nisida. Diplomatic protests from various governments—Mr Gladstone's was declared by Garibaldi to have sounded the first trumpet-call of Italian liberty—and eloquent denunciations of the royal tyranny moved Ferdinand II. at last in 1858 to ship sixty-six prisoners to America. They persuaded the captain to land them at Cork, and Poerio returned by London to Turin. There he became a member of the parliament, and in 1861 its vice-president. He died at Florence, 28th April 1867.—The elder brother ALESSANDRO (1802–48), who fell in battle for the liberation of Venice, shared his father's exile, studied in Germany, settled in Florence, and devoted his life mainly to poetry and patriotism. His poems, which contain some of the most stirring Italian songs of freedom, have been repeatedly published. See a monograph on Alessandro by Imbriani (Naples, 1884).

Poet Laureate. See LAUREATE.

Poetry is that one of the fine arts which employs rhythmical language as the medium of its expression. The present form of the word is due to the old French noun *poëterie*, but both are derived from the Greek *ποιεῖν*, 'to make.' A poet was *ποιητής*, 'a maker or composer,' and poetry *ποίησις*, 'the act of making or forming.' A poem was *ποίημα*, 'a thing made and finished.' Into all these expressions there entered the sense of artistic fashioning, and poetry from the first was felt to be, like sculpture, painting, or music, the work of a creative craftsman. As we cannot conceive of sculpture without something carved or modelled, or of painting without something painted, so poetry cannot, in the first instance, be conceived without the coincident idea of language rhythmically arranged. If this idea be absent the term must be used allusively or figuratively, as its counterparts often and legitimately are in the cases of those other arts. But to the primitive conception of poetry rhythm is absolutely necessary. In other words, it is only by a license, and in a sense which is unscientific, that we can speak of anything which is not composed in verse as poetry. To this rule, however, there are some conventional exceptions which will presently be mentioned.

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Verse, therefore, is the essential vehicle of poetry, and on the varieties of versification the external form of any given poetical product depends. That species of rhythm on which verse is founded is the law of regularly recurring succession of articulate sounds. Verse was defined by Dr Edwin Guest as 'a succession of articulate sounds regulated by a rhythm so definite that we can readily foresee the results which follow from its application.' The definiteness, repetition, and formal character of verse-rhythm distinguish it from that laxer and more undulating rhythm which gives charm to fine prose. The difference is one not of amount but of kind. All good verse must be severely regulated, and must obey the laws of its own prosody. The rhythm of prose, on the contrary, must, in order to be good of its species, be unrecurrent. No greater fault can be committed in prose than the intentional or even accidental introduction of passages which can be read as verse—that is, as recurrent rhythm. Poetry, therefore, in the English sense of the term, is, in its external form, an arrangement of syllables into verses or staves, distinguished by the rhythmical accidents of quantity and accent, and effected by the law of succession.

This definition of the external form of poetry, however, is not sufficient, and to complete it is admittedly so extremely difficult as almost to defy expression. In defining the term *poetry*, nevertheless, as an English word, the lexicographers have probably been too much rather than too little affected by the necessity of including a spiritual meaning. Hardly any one has attempted to say what poetry is without mingling the figurative with the exact sense, or at least without making the definition apply to none but good and original poetry. In speaking of sculpture and painting we do not necessarily exclude all experiments in those arts which are not successful; but poetry, in English, has come to mean something which excludes unsuccessful effort in rhythmical expression. Hence a certain confusion between the external and the internal, between a craft and an ecstasy. It would be well, perhaps, to bring the term back to its more exact meaning, but it is too late to hope to do this. Poetry must continue to mean not merely language arranged in rhythmical sequence, but verse which is also inspired by imagination, and which attains a measure of perfection in that degree at which it aims. The degree may be a low one, but if the aim is fulfilled, and the rhythmical laws are followed, the work produced must not be refused the title of poetry. The word, indeed, is capable of much expansion. Any man who has written what the world accepts as a *ποίησις*, a finished composition in verse, is allowed the name of 'poet,' and his other rhythmical experiments, even though many of them are unsuccessful, are broadly defined as 'poetry.' The presence of high imagination, and of a brilliant propriety of language, are presupposed in all that is called poetry, but the word must be extended to much that is not very lofty nor very skilful if we are not to slip into pedantry in its use. Wordsworth at one time was of opinion that the only strict antithesis to Prose was Metre; but it is simpler, as well as more exact, to understand by poetry metrical composition, not troubling ourselves more than is absolutely necessary in its definition about the quality of high imagination. This latter is essential indeed to the best poetry, but not to all poetry in the colloquial use of that term.

In some languages, and particularly in French, *rime* (constantly misspelt *rhyme*, which is a meaningless arrangement of letters formed in imitation of *rhythm*) is an essential part of the form of poetry. In other languages, as in ancient Greek and Latin, rime does not exist. In English poetry final rime, though not essential, is extremely common, and is the necessary ornament of the main classes of lyrical composition. Rime is a correspondence of sound between syllables which occur at regular intervals, and in final rime that recurrence always takes place at the end of a verse. It may be single, double, or even triple. Propriety and vigour in riming are so important a portion of the art of poetry that rime cannot be overlooked in the briefest survey. Where rime is not rejected altogether, as in blank verse (and in some strophic measures of doubtful value), it forms a main ornament of English verse-composition, and some of the most beautiful effects which poetry produces are due to the skilful arrangement of these recurrent sounds. It is only a poet of great resource and infinite accomplishment who can safely dispense with this fortunate regulation of rime. To one who knows his business it offers no real restraint, but rather a support and an encouragement. As Dryden has excellently said, 'That which most regulates the fancy and gives the judgment its busiest employment is like to bring forth the richest and clearest thoughts.'

It is a popular error that the necessity of finding a rime checks the inspiration of a poet, and that he would be more fortunate if he could contrive to do without it. The universal testimony of the poets themselves does not support this notion. The best writers of verse have been unanimous in declaring that the more distinct and spontaneous are the visions which present themselves to the brain for verse-expression the more rapidly and inevitably do the rimes occur in logical sequence, the proper word fitting into its proper place with as little conscious brain-effort as the proper tone or the proper form does in the work of the painter or the sculptor. If this be so, and it seems impossible to doubt it, the difficulty which the unskilful versifier finds in riming is but another safeguard to protect us from incompetence. For those readers who declare that rime gives them no enjoyment, and is only an interruption of the sense, we can but pray that ears may be added to them.

The recognised species of poetical composition are numerous, and are exceedingly difficult to distinguish from one another, because two or more of them may frequently be found existing side by side in the same specimen. Three principal divisions are, however, supposed to include all the minor classes of poetry under general headings. These are lyrical, epical, and dramatic poetry. In the original sense all poetry was Lyrical—that is to say, was composed to be sung to a musical accompaniment, and could not be conceived except in relation to music. But at a very early period this work of song was divided into two parts, that which was regulated by the air, and that which was expressed in recitative. In the former manner were sung all the poems which were inspired by the passions, which reflected moods individual to the poet, or which were devoted to religious aspiration. In the second manner were chanted matters of narration, statements of fact, didactic, hortatory, and philosophical disquisition. The poems on an air remained lyrical poetry proper, and continued to be more or less fitted to be sung to a musical accompaniment. The poems in recitative became what is vaguely known as Epic poetry, with its attendant classes, the Satire, the Epistle, the Tale, and the Fable. From all these the musical accompaniment soon fell away. In some eastern countries, however, narrative poetry is still, when publicly recited, accompanied by a monotonous music on a stringed instrument.

Dramatic poetry has retained, in its principal branches of Tragedy and Comedy, still less of the singing quality than epical poetry. In many cases drama has thrown off the restraints of versification altogether, and is now included in the general category of poetry partly because of its traditional form, and partly because its imaginative character still links it to lyrical and epical work. The origin of drama, however, was wholly lyrical. It was out of the dithyrambic song in honour of Dionysus that tragedy sprang. The litany was chanted by a chorus that danced as it sang, and in the process of time a single personage began to break away from the chorus at intervals, and either to express aspirations of his own, or to narrate stories of the god, or to incite the chorus to fresh exertions. Comedy had a similar beginning, and by degrees not one but two and then many actors confronted the chorus and drew it into conversation. The development of this new form of poetry was very rapid; it gained variety and a recognised code of forms within a very short time, and we now possess in the tragedies of Æschylus a body of ancient dramatic poetry still capable, as recent experiment has shown, of satisfying the demands of a modern playgoer. Here the purely lyric element, in spite of the prominence of the chorus, is already minimised in favour of the development of personal action and character, so that the subsequent transition to the form of the most modern prose tragedy is really very unessential. All the principles of dramatic poetry may be comprised in an essay on the *Agamemnon*.

Into these three elements, then, the Song, the Statement, and the Drama, all poetry that is not of a primitive nature is capable of being resolved. That which was primitive—and of this we have to conjecture more than we can prove—was probably Song alone. But, while we divide poetry into these three elements, it is not possible to make the same easy division of poetical literature. Here are found, indeed, the three great classes, but, as has been already said, they are constantly detected existing side by side in one and the same composition. The more elaborate the species of poetry the more likely are we to find upon analysis that the classes are confounded in it. In the Song we still preserve the simplest form of poem. This is a short piece in regular recurrent rhythm, expressing with the utmost conciseness a single enthusiastic and intense personal emotion, which it pours forth without deviation at a breath. When the spontaneous outburst is over the song naturally closes.

No other species of poetry is so simple as this. The Ode, which is often regarded not merely as a lofty form of lyric, but as the typical form *par excellence*, introduces a complexity. Too long and elaborate to be sung spontaneously, it verges upon drama in calling to its aid a chorus and an antichorus of singers; upon epic by its excursions into narrative and didactic reflection. The ode, in which we include its funereal form the Elegy, remains, however, truly lyrical in its necessary dependence upon melody. Not a line of it but presupposes a musical interpretation. The traditional fixed forms suggest the accompaniment of music to a far less degree. The Sonnet, for instance, with its dignified arrangement of full lines, admitting very slight modification of form, is singularly ill-fitted to be sung. It offers no musical variety, whereas its very beauties, and in particular those subtle harmonies which are secured by a proper attention to the structure of its quatrains and tercets, would not merely gain nothing, but would lose much by being set to music. Yet we can imagine even the sonnet chanted to some simple conventional melody, unobtrusive enough not to conceal its intellectual beauties nor that vein of reflective and pensive narration which links it to the epical order; and we must continue to regard the sonnet as essentially lyrical, notwithstanding its complexity and monotony. Not less than the song, the sonnet requires to consist of the spontaneous expression of a single intense emotion. What is true of the sonnet is true of the other traditional forms, some of which, as, for instance, the Rondeau, approach the song more closely, while others, as, for example, the grandiose Chant Royal, take their place on the further side of the sonnet, between the ode and the latter.

If in the divisions of lyrical poetry we find the other two classes occasionally present, the counterpart is still more true when we turn to a similar examination of epic and dramatic poetry. In the first case we possess an exquisite form, less successfully cultivated in England than in Italy, the Terza Rima, in which the lyrical and the epic forms co-exist to an almost equal degree. Here it is impossible to say whether the art of narrative or the art of song predominates. Even in the pure epic neither the lyrical nor the dramatic element is omitted. Whenever a burst of enthusiasm or passion seizes the narrator he passes without transition into lyric; whenever from describing his personages he proceeds to a record of their conversation, he suddenly transforms his epic into drama. Indeed, the rank of the various sections of the epical order of poetry may almost be determined by the opportunity they give for an admixture of the others. The Epistle is one of the least lyrical sections of all poetry; it may, however, contain an element of the dramatic. Satire, when it comprises no admixture of narrative, is apt to fall very low in the poetic scale. If its passion be enthusiastic and genuine it may attain to a certain lyrical afflatus; but there is little of the instinct of song in mere rage and disdain. Pure satire is commonly sustained solely by its executive ability, and is one of those species of literature which prove the necessity of giving to poetry a definition depending in the first instance not on its truth or beauty as 'a criticism of life,' but on its rhythmical structure.

Drama, as existing in modern Europe, has lost much of the external appearance of poetry. The distinction which admits a comedy in prose within the order of poetical literature and yet excludes a novel seems an arbitrary one. But it can be accounted for on traditional grounds. The novel has always been, from the days of the later Greeks, written in prose, and properly so, for it is independent of regulated form. Comedy, on the other hand, has but very lately, and still not completely, escaped from the bonds of verse. Rhythmical form is still largely used for tragedy, although the tendency in each of the great sections of drama is to dispense with a restraint which adds to the reader's pleasure, but in a much less degree to the spectator's. In other divisions of dramatic literature verse and even rime are still essential. In Opera, which is a combination of song with a conventional species of drama, both are necessary; and Pastoral imperatively demands for its graceful convention the ornament of metre. Dialogue, a dramatic form, may be combined even with an epical species as a medium for giving information or exhortation. Hastily looked at, however, drama appears in its modern aspects to be divorced more and more completely from the sister branches of poetry. It is therefore important to insist on the fact that the great poetical principle of unity in variety rules here as it does in those compositions which seem more completely under its sway. Without a lyrical element holding the parts of a drama together, balancing them, and supplying them with the necessary fire and harmony, the humblest play cannot maintain its existence. It is this more or less concealed dependence upon fixed laws of form which must always distinguish dramatic literature from the varieties of prose fiction. As long as it obeys these laws it holds its place in the order of poetry, although it may have abandoned its rhythmical shape. If it throws off these fortunate restraints it either perishes altogether or it becomes a mere variety of the prose novel.

In the incessant discussion which takes place as to the nature of poetry, the real aspect of the question is too frequently obscured by a confusion between Poetry, as a craft practised by artists, and the Poetical, as a metaphysical conception. The latter, which has been analysed with extraordinary minuteness by the Germans, and in particular by Goethe and by Hegel, is not necessarily combined with any of the external forms of poetical literature. This distinction, admirably laid down by Diotima in the *Symposium* of Plato, has been generally forgotten by those who have endeavoured to sentimentalise the art and to confuse our ideas of it by such vague and futile definitions as the well-known formula 'Poetry is impassioned truth.' It seems almost waste of words to point out that while the best poetry must be impassioned and must be true, in accordance with Aristotle's dictum that the superiority of poetry consists 'in its possessing a higher truth and a higher seriousness,' yet that no definition which confines itself to moral or sentimental attributes can be adequate to distinguish an art which consists of the making of a certain definite thing in a certain definite form.

In short, and in spite of the extreme unwillingness of the metaphysician to acknowledge it, we must insist that the idea of poetry cannot be divorced from the incident of 'making,' whether we call it with Wordsworth 'impassioned expression' or employ the broader and simpler word 'execution.' Until the passion and the truth are fused into actual speech, and until that speech takes a rhythmical form, those elements may be as 'poetical' as you please, but they do not form poetry. None of the wild words of Mr Ruskin deserve an immortality of repudiation more thoroughly than the following phrase, which is always on the lips of those who write laxly and nebulously about the poetic art. 'No weight nor mass nor beauty of execution can outweigh one grain or fragment of thought,' says Mr Ruskin. If this were true, half of the noblest poetry in the world would cease to possess any value. Thought may and often does accompany the expression of the poetic art, but it is not essential to it in the sense in which Mr Ruskin uses the word, as an original act of the intellectual faculty. The few poets, indeed, who have aimed at producing 'chains of valuable thoughts' have rarely succeeded in doing more than giving tuneful expression to thought reflected from other and more ratiocinative minds. Even when a poet, such as Coleridge, has been eminently deductive and argumentative in his prose, he has generally been sensuous and simple in his verse. In the peculiar sense in which Mr Ruskin uses the word 'execution,' as directly distinguished from 'thought,' the work of the great poets has seldom possessed the latter quality in any notable degree.

It is desirable to define what is meant by 'execution,' for on this depends our whole conception of the practice of poetry as an art. It is not confined to an observance of the technical laws of this form of composition, to a correct and beautiful use of rhythm, of stanzaic form, of rime, and of that 'variety in unity' in which the charm of verse consists. All this is part of poetical execution, and an extremely important part. In most cases it may be said to be an indispensable part. But it is not all. Execution in poetry, as in the other fine arts, is the mechanical performance by which the effect desired is produced in the most perfect and most characteristic manner, so as in the happiest combination to illustrate the nature of the art itself and the individuality of the artist. As the medium in which the poet works is language, execution in his case is the arrangement of the best words in the best order, the best order being, in all but a few anomalous cases, a rhythmical one. The technical laws of verse, however, deal only with 'the best order.' There remain, as a part of execution, 'the best words.' This section of the definition covers all the intellectual propriety, the moral passion, the verbal felicity, the myriad charms and graces, of which 'the best order' is but the vehicle. It is part of a poet's technical work, part of his business as a 'maker,' to produce this manifold perfection of regulated language, and all these beauties of expression and feeling cannot be rudely divided from that 'execution' of which they are an inherent feature. The bad poet may have the intellect of Locke or of Spinoza; he will learn by the total neglect of his verses that in poetry no weight nor mass of thought can outweigh one grain of executive skill.

It would, nevertheless, be a grave error to insist so emphatically on the importance of the outward form of poetry as to encourage neglect of its inward character. In a definition of poetry it has been deemed needful to dwell here on the fact that it is primarily an art and subjected to definite laws. But, as Joubert has said, 'the lyre is a winged instrument,' and the closest attention to its constructive mechanism will not give it the power of flight if inspiration be lacking. The vivid pleasure produced by the best poetry is due in large measure to the merits of its execution—its music, the splendour of its images, the harmony and felicity of its arrangement of language. But there is something beyond and above this 'complex feeling of delight;' there is a spiritual emotion which is the spontaneous result of close attention to great poetry, and which is created in the soul only by verse that is of the highest value. This emotion is founded on the Aristotelian qualities of 'the higher truth' and 'the higher seriousness,' and is inseparable from, though not to be confounded with, the mere physical delight in lovely sounds and marshalled groups of images. In this exquisite passion of poetry there is something supernatural, which evades analysis. It combines the experience of life with the hope of immortality, and fuses what has been felt and witnessed into what has only been, and can only be, imagined. The literature of all countries and of all ages has proved that this subtle and divine emotion is produced in its most direct form by the art of language rhythmically arranged, and to this art is given the name of Poetry.

The prose fragment called the *Poetics* of Aristotle is the earliest and most important treatise on the art of poetry which has come down to us from antiquity. What is commonly known as Horace's 'Art of Poetry' gives us the views of an admirable Latin writer on verse and on the poet. In 1527 Vida published his Latin poem, *Ars Poetica*, which exercised a great authority, and was by many students preferred to Horace. Of more modern interest is Scaliger's treatise, *Poetices Libri Septem* (1561). The first manual of modern Italian prosody was Girolamo Muzio's *Arte Poetica* (1551). In the England of Elizabeth we have three important treatises on the art, *An Apology for Poetry* (1595), by Sir Philip Sidney; *A Discourse of English Poetry* (1586), by W. Webbe; and *The Art of English Poesy* (1589), by George Puttenham. In France the first important treatise on the subject was the *Art Poëtique Français* (1604), by Vauquelin de la Fresnaye. Nicolas Boileau, 'the Lawgiver of Parnassus,' wrote an *Art Poétique*. Among French works of the 18th century the most important are *Traité de la Prosodie Française* (1736), by Olivet, and *Réflexions sur la Poésie* (1752), by Louis Racine. Dryden's *Essay on Dramatic Poetry* belongs to 1669. Among modern works must be cited that portion of Hegel's *Æsthetik*. Guest's *History of English Rhythms* (1838; new ed. 1882) remains the best authority on British prosody, while the *Petit Traité de Poésie Française* is greatly to be recommended.

See also in this work English Literature, the sections on literature in the articles on the several countries, and the articles Ballad, Blank Verse, Didactic Poetry, Drama, Epic Poetry, Hymn, Lyric, Metre, Ode, Pastoral Poetry, Rhyme, Satire, Sonnet. There are separate articles on all the best-known poets, including the following:

Greek.

Homer (about 900).
Alcæus (600).
Sappho (680–570 B.C.).
Æschylus (525–461 B.C.).
Pindar (522–422 B.C.).
Sophocles (495–405 B.C.).
Euripides (480–406 B.C.).
Aristophanes (448–388 B.C.).
Menander (342–291 B.C.).

Latin.

Plautus (254–184 B.C.).
Terence (185–159 B.C.).
Lucretius (98?–55 B.C.).
Catullus (87–54 B.C.).
Virgil (70–19 B.C.).
Horace (65–8 B.C.).

Latin.

Tibullus (54–18 B.C.).
Propertius (50–16 B.C.).
Ovid (43 B.C.–18 A.D.).
Lucan (39–65 A.D.).
Martial (41–104 A.D.).
Juvenal (55–130? A.D.).

Italian.

Dante (1265–1321).
Petrarch (1304–74).
Boiardo (1434–94).
Ariosto (1474–1533).
Tasso (1493–1569).
Goldoni (1707–93).
Alfieri (1749–1803).
Manzoni (1785–1873).
Leopardi (1798–1837).

FRENCH.

Chanson de Roland (11th c.).
Villon (1431-61).
Marot (1496-1544).
Ronsard (1524-85).
Malherbe (1555-1628).
Regnier (1573-1613).
Corneille (1606-84).
Lafontaine (1621-95).
Molière (1622-73).
Boileau (1636-1711).
Racine (1639-99).
Rousseau, J. B. (1670-1741).
Voltaire (1694-1778).
A. de Chénier (1762-94).
Béranger (1780-1857).
Lamartine (1790-1869).
Hugo (1802-85).
De Musset (1810-57).
Gautier (1811-72).
Leconte de Lisle (1818-94).
Sully-Prudhomme (b. 1839).
Coppée (b. 1842).

SPANISH.

The Cid (12th century).
Lope de Vega (1562-1635).
Calderon (1600-81).

PORTUGUESE.

Camoens (1524-80).

RUSSIAN.

Pushkin (1799-1837).
Lermontoff (1814-41).

SCANDINAVIAN.

The Eddas.
Holberg (1684-1754).
Bellman (1740-95).
Ewald (1743-81).
Baggesen (1764-1826).
Œhlenschläger (1779-1850).
Tegner (1782-1846).
Geijer (1783-1847).
Grundtvig (1783-1872).
Heiberg (1791-1860).
Runeberg (1804-77).
Ibsen (b. 1828).
Bjornscn (b. 1832).

DUTCH.

Vondel (1587-1679).
Bilderdijk (1756-1831).
Lennep (1802-68).
Beets (b. 1814).

GERMAN.

Nibelungen (12th century).
Reineke Fuchs (13th century).
Sachs (1494-1576).
Klopstock (1724-1803).
Lessing (1729-81).
Wieland (1733-1813).
Herder (1744-1803).
Goethe (1749-1832).
Schiller (1759-1805).
Arndt (1769-1860).
Uhland (1787-1862).
Korner (1791-1813).
Heine (1799-1856).
Gutzkow (1811-78).
Hebbel (1813-63).

BRITISH.

Cædmon (d. 680).
Beowulf (8th century).
Barbour (1316-95).
Langland (b. about 1332).
Chaucer (1340-1400).
Lyndsay (15th century).
James I. (1406-37).
Dunbar (1460-1530).
Gavin Douglas (1474-1522).
Spenser (1553-99).
Sir P. Sidney (1554-86).
Lodge (1556-1625).
Drayton (1563-1631).
Marlowe (1564-93).
Shakespeare (1564-1616).
Dekker (1570-1641).
Donne (1573-1631).
Jonson (1573-1637).
Marston (1575-1634).
Fletcher (1579-1625).
Massinger (1583-1638-39).
Beaumont (1584-1616).
Drummond (1585-1649).
Ford (1586-1639).
Carew (1589-1639).
Herrick (1591-1674).
Herbert (1593-1633).
Waller (1605-87).
Milton (1608-74).
Suckling (1609-41).
Butler (1612-80).
Cowley (1618-67).
Marvell (1621-78).
H. Vaughan (1621-95).
Dryden (1631-1700).
Otway (1651-85).
Prior (1664-1721).
Young (1684-1765).
Gay (1685-1732).
Pope (1688-1744).
Thomson (1700-48).
Gray (1716-71).
Collins (1721-59).
Goldsmith (1728-74).
Cowper (1731-1800).
Chatterton (1752-70).
Crabbe (1754-1832).
Blake (1757-1827).
Burns (1759-96).
Rogers (1763-1855).
Wordsworth (1770-1850).
Scott (1771-1832).
Coleridge (1772-1834).
Southey (1774-1843).
Landor (1775-1864).
Campbell (1777-1844).
Moore (1779-1852).
Leigh Hunt (1784-1859).
Byron (1788-1824).
Shelley (1792-1822).
Keats (1795-1821).
Hood (1799-1845).
Mrs Browning (1806-61).
Tennyson (b. 1809).
Browning (1812-89).
Clough (1819-61).
Arnold (1822-88).
Rossetti (1828-82).
Christina Rossetti (1830-94).
W. Morris (b. 1834).
Swinburne (b. 1837).

AMERICAN.

Bryant (1794-1878).
Emerson (1803-82).
Whittier (1807-92).
Longfellow (1807-82).
Holmes (1809-94).
Poe (1809-49).
Lowell (1819-90).
Whitman (1819-92).

Pogge (*Agonus cataphractus*), a small fish, not uncommon on British coasts, also known as *Armed Bullhead*, *Lyrie*, *Pluck*, and *Noble*. It is related to the Bullhead (q.v.). The body, about 6 inches long, is cuirassed by large scales; the head is very broad, and the mouth is very small. Notwithstanding its uncouth appearance, it is good to eat.

Poggendorf, JOHANN CHRISTIAN, a German physicist, was born at Hamburg, 29th December 1796. He studied pharmacy, chemistry, and physics, and was professor of Physics at Berlin from 1834 till his death. In 1839 he was made a member of the Berlin Academy of Sciences. His chief discoveries were in connection with electricity and galvanism; he also invented a multiplying galvanometer for measuring the calorific action of currents. From 1824 he edited the *Annalen der Physik und Chimie*, better known as *Poggendorfs Annalen*, an important organ for the history of the physical sciences. Besides helping Liebig and Wöhler to prepare the *Dictionnaire de Chimie* (1837-51), he wrote *Lebenslinien zu einer Geschichte der exakten Wissenschaften* (1853), *Biographisch-litterarisches Wörterbuch zur Geschichte der exakten Wissenschaften* (2 vols. 1857-63), and *Geschichte der Physik* (1879). He died 24th January 1877.

Poggio Bracciolini, GIAN FRANCESCO, a famous Italian humanist, was born in 1380 at Terranova in Florence. He studied Latin under John of Ravenna, and Greek under Manuel Chrysoloras, and early gained the notice of the Florentine scholars for his skill in copying MSS. About 1402 he became a secretary to the Roman curia; but, though the fifty years of his service covered a period of remarkable importance, he seems to have taken no interest whatever in the movement of church affairs, but to have been devoted heart and soul to the resuscitation of classical learning. In the course of his duties at the Council of Constance (1414-18) he explored the Swiss and Swabian convents for MSS., and later in his wider travels to England and elsewhere he never lost sight of the dearest interest of his life. He was able to recover MSS. of Quintilian, Ammianus Marcellinus, Lucretius, Silius Italicus, Vitruvius, and many other Roman authors. About 1452 he retired to Florence, and next year succeeded Carlo Aretino as historiographer to the republic. Here he died in 1459. His writings include *Letters* (best ed. by Tonelli, 3 vols. Flor. 1832-61); moral essays *On Nobility*, *On the Infelicity of Princes*, *On Marriage in Old Age* (he himself in 1435 took to wife a girl of eighteen), and the like; a rhetorical Latin *History of Florence*, in imitation of Livy; a series of unclean and unscrupulous polemical invectives against contemporaries, especially Filelfo and Valla; and a poor translation into Latin of Xenophon's *Cyropædia*. But his most famous book is the *Liber Facetiarum*, a collection of humorous and not too decent stories and jests, written in fair Latin, and full of merry raillery at the expense of the monks and secular clergy. The book has some importance in the study of the diffusion and development of folk-tales, and here Poggio takes a place with Straparola, Morlini, Boccaccio, Sacchetti, and Bandello, between the later *conteurs* who have borrowed or worked up their stories on the one hand, and such earlier storehouses as the *Exempla*, the *Disciplina Clericalis*, the *Aurea Legenda*, the *Gesta Romanorum*, and the *Fabliaux* on the other. A good edition (Fr. trans. and text) is that of Isidore Lisieux (Paris, 1878).

See the Life by Dr Shepherd; also Voigt's *Wiederbelebung des classischen Alterthums*, and Symonds' *Renaissance in Italy*.

Poinding (same root as Eng. *pound*), in the law of Scotland, means the seizing and selling of a debtor's goods under process of law, or under the warrant of a heritable security, in order to pay the debt. It is either real or personal. Real poinding is the attaching of goods or movables on the land over which some heritable security exists. It is one mode in which heritable security is made effectual. Thus, the superior of lands can poind the ground to obtain payment of his feu-duties; and the holder of a heritable bond can do the same in order to recover his debt. Personal poinding is the mode in which a decree of the court is made effectual by the messenger or bailiff seizing the movables of the debtor. It may not proceed until the debtor has been charged to pay the debt and the days of charge have elapsed. The debtor's goods being poinded, they are appraised or valued, and the messenger reports his execution to the sheriff, or other judge ordinary, who grants warrant to sell the goods by public roup after advertisements. The net amount of the sale is paid over to the creditor, or, if no purchaser bid for them, they are delivered to the creditor at the appraised value. There is also another kind of poinding, called a poinding of stray cattle, which takes place whenever the cattle of a stranger trespass on lands, in which case the owner or occupier of the lands can seize them at his own hand, without judicial warrant, and keep them as a security until the damage done by the cattle is paid to the owner of the land. The poinder must, however, take care to keep the cattle in a proper place, and feed them. In England the word poinding is not used, the corresponding term being Distress (q.v.).

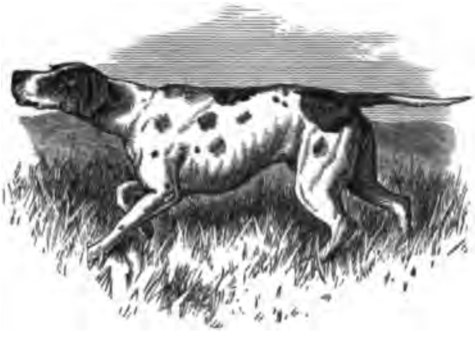
Poinsettia, a name given to the Mexican shrub *Euphorbia pulcherrima*, introduced into the horticulture of other lands by Joel Roberts Poinsett (1779–1851), U.S. minister to Mexico. It is remarkable for the large and conspicuous vermilion bracts below its yellowish flowers.

Point-a-Pitre, the principal town and port, though not the capital, of Guadeloupe (q.v.), on the south-west side of Grande-Terre. It is fortified, and has some sugar-boiling. Pop. 17,000.

Point de Galle. See GALLE.

Pointed Architecture. See GOTHIC.

Pointer, a breed introduced from Spain about the middle of the 18th century. The Spanish pointer was a larger and much slower dog than the modern English pointer, rather wanting in stamina, and inclined to 'knock up' with a hard day's work; but, if not hurried, was possessed of wonderful nose and powers of scent. As shooting became more common, and guns approached nearer to perfection, the Spanish pointer was found to be too slow and soft. With the object of removing these defects, crosses with the greyhound to improve the speed, and with the bulldog to get courage, were tried, but with little success, until about the beginning of the 19th century the well-known Colonel Thornton tried a cross with the lighter variety of foxhound. He soon succeeded in breeding a light and active dog, capable of ranging at a fast pace for a considerable time, and though possibly not with the nose of the old Spanish pointer, yet with sufficient for the purpose. Other breeders followed suit, and a distinct strain known as the English Pointer was soon established. By careful selection the hound tendency to hunt a foot-scent was eradicated, or nearly so, while some of the speed and staying powers of the hound were retained. The act of 'pointing' when the game is first scented was at first carefully taught, but gradually became instinctive, until now well-bred puppies of a few months old may be seen pointing at any object which excites them. In general appearance the pointer somewhat resembles the foxhound, though he is a lighter and more active dog, with a finer coat. The head of the pointer should be fairly large, with an intelligent expression; a small eye or too much lip greatly detracts from the appearance. The shoulders should be sloping and powerful, as the dog has often to stop suddenly on a 'point' when at full speed. The body should be built on graceful and racing lines, chest not too wide, but very deep, feet round and compact. Liver and white, and lemon and white, are the popular colours, as they are easily seen in heather or turnips, but whole black or liver has many admirers. Owing to the changed conditions of agriculture, the pointer is not now used so extensively for partridge shooting, but is still used for grouse. In hot weather, where water is scarce, the pointer has a great advantage over the setter, but succumbs sooner to cold and wet than the heavy coated setter. As the pointer is seldom kept as a companion, his intelligence is not of a high order, but he is easily kept in command, and is generally good-tempered.



Pointer Standing at Game.

Poison is commonly defined to be a substance which, when administered in small quantity, is capable of acting deleteriously on the body; but this definition is obviously too restricted, for it would exclude numerous substances which are only poisonous when administered in large doses, as the salts of lead, antimony, &c.; hence the quantity required to kill must not enter into the definition. A good practical definition of a poison is 'any substance or matter which, when introduced into the body in any way, can destroy life by its own inherent qualities without acting mechanically.' This definition includes poisonous solids, liquids, and gases of definite chemical composition—the products of decomposition or of bacterial organisms, and the virus of contagious diseases. The last mentioned produce the symptoms of the various infectious and contagious diseases, and are not included in treatises on poisons. The others are classified sometimes according to their source, as mineral, vegetable, and animal; or more conveniently according to their action, as *Irritants*, *Narcotics*, and *Narcotico-irritants*.

The *Irritants*, when taken in ordinary doses, speedily occasion intense vomiting and purging and severe abdominal pain. They act chiefly on the stomach and intestines, which they irritate, inflame, and frequently corrode, and may thus occasion ulceration, perforation, or gangrene. Amongst those which possess corrosive properties are the strong mineral acids, caustic alkalies, corrosive sublimate, &c.; whilst among the pure irritants which exert no destructive chemical action on the tissues with which they come in contact may be mentioned cantharides. The *Narcotics* act specially on the brain and spinal cord. Amongst their most common symptoms are giddiness, headache, obscurity of sight or double vision, stupor, loss of power of the voluntary muscles, convulsions, and, finally, complete coma. These poisons have no acrid, burning taste, nor do they usually give rise to vomiting or diarrhœa, and, excepting a slight fullness of the cerebral vessels, they leave no well-marked post-mortem appearance. They are few in number, and none of them belong to the mineral kingdom. The *Narcotico-irritants* have, as their name implies, a mixed action. At varying periods after they have been swallowed they give rise to vomiting and purging, like irritants, and sooner or later produce stupor, coma, paralysis, and convulsions, owing to their effect on the brain and spinal marrow. As familiar examples we may point to monkshood, tobacco, and poisonous mushrooms. Sometimes the more violent of the poisons here classed as irritants are made into a separate group—*Corrosives;* the narcotics are put under the head *Neurotics;* and the *gaseous* poisons are treated as a separate class.

Under the head of *Irritant Poisons* may be included (1) Mineral Acids, as sulphuric, nitric, and hydrochloric acids; vegetable acids, and some of their salts, as oxalic acid, binoxalate of potash, and tartaric acid (in doses of half an ounce or more); the alkalies, as pearl-ash (carbonate of potash), soap lees (carbonate of soda), ammonia and its sesquicarbonate in strong solution; and metallic compounds, as white arsenic (arsenious acid), yellow arsenic (orpiment), corrosive sublimate, pernitrate and other salts of mercury, acetate of lead (sugar of lead) in doses of an ounce and upwards, sulphate of copper (blue vitriol), subacetate of copper (verdigris), arsenite of copper (commonly known as *Scheele's green* or *emerald green*, which has been employed under the name of *extract of spinach* for colouring confectionery), tartarated antimony, chloride of antimony (butter of antimony), chloride of zinc (Sir W. Burnett's Fluid), nitrate of silver (lunar caustic), sulphate of iron (copperas or green vitriol), and bichromate of potash; (2) Vegetable Substances—viz. colocynth and gamboge in large doses, savin, croton-oil, elaterium, &c.; and (3) Animal Substances, such as cantharides, to which must be added the occasional cases in which sausages, and certain fish and molluscs, usually quite innocuous, act as irritant poisons. The *Narcotic Poisons* include opium, hydrocyanic (or prussic) acid, cyanide of potassium, henbane, alcohol, ether, chloral, and chloroform. The *Narcotico-irritant Poisons* include nux vomica, meadow saffron (Colchicum), white hellebore, foxglove, common hemlock, water hemlock (*Cicuta virosa*), hemlock water-dropwort (*Œnanthe crocata*), fool's parsley, thorn-apple, monkshood or aconite, deadly nightshade, tobacco, Indian tobacco (*Lobelia inflata*), the bark and seeds of the common laburnum, the berries and leaves of the yew-tree, and certain kinds of fungi.

The cases in which there are antidotes qualified to neutralise chemically the action of the poison are few in number. For the *mineral acids* chalk or magnesia in water must be used, with the view of neutralising them, after which milk should be given freely. The *alkalies and their carbonates* must be neutralised by vinegar and water, or lemon-juice mixed with water, after which milk should be given. For *oxalic acid* the antidote is chalk or magnesia in water, by which an insoluble oxalate of lime or magnesia is formed. For *arsenic* the hydrated peroxide of iron has been regarded as an antidote, but its efficacy is doubtful. Vomiting should be excited by the administration of a scruple of sulphate of zinc in warm water, and, after the stomach has been well cleared out, demulcent fluids, such as flour and water or milk, should be given. *Corrosive sublimate* combines with albumen (white of egg), and forms an insoluble inert mass; *nitrate of silver* is neutralised by chloride of sodium (common salt) dissolved in water; *tartarated antimony* is to a great degree rendered inert by the administration of decoction of bark or gall-nuts; and *acetate of lead* is rendered inert by the administration of sulphate of magnesia, which converts it into an insoluble sulphate of lead. In all cases of suspected poisoning, in which the nature of the poison is not known, the safest course is at once to produce vomiting by sulphate of zinc, or in its absence by a dessert-spoonful of flour of mustard suspended in tepid water, and to continue the vomiting till all the contents of the stomach are discharged, after which milk should be given freely.

Most of the known gases have a poisonous action when inhaled into the lungs; in these cases death may be due simply to suffocation or to a specific action of the gas. *Carbonic Acid* (q.v.), although seldom employed as an instrument of murder, is a frequent cause of accidental death, and in France is a common means of self-destruction. It is established by numerous experiments that air containing more than *one-tenth* of its volume of carbonic acid will, if inhaled, destroy life in man and the higher animals; when diluted with two or more volumes of air it can be breathed, and produces symptoms of vertigo and somnolency, and so great a loss of muscular power that the individual, if in an erect or sitting position, falls as if struck to the ground. The respiration, which at first is difficult and stertorous, becomes suspended. The action of the heart is at first violent, but soon ceases, sensibility is lost, and the person now falls into a comatose or death-like state. Those who have been resuscitated usually feel pain in the head and general soreness of the body for some days, and in a few severe cases paralysis of the muscles of the face has remained. The patient must, of course, be at once removed from the poisonous atmosphere, after which artificial respiration should be had recourse to. If the skin is warm cold water may be poured on the head and spine; while if the surface be cold a warm bath should be employed. When respiration is re-established venesection will often relieve the congestion of the vessels of the brain. The inhalation of oxygen gas is said to have been of service in these cases. *Carbonic oxide* is also an active poison, and is present in coal-gas and in charcoal fumes. Both carbonic acid and carbonic oxide act as powerful narcotics. The fatal power of ordinary coal-gas as an asphyxiant and irritant is probably due to the carbonic oxide present; the post-mortem appearances are very similar in cases of poisoning by coal-gas and by carbonic oxide. *Sulphuretted hydrogen*, which occurs abundantly in foul drains, sewers, cesspools, &c., is a gaseous poison whose effects are often noticed. Nothing certain is known of the smallest proportion of this gas required to destroy human life; but air containing only $\frac{1}{800}$th of its volume of this gas will destroy a dog; and when the gas exists in the proportion of $\frac{1}{250}$th it will kill a horse. During the construction of the Thames Tunnel the men engaged in the work suffered severely from the presence of this gas, which was probably derived from the action of the water on the iron pyrites in the clay, and which issued in sudden bursts from the walls. By respiring this atmosphere the strongest and most robust men were in the course of a few months reduced to an extreme state of exhaustion, and several died. The symptoms with which they were first affected were giddiness, sickness, and general debility; they became emaciated, and fell into a state of low fever accompanied by delirium. In this case the dilution was extreme; when the gas is breathed in a more concentrated form the person speedily falls, apparently lifeless. It appears to act as a narcotic poison when concentrated, but like a narcotico-irritant when much diluted with air. The action of the vapour of *sulphide of ammonium*, which is also commonly present in cesspools, &c., is probably much the same as that of sulphuretted hydrogen. Many of the gases which are only found as products of the laboratory are in the highest degree poisonous, as arseniuretted hydrogen; but as few persons run the risk of inspiring them it is unnecessary to enter into details.

In point of Law, the use of poison to kill or injure a human being or certain animals renders the poisoner amenable to the criminal courts. With regard to the sale of poisons, the legislature found it necessary to put some restrictions on one description—viz. arsenic—in order to prevent persons obtaining it with facility, and in such a manner as to avoid detection. The 14 and 15 Vict. chap. 13, requires every person who sells arsenic to enter in his books the date and quantity and purpose of its use, and later acts apply this rule to other poisons. It is not to be sold to one who is unknown to the vendor unless in presence of a witness who is known, and whose place of abode is recorded in the book. The arsenic must also be mixed with soot or indigo, in the proportion of ½ oz. of soot or indigo to the lb. All the boxes, bottles, &c. must be labelled 'Poison.' Those who offend as to arsenic incur a penalty of £20; but in ordinary prescriptions poisons may be used in the ordinary way by duly qualified medical practitioners. As to the restriction on the sale of other poisons, see CHEMISTS AND DRUGGISTS. The offences committed by those who administer poisons to mankind are as follow: Whoever causes death by poison commits murder, for the means are immaterial if the death was caused by such means with a felonious intent. Where death is not caused, nevertheless whoever administers poison, or causes it to be administered to any person, with intent to commit murder is guilty of felony, and is liable to penal servitude for life, or for not less than three years. Moreover, whoever attempts to administer poison, or other destructive thing, to any person with intent to commit murder is guilty of felony, and is punishable in the same way. These offences are committed whether the poison administered or attempted to be administered, does injury or not; and it is a sufficient committing of the offence if the poison is put in such a place that a party was likely, and was intended to take it. Moreover, even though murder was not intended, but merely an intent to endanger life or inflict grievous bodily harm, still the offence is felony, and is punishable by penal servitude varying from three to ten years. There is also a similar punishment for the attempt to administer any stupefying drug. Not only is it a crime to administer or attempt to administer poison to human beings, but if cattle are maliciously killed by poison the offence is felony, punishable by penal servitude of from three to fourteen years. So to kill by poison any dog, bird, beast, or other animal, ordinarily kept in a state of confinement, is an offence punishable by justices of the peace with imprisonment for six months, or a fine of £20 over and above the injury done. If any person lay poison on lands to kill game he incurs a penalty of £10. Moreover, by the Act 26 and 27 Vict. chap. 113, extending to the United Kingdom, whoever sells or offers to sell poisoned grain, seed, or meal incurs a penalty of £10. Whoever sows, lays, or puts on ground such poisoned grain incurs a like penalty. The use of poisoned flesh is also prohibited. But the sale or use of any solution, material, or ingredient for dressing, protecting, or preparing any grain or seed for agricultural use only, if used *bonâ fide*, is not interfered with.

Secret Poisoning is a mode of taking away life by poisons so slow in their operation that the gradual sinking of the victims under their influence closely resembled the effects of disease or the ordinary decay of nature. It has been practised in all ages, and several undoubted and numerous supposed instances of it are mentioned by Greek and Roman writers. The prevailing ignorance of pathology and chemistry enabled crimes to be carried out with impunity with poisons which would be readily detected at the present day; and for similar reasons many deaths were ascribed to poison that were doubtless due to natural causes. It is impossible to attach much credence to stories such as that Henry VI. was killed by a pair of poisoned gloves, or that victims were simply got rid of by inducing them to smell a poisoned rose. And it is wholly incredible that in pre-scientific days treacherous friends and hidden enemies had access to secret and mysterious methods of poisoning beyond the power of detection that are happily denied to scientific investigators in days when we are acquainted with ten times as many and ten times as subtle poisons. In secret poisoning various preparations of arsenic seem once to have been most frequently used. In the 17th century this atrocious practice became of specially frequent occurrence; and from this time it rapidly increased, spread over western Europe like an epidemic, and became gradually a regular branch of education among those who professed a knowledge of chemistry, magic, or astrology. These persons regarded the knowledge of the mode of preparing secret poisons as of the highest importance, and many of them realised large sums by the sale of their preparations, and occasionally of the secret of their composition. It was in Italy and France that this art was chiefly practised and brought to the highest perfection; but it seems also to have prevailed in England to a considerable extent, for in 1531 the poisoning of seventeen persons, two of whom died, by the Bishop of Rochester's cook led to the passing of an act which declared the employment of secret poisons to be high-treason, and sentenced those who were found guilty of it to be boiled to death. This act was repealed in 1547.

The only undoubted instance of this crime which appears prominently in English history is the murder of Sir Thomas Overbury (q.v.) by Viscount Rochester (the favourite minion of James I.) and his wife, the divorced Countess of Essex. Prince Henry was falsely supposed to have been poisoned by his father, James I. (1612); and James's own death was similarly ascribed to nefarious practices on the part of Buckingham, nay, even of Charles I. (Milton). Undoubtedly such was the popular impression at the time, for Dr Lamb, a conjuror and quack, who was believed to have furnished Buckingham with the poisons, was seized by the angry populace in Wood Street, Cheapside, London, and beaten and stoned to death. But it was in Italy that this mode of poisoning was most prevalent. There, judging from the writings of various authors, it seems to have been looked upon as a not unjustifiable proceeding to get rid of a rival or enemy by poison; and from the time of the Lombard invasion down to the 17th century Italian history teems with instances which sufficiently show that poison was both the favourite weapon of the oppressor and the protection or revenge of the oppressed. The Borgias (q.v.) are generally singled out and held up to the horror and detestation of mankind; but as far as their poisonings are concerned they merely employed this method of destroying their adversaries a little more frequently than their neighbours. To show the popular feeling on this subject we may instance the case mentioned in the *Mémoires* of Henry II., fifth Duke of Guise, of a soldier who was requested to rid the Duke of Gennaro Annese, one of his opponents in Naples. *Assassination* was the mode proposed to the soldier, but he shrank with horror from the suggestion, stating at the same time that he was quite willing to *poison* Annese. It was shortly after the date of this story (1648) that secret poisoning became so frequent; and the Catholic clergy, despite the rules of the confessional, felt themselves bound to acquaint Pope Alexander VII. with the extent of the practice. On investigation it was found that young widows were extraordinarily abundant in Rome, and that most of the unhappy marriages were speedily dissolved by the sickness and death of the husband; and further inquiries resulted in the discovery of a secret society of young matrons which met at the house of an old hag, by name Hieronyma Spara, a reputed witch and fortune-teller, who supplied those of them who wished to resent the infidelities of their husbands with a slow poison, clear, tasteless, and limpid, and of strength sufficient to destroy life in the course of a day, week, month, or number of months, as the purchaser preferred. The ladies of Rome had been long acquainted with the 'wonderful elixir' compounded by La Spara; but they kept the secret so well, and made such effectual use of their knowledge, that it was only after several years, during which a large number of unsuspected victims had perished, and even then through a cunning artifice of the police, that the whole proceedings were brought to light. La Spara and thirteen of her companions were hanged, a large number of the culprits were whipped half-naked through the streets of Rome, and some of the highest rank suffered fines and banishment. About half a century afterwards the discovery was made of a similar organisation at Naples, headed by an old woman of threescore and ten named Toffania, who manufactured a poison similar to that of La Spara, and sold it extensively in Naples under the name of *acquetta*, and even sent it to all parts of Italy under the name of 'Manna of St Nicola of Bari,' giving it the same name as the renowned miraculous oil of St Nicóla to elude discovery. This poison, now best known as the 'Acqua Tofana' or 'Acqua di Perugia,' is said by Hahnemann to have been compounded of arsenical neutral salts; while Garelli states that it was crystallised arsenic dissolved in a large quantity of water; but both agree that it produced its effect almost imperceptibly by gradually weakening the appetite and respiratory organs. After having directly or indirectly caused the death of more than 600 persons, Toffania was at length seized, tried, and strangled in 1719. From this time the mania for secret poisoning gradually died away in Italy.

Catharine de' Medici has been frequently charged with wholesale poisoning, and in 1558 four of the Scottish commissioners who had been present at Queen Mary's marriage to the Dauphin were poisoned, it was believed, at Dieppe. But it was about the middle of the 17th century that this horrible practice seems to have become most prevalent in France. Here, too, the agents were married women, and their husbands the victims; and, as in Italy, the extent to which the practice was carried was first made known by the clergy. The government, acting on the information thus obtained, seized and imprisoned in the Bastille two Italians named Exili and Glaser, who were suspected of having been the manufacturers and vendors of the poisons. Glaser died in prison; but Exili, becoming acquainted with another prisoner named St Croix, communicated to him his secret, which the latter made considerable use of after his release, compounding in particular the poison known as 'succession powder,' which subsequently became so celebrated. It was the same St Croix who played such a prominent part in the tragical history of the Marquise de Brinvilliers (q.v.). Penautier, the treasurer of the province of Languedoc, and the Cardinal de Bonzy were both pupils of St Croix, and managed, the one to pave the way for his own advancement, and the other to rid himself of his numerous creditors by the administration of poison; but the great influence of these men and the want of direct evidence barred all proceedings against them. Secret poisoning now became fashionable; the passions of jealousy, revenge, avarice, and even petty spite were all satisfied in the same way, and as a necessary consequence other offences decreased in proportion. The prisons teemed with suspected criminals, and the 'Chambre Ardente' was instituted for the special purpose of trying these offenders. In Paris this trade was chiefly in the hands of two women named Lavoisin and Lavigoreux, who combined with the ostensible occupation of midwife that of fortune-teller, and foretold to wives the decease of their husbands, to needy heirs that of their rich relatives, taking care at the same time to be instrumental in fulfilling their own predictions. Their houses were frequented by numbers of all classes, both from Paris and the provinces, among whom were the celebrated Marshal de Luxembourg (q.v.), the Duchess de Bouillon, and the Countess de Soissons; the two former of these, however, went merely from curiosity. Lavoisin and her confederate were at last discovered, tried, condemned, and burned alive in the Place de Grève, 22d February 1680; and from thirty to fifty of their accomplices were hanged in various cities of France. So common had this atrocious practice been that Madame de Sévigné, in one of her letters, expresses a fear lest the terms 'Frenchman' and 'poisoner' should become synonymous. For two years after the execution of the two Parisian poisoners the crime continued to be largely committed, being fostered by the impunity with which offenders of high rank were allowed to escape; and it was not till more than a hundred persons had died at the stake or on the gallows that the government succeeded in suppressing it. The mania for secret poisoning has not since been revived to the same extent, though isolated instances of its practice have occasionally been discovered, particularly in Hungary, where, within the last half of the 19th century, very extraordinary disclosures have at different times been made of the prevalence of this frightful crime among the peasant women. During the times of slavery the Obeah men among the negroes in the West Indies were credited with being expert poisoners. They used vegetable poisons obtained from plants, and there can be no doubt were often instrumental in getting rid of tyrannical or otherwise objectionable masters. In Britain famous poisoning trials have been those of W. Palmer (three victims, 1856), Madeleine Smith ('not proven,' 1857), E. W. Pritchard, M.D. (two victims, 1865), Mary Ann Cotton (sixteen victims, 1872), G. H. Lamson, M.D. (1882), P. Cross, M.D. (1887), and Mrs Maybrick (1889).

See the articles on ADULTERATION, ASPHYXIANTS, NARCOTICS, DISSECTION WOUNDS, LEAD-POISONING, PYÆMIA, SERPENT, VENOMOUS BITES, WOUNDS (POISONED), and for poisoned arrows, ARCHERY and CURARI; those on the more important poisons and the treatment (ACONITE, ARSENIC, HYDROCYANIC ACID, STRYCHNINE, UPAS, &c.); the manuals of medical jurisprudence; and works on toxicology by Christison (1829), Taylor (1847; 2d ed. 1875), Reese (1874), Wormley (1867; 2d ed. 1875), and A. Winter Blyth (1883; 2d ed. 1886).

Poison Ivy. See SUMACH.

Poisson, SIMEON-DENIS, a celebrated French geometer, was born at Pithiviers, in the department of Loiret, 21st June 1781; and displaying an aptitude for mathematics, he was received into the École Polytechnique in 1798. The striking talent he thus early exhibited attracted the notice of Lagrange and Laplace, both of whom anticipated for him a brilliant future. In 1802 he became a professor in the Polytechnique; in 1808 a member of the Bureau des Longitudes; in 1809 professor in the Faculty of Sciences; member of the Institute in 1812, &c.; and this list of distinctions was crowned in 1837 by his elevation to the dignity of a peer of France. He died 25th April 1840. Poisson's whole life was devoted to the prosecution of scientific research, and the fruits of his pen number about 300 Memoirs, inserted in the publications of the École Polytechnique, of the Academy of Sciences, and other scientific journals. Of the separate treatises published by Poisson the best known is the *Traité de Mécanique* (2 vols. 1833); others were on capillary action, the mathematical theory of heat, the motion of projectiles, and, lastly, the celebrated work *Sur l'Invariabilité des moyens Mouvements des grands Axes Planétaires*. Poisson is fairly considered one of the chief founders of the science of mathematical physics.

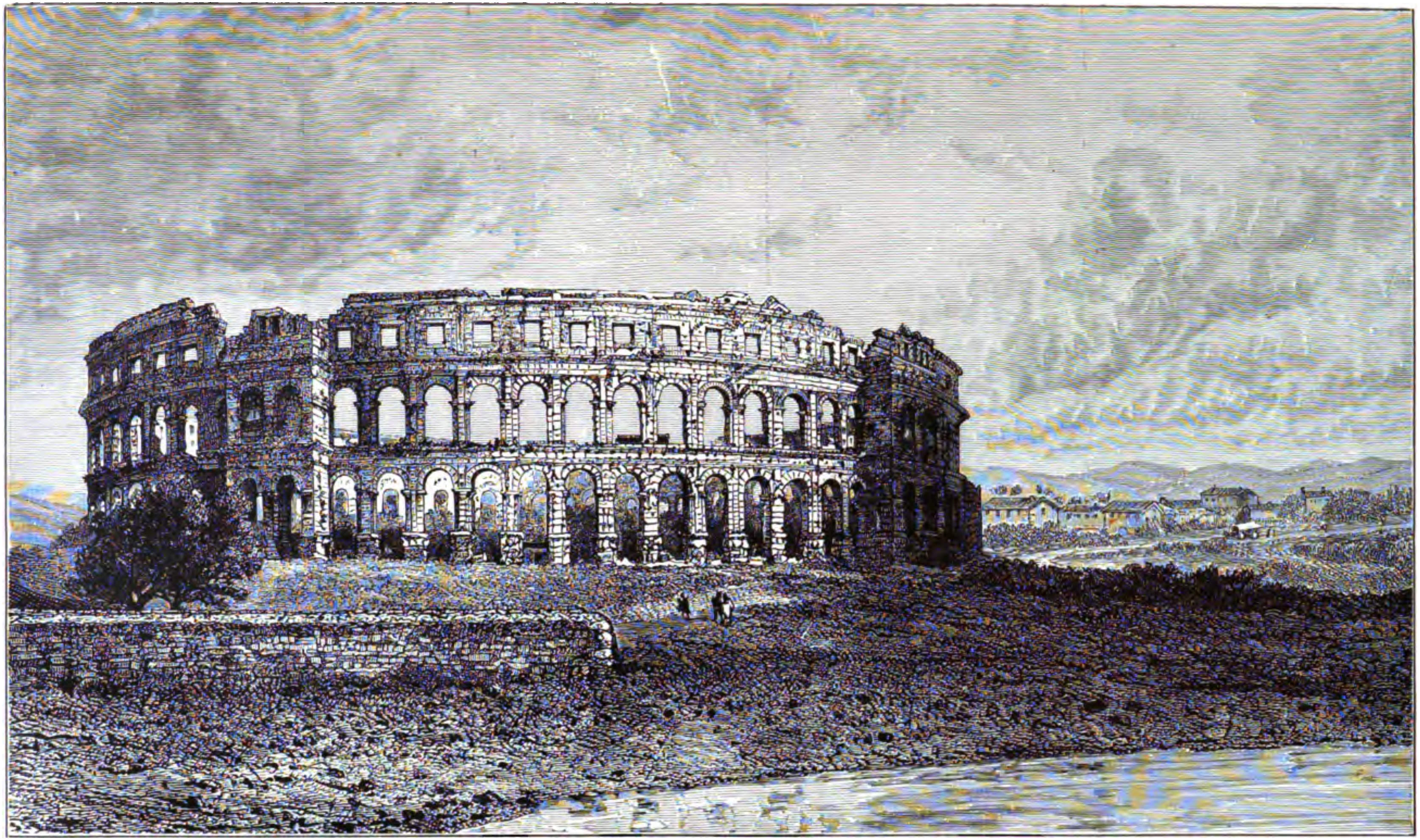
Poitiers, the capital of the French department of Vienne, occupies the summit and slopes of a little eminence, round whose base flow the Clain and the Boivre, 61 miles SSW. of Tours. Before the revolution it had an immense number of religious edifices, which even yet are sufficiently numerous. The most interesting are the little Temple de St Jean, originally a baptistery of the 6th or 7th century; the abbey church of St Radegonde, with the saint's cenotaph, much visited by pilgrims; and the noble cathedral of St Pierre (1161–15th century), in which, or in the older edifice that occupied its site, twenty-three councils were held —the first in the 4th, and the last in the 15th century. Other edifices are the Palais-de-Justice (the palace formerly of the Counts of Poitou) and the Hôtel-de-Ville (1876). A university, founded by Charles VII. in 1431, is now represented by a school of law, with faculties also of science and literature. There are besides a public library of 30,000 volumes and 400 MSS., a museum, and several learned societies, including one for studying the antiquities of western France (1834). Pop. (1872) 28,247; (1891) 37,497. Poitiers, the *Limonum* of the Romans, derives its present name (earlier *Poictiers*) from the Pictavi or Pictones. In and around it are numerous Celtic and Roman remains, a dolmen, baths, some fragments of a huge amphitheatre, &c.; and here in 1882 the remains of a whole Gallo-Roman town were discovered, with temple, baths, and streets, spread over 14 acres. In the vicinity Alaric II., the Visigoth, was defeated and slain by Clovis in 507; and somewhere between Poitiers and Tours Charles Martel won his great victory in 732 over the Saracens under Abd-ur-Rahmân. Later still (on 19th September 1356), at a spot 5 miles north of Poitiers, Edward the Black Prince, with some 12,000 or 14,000 Englishmen and Gascons, defeated 60,000 of the troops of King John of France, killing 11,000 and taking more than 2000 prisoners, among these the monarch himself and one of his sons. St Hilary (q.v.) was the first bishop of Poitiers, which long was capital of the province of Poitou. From this town the ancient family took its name to which Diana of Poitiers (q.v.) belonged.

Poitou, a former province of south-western France, coincident with the present departments of Deux Sèvres, Vendée, and Vienne. It was divided into Upper and Lower Poitou, and had for its capital Poitiers. Its early history is the same as that of Aquitania (q.v.). Poitou became a possession of the English crown when Eleanor, Countess of Poitou and Duchess of Aquitaine, married (1152) Henry of Anjou (see HENRY II). Philip Augustus reconquered it in 1205. In 1360 it reverted to England, but nine years later was retaken by Charles V. See Auber, *Histoire de Poitou* (1886–88).

Poke (*Phytolacca decandra*), an American branching herb, with racemes of white flowers and deep-purple berries (Inkberries or Pigeonberries). See also HELLEBORE.

Poker, a round game at cards (developed from the older game of brag). Each player has five cards dealt him. A sum called the *ante* is deposited by the oldest hand. The players then look at their hands, each in order after the ante saying whether he will play or pass. If he passes he throws down his cards and stakes nothing. If he plays he has to *chip to fill*—i.e. to stake a sum equal to twice the ante; the amount chipped by the ante, if he plays, or *makes good the ante*, is only equal to his first stake. Each player in rotation may then discard any of his cards and receive from the dealer an equal number of cards from the top of the pack, but no one is obliged to discard any. When all have filled, each player in order must either raise his stake or go out of the game, forfeiting what he has already staked. The *raise* is generally limited, but any less sum than the limit may be staked. Subsequent players must either *see* the raise—i.e. make the sum next staked equal to that of the last raiser—or *go better*—i.e. raise higher, or go out of the game. The raising, seeing, going better, or going out, as the case may be, continues until either all the players but one have gone out (when the one left in takes the pool), or until all the stakes of all the players left in are equal, no one going better. Then a *call* is declared. The player to the left of the one who compelled a call has then to show, face upwards, the best combination he holds which has a poker value. The subsequent players in order either show anything they have better, or throw down their hands. The best poker hand takes the pool. In case of absolute equality the pool is divided. The value of the hands is as follows, beginning with the best: (1) *Straight flush*, sequence of five cards of the same suit; (2) *Fours*, four cards of the same rank, accompanied by any other card; (3) *Full*, three cards of the same rank, and a pair; (4) *Flush*, five cards of the same suit, not in sequence; (5) *Straight*, sequence of five cards not all of the same suit; (6) *Triplets*, three cards of the same rank, not accompanied by a pair; (7) *Two pairs*; (8) *One pair*; (9) *Highest card*. The cards rank as at whist (ace highest), except in the case of straights, when ace may be highest or lowest—i.e. ace, king, queen, knave, ten, or five, four, three, two, ace form the highest and lowest straights respectively. If more than one player holds a straight flush the sequence headed by the highest card wins; the same as between two straights. Similarly, the highest fours win, or the highest triplets in triplet hands; in the case of fulls, the holder of the highest triplets wins. As between two flushes, the highest card wins; if these tie, the next highest, and so on. If two players each hold two pairs, the highest pair wins; if the two pairs tie, the remaining highest card wins; with one pair, the same. If none of the players remaining in the game hold any of the above combinations, each shows his highest card; if there is a tie, the next highest, and so on. There are numerous varieties in the way of playing, for which treatises on poker should be consulted. The above describes the simplest form of *Draw Poker*, the game most commonly played. See books by Keller (New York, 1887) and Guerndale (1889).

Poker-drawings, the name given to designs (after well-known pictures generally) burnt into lime-tree or other wood with 'pokers,' which rather resembled plumbers' soldering-irons. The chief 'poker,' 'pyrotechnic,' or 'pyrographic' artists were John Cranch (1751–1823), Smith of Skipton, and Dr Griffiths, the master of University College, for whose chapel he executed an altar-piece after Carlo Dolce. At Knowsley are two poker-drawings ascribed to Salvator Rosa. A similar process, for adorning ships' cabins, table-tops, &c., was patented in 1865.



ANCIENT MONUMENTS AT POLA—ROMAN AMPHITHEATRE.

Vol. VIII., page 269.

Pokhurn (*Pokaran*), a town of India, in the Rajput state of Jodhpur, 70 miles NW. of Jodhpur. Pop. 15,000.

Pola, the most important naval station of Austria-Hungary, is situated near the southern extremity of the peninsula of Istria, 105 miles by rail S. of Trieste. The harbour is thoroughly sheltered, deep, and spacious enough to accommodate the largest fleet. The town is protected by forts and batteries, and is overlooked by the citadel, by which it and the bay are commanded. The arsenal employs about 2400 men. There are also artillery and powder stores, docks, slips, &c. The cathedral dates from the 15th century. Pola is also a shipping port, exporting wood, fish, sand, and building stones, and importing provisions, coal, and bricks. Pop. (1880) 27,173; (1890) 39,273, of whom 10,000 belonged to the garrison. Founded traditionally by the Colchians who were sent in pursuit of Jason, Pola was destroyed by Augustus, but rebuilt at the request of his daughter Julia, on which account it was named *Pietas Julia.* At the beginning of the 3d century it had 30,000 inhabitants, and was a station of the Roman fleet. It was destroyed in 1267 by its Venetian masters, who had conquered it in 1148; and in 1379 the Genoese, after routing the Venetians in a sea-fight off the town, once more ravaged it. But it only passed from Venice in 1797 to Austria, who chose it as her chief naval harbour in 1848. It contains numerous interesting Roman remains, among them a well-preserved amphitheatre, 450 feet long and 360 broad. A temple and several ancient gates are also extant. See Allason's *Antiquities of Pola* (Lond. 1819), and Jackson's *Dalmatia, the Quarnaro, and Istria* (1887).

Polabians, an ancient Slavic race, belonging to the same group as the Poles, occupying the basin of the Lower Elbe. They have long been Germanised, and their language is now extinct. The term is sometimes used in a wider sense for all Slavonic peoples west and north-west of the Oder and the Erzgebirge. See SLAVS.

Polacca, a species of vessel in use in the Mediterranean, with three masts and a jib-boom; the fore- and main-masts being of one piece ('pole-masts'), and the mizzen-mast with a top and top-mast.

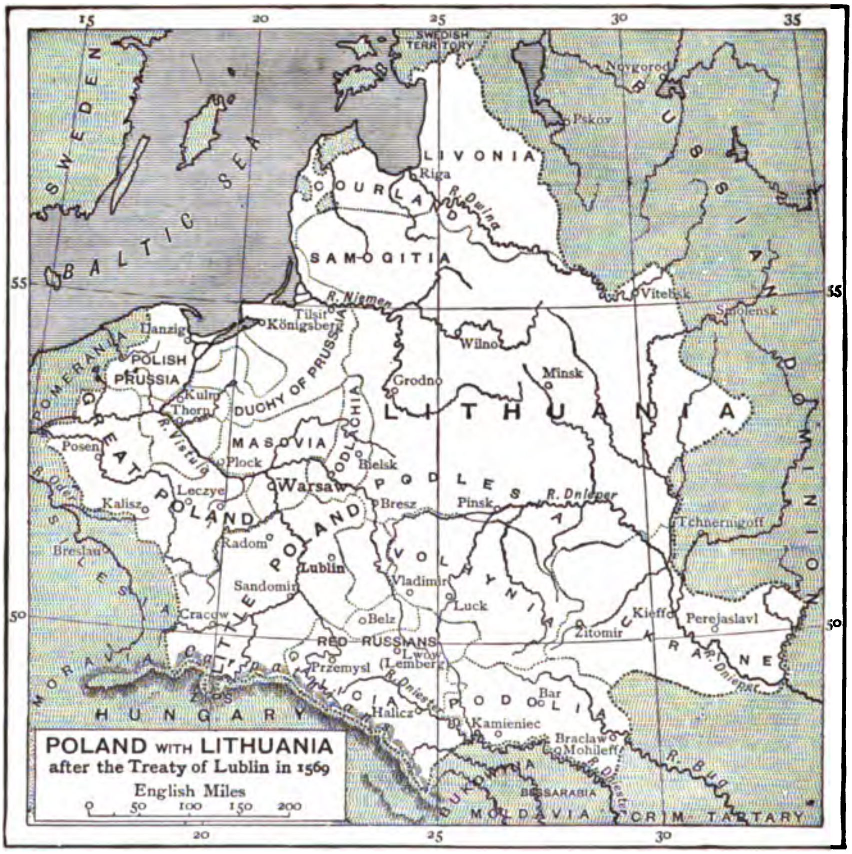
Polacca. See POLONAISE.

Poland (called by the natives *Polska*, a word of the same root as *Pole*, 'a plain'), a former kingdom of Europe, was, immediately previous to its dismemberment, bounded on the N. by the Baltic Sea from Danzig to Riga, and by the Russian provinces of Riga and Pskov; on the E. by the Russian provinces of Smolensk, Tchernigoff, Poltava, and Kherson; on the S. by Bessarabia, Moldavia, and the Carpathian Mountains; and on the W. by the Prussian provinces of Silesia, Brandenburg, and Pomerania. Its greatest length from north to south was 713 English miles, and from east to west 693 miles, embracing an area of about 282,000 English sq. m. (40,000 larger than Austria-Hungary is now); an area which in 1880 had a population of 24,000,000. This extensive tract forms part of the great European central plain, and is crossed by only one range of hills, which rise from the north side of the Carpathians and run north-east through the country, forming the watershed between the rivers which flow into the Baltic and Black Sea. The soil is mostly a light fertile loam, well adapted for cereals, though here and there occur extensive barren tracts of sand, heath, and swamp, especially in the eastern districts. Much of the fertile soil is rich pasture-land, and much is occupied with forests of pine, birch, oak, &c. Rye, wheat, barley, and other cereals, hemp, timber, honey and wax, cattle, sheep, and horses, vast mines of salt, and a little silver, iron, copper, and lead constitute the natural riches of the country; and for the purposes of commerce the Vistula, Dnieper, Dwina, and their tributaries afford great facilities.

The kingdom of Poland, during the period of its greatest extent, after the addition of the grand-duchy of Lithuania at the close of the 14th century, was subdivided, for purposes of government, into about forty palatinates (Pol. *województwa*), which were mostly governed by hereditary chiefs. The people were divided into two great classes—nobles and serfs. The noble class, which was the privileged and governing class, included the higher nobles, the inferior nobles (a numerous class, corresponding to the knights and gentry of other countries), and the clergy, and numbered in all 200,000; the serfs formed the agricultural labourers, and were attached to the soil. Their condition is described by all travellers as a very pitiable one. Such trade as the country had was mostly in the hands of the Germans and Jews. The nobles were the proprietors of the soil, and appropriated the larger portion of its products, the serfs being left with a bare maintenance. The former were brave and hospitable, but quarrelsome, and generally preferred their own interests to that of their country; the serfs (originally called *Kmieci*; Lat. *Kmetones*) were sunk in poverty and ignorance. The present population of the provinces included in the Poland of former days consists of Poles, Lithuanians, Germans, Jews, Malo-Russians, Roumanians, Gypsies, &c. The Poles, who number 10,000,000, form the bulk of the population; the Lithuanians, 2,100,000 in number, inhabit the north-east of the country; the Germans, of whom there are 2,000,000, live mostly in the towns; the Jews are very numerous, being reckoned at 2,200,000. Of Roman Catholics there are about 9,400,000; of members of the Greek Church (including Uniates), 7,900,000; of Protestants, 2,360,000; the rest are Jews, Armenians in Galicia, &c.

History.—The Poles are ethnologically a branch of the Slavs (q.v.). The name appears first in history as the designation of a tribe, the Poliani, who dwelt between the Oder and the Vistula, surrounded by the kindred tribes of the Masovii, Kujavii, Chrobates, Silesians, Obotrites, and others. In course of time the name Poliani became predominant. There is no real Polish history till the reign of Mieczyslaw (962–992); up to the period of this sovereign we have only fables. He became a convert to Christianity, and Poland took rank as one of the political powers of Europe. Mieczyslaw acknowledged himself to be the feudatory of Otho of Germany. In his time the first Polish bishopric was founded at Posen. He was succeeded by his son Boleslas I. (992–1025), who extended his kingdom beyond the Oder, the Carpathians, and the Dniester. He was recognised as king by the German emperors. After a period of anarchy he was succeeded by his son Casimir (1040–58), whose reign, and that of his warlike son Boleslas II. (1058–1101), although brilliant, were of little real profit to the country. The latter monarch having murdered the Bishop of Cracow with his own hand, Poland was laid under the papal interdict, and the people absolved from their allegiance, whereupon Boleslas fled to Hungary. For two hundred years from this time Poland was only a duchy. Boleslas III., surnamed the 'Wry-mouthed' (1102–39), an energetic monarch, annexed Pomerania.

In the time of Casimir II. (1177–94) we have the senate established, which was formed from the bishops, palatines, and castellans. His death was the signal for a contest among the various claimants for the throne, which was speedily followed, as usual, by a division of the country, and during this disturbance Pomerania emancipated itself from Polish rule. In 1226 the Teutonic Knights were summoned by the Duke of Masovia to aid him against the pagan Prussians; but they soon became as formidable enemies to Poland as the Prussians, and conquered a large part of Podlachia and Lithuania. The Mongols swept over the country in 1241, committing great devastations, and defeated the Poles in a battle at Liegnitz. Many districts of the country were now colonised by Germans, and numbers of Jews took refuge in Poland. The Germans obtained great privileges from the Polish king, and were governed by the *Jus Magdeburgicum*. The reign of Ladislaus Lokietek ('the Short') is important (1305–33), because in his reign the first Polish diet (1331) was summoned at Checiny. In conjunction with Gedymin, Grand-duke of Lithuania, a vigorous war was carried on against the Teutonic Knights. His son, Casimir the Great (1333–70), increased the prosperity of Poland. Commerce was active, and Danzig and Cracow joined the league of the Hansa. In 1347 was enacted the celebrated Statute of Wislica, the foundation of Polish law; in this reign also Galicia was united to Poland. With Casimir the dynasty of the Piasts became extinct, after a rule of 510 years, according to the old Polish chroniclers. His nephew, Louis, king of Hungary, succeeded him by the will of the deceased monarch and the election of the diet. On his death without male heirs the succession fell to his daughter Jadviga or Hedwig, who was induced by the diet to marry Jagiello, Grand-duke of Lithuania, who founded the dynasty of the Jagellons (q.v.; 1386–1572), and first united Lithuania and Poland, thus doubling the extent, though not the population, of the kingdom. In 1410 the Teutonic Knights were defeated at the battle of Grünwald. His son, Ladislaus, who was also chosen king of Hungary, fell at the battle of Varna in 1444 fighting against the Turks. Casimir, who succeeded, recovered West Prussia from the Teutonic Knights and compelled them to do homage for East Prussia. In 1454 was held the diet of Nieszawa, at which the celebrated statute was enacted which conferred great privileges upon the Polish nobility. The brief reigns of Casimir's two sons were marked only by the increased power of the diet, which had by this time absorbed all but the symbols of supreme authority, and had turned Poland from a monarchy into an oligarchy. The king thus possessed but little power beyond what his personal influence gave him.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SWEDEN
BALTIC SEA
SWEDISH TERRITORY
Novgorod
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RUSSIA
LIVONIA
Riga
COURLAND
R. Dwina
SAMOGITIA
R. Niemen
Tilsit
Königsberg
Vitebsk
Smolensk
Danzig
POLISH PRUSSIA
POMERANIA
Kulm
Thorn
DUCHY OF PRUSSIA
Wilno
Grodno
Minsk
LITHUANIA
PODLACHIA
Posen
GREAT POLAND
R. Vistula
MASOVIA
Plock
Bielsk
R. Oder
Kalisz
Leczyc
Warsaw
PODLESIA
Bresc
Pinsk
R. Dnieper
Tchernigoff
SILESIA
Breslau
Radom
LITTLE POLAND
Lublin
VOLHYNIA
Sandomir
Vladimir
Luck
Cracow
Belz
Zitomir
Kieff
Perejaslavl
MORAVIA
RED RUSSIANS
Przemysl
Lwow (Lemberg)
UKRAINE
Halicz
R. Dniester
PODOLIA
Bar
Kamieniec
Braclaw
Mohileff
R. Bug
HUNGARY
BESSARABIA
MOLDAVIA
CRIM TARTARY
English Miles
0 50 100 150 200

POLAND WITH LITHUANIA
after the Treaty of Lublin in 1569

Sigismund I. (1506–48), also son of Casimir IV., had a long and prosperous reign, Poland being at that time the dominant country of eastern Europe. Very different opinions have been held about this monarch, some Polish historians praising his government, while Bobrzynski and others consider him to have been a weak man. His court was filled with factions fomented by his wife, Bona Sforza, daughter of the Duke of Milan, a malignant and avaricious woman. The doctrines of the Reformation penetrated to Poland, and were a source of fresh discontents. In a war with Basil, the Grand-duke of Russia, Sigismund lost Smolensk, but he was partly compensated by obtaining lordship over Moldavia. In 1529 Sigismund issued a legal code for Lithuania in the White-Russian language, which forms an important monument of Polish law. In 1537 occurred the first *rokosz*, or rebellion of the nobility against the kingly authority. Sigismund was about to set out to Wallachia, and was obliged to make several concessions before they would accompany him. In 1548 the king died at the advanced age of eighty-two.

He was succeeded by his son, Sigismund II. (1548–72), otherwise called Sigismund Augustus, but this prince was not elected till a debate had taken place about his marriage. He had secretly espoused as a widower a widow of the great house Radziwill, and the nobles required the union to be annulled, because they fancied that the country would gain more by a foreign alliance. Sigismund; however, carried his point, and his wife was crowned in 1550, but died soon after, not without suspicions of having been poisoned by her mother-in-law, Bona, who in this reign left Poland for her native country, carrying with her a vast amount of treasure. The quarrels between Protestants and Romanists now raged fiercely, and the Reformed faith spread rapidly in Poland. We hear of persons being burned to death for their adhesion to it. Sigismund showed great indecision in the matter. In 1569, by the diet of Lublin, Lithuania was finally joined indissolubly to Poland, and from this time there was to be but one diet for the united realm, and Warsaw, for greater convenience, became the capital. Poland also gained Livonia. In 1572 the king died. In the diet held the year after at Warsaw it was enacted that there should be toleration for all religious opinions, but the nobles were still to have power over their serfs in spiritual matters.

The population almost doubled itself, but the nobles became every year more impatient of restraint, and the crown was now virtually elective. The members of the diet, consisting of the palatines and the *posly*, or deputies of the lesser nobility, together with the higher nobility, sat in one chamber. The king had the right of summoning the diet, which only lasted for six weeks, and its decisions were required at a later stage, as we shall see, to be unanimous. This idea of unanimity in voting is thoroughly Slavonic, and is to be found in the old Russian folk-motes. The right of forbidding the passing of any measure was called in Poland the *liberum veto* (in Polish, *nie pozwalam*), and brought all legislation to a standstill. It was employed by many of the corrupt Polish nobles to avoid the detection of their malpractices or to gratify their private malice, and hastened the ruin of the country.

The diet of 1573 elected Henry of Valois (III. of France, q.v.), a worthless man, who fled in the most ludicrous fashion from the country after a reign of about five months, and was succeeded by Stephen Batory (1575–86), voivode of Transylvania, one of Poland's best kings, who carried on war successfully against the Russians, and compelled Ivan IV. to sue for peace; he also organised the Cossacks of the Ukraine into regiments of frontier soldiers. Batory, who had no heirs, was succeeded by Sigismund III. (1586–1632), the son of Catharine, sister of Sigismund II., who had married John Vasa, king of Sweden. He signed the *pacta conventa*, as the agreement between the Poles and their king was named, and an alliance offensive and defensive was made between Poland and Sweden. Constant disputes took place between the king and the diet, and he was a great persecutor of the Dissidents, as the Protestants were called. Sigismund assisted the claims of the false Demetrius, who was assassinated at Moscow in 1606, and we find the Poles afterwards taking that city and causing Ladislaus, the son of Sigismund, to be crowned czar; but he was soon obliged to resign, and ultimately the family of the Romanovs ascended the throne in the person of Michael. Nor was Sigismund successful in his attempts to get the crown of Sweden. He died in 1632, and was followed by his sons Ladislaus IV. (1632–48) and John Casimir (1648–68). During the reign of this dynasty Wallachia and Moldavia were taken by the Turks from the Polish protectorate, Livonia was conquered (1605–21) by Sweden, and Brandenburg established itself in complete independence (1657). In 1652 Sicinski, the deputy for Upita, first put an end to the diet by the *liberum veto*. The Cossacks had been goaded into rebellion by oppression and religious persecution, as they were members of the Greek Church, and finally went over to Russia in 1654. This occurred in the unfortunate days of John Casimir; and during the same reign Poland was attacked simultaneously by Russia, Sweden, Brandenburg, and the Cossacks; the country was entirely overrun, Warsaw, Wilno, and Lemberg taken, and the king compelled to flee into Silesia. Many of the Polish nobles behaved with great treachery, but the invaders were finally driven out. In 1660 Livonia was ceded to Sweden. In 1667, by the treaty of Andruszowo, the territory beyond the Dnieper was ceded to Russia. John Casimir abdicated in 1668, and retired to France, where he died in 1672.

Michael Wisniowiecki (1668–74), son of a famous general, but a weak and very insignificant man, was elected king—it is said almost against his own will. He was a mere puppet in the hands of his subjects. A war with Turkey was concluded by the ignominious peace of Buczacz in 1672, by which the town of Kamieniec remained in the hands of the Ottomans. But the senate rejected the treaty; the Polish army was reinforced, and the command given to the celebrated John Sobieski, who routed the Turks at Choczim the following year. Michael died suddenly in 1674. After some dissensions concerning the election of a successor, John Sobieski (q.v., 1674–96) was chosen, but his reign, although adorned by the splendid triumph at Vienna (1685), was productive of little good to his country, chiefly through the continual dissensions of the nobles. As Sobieski's successor the Prince of Conti was legally elected and proclaimed king; but Augustus II. of Saxony, whose cause was supported by the House of Austria, entered Poland at the head of a Saxon army, and succeeded in obtaining the throne. Augustus showed little sympathy with his Polish subjects; he promised to reconquer for Poland her lost provinces, but this promise was chiefly made as an excuse for keeping his Saxon army in the country, in violation of the *pacta conventa*. His war with the Turks restored to Poland part of the Ukraine and the fortress of Kamieniec; but that with Charles XII. brought nothing but misfortune. Cracow was taken in 1702; Augustus was deposed, and Stanislaus Leszczynski, palatine of Posen, elected in his place. All the courts of Europe acknowledged Stanislaus, except that of Peter the Great; and, when the latter defeated Charles at the battle of Pultowa in 1709, Leszczynski was compelled to leave the country, and Augustus returned. In this reign Poland lost Courland, one of its fiefs, which was given by the Empress Anna to Biron, her favourite. Religious fanaticism was also rampant. The Dissidents were very much persecuted, and a riot having taken place in 1724 at Thorn, several of the leading citizens, including the burgomaster, were put to death. In 1733 a law was passed excluding them from all public offices. This same year the contemptible Augustus died. At the instigation of some of his supporters, Stanislaus Leszczynski, who was then residing in Lorraine, was induced to return to Poland and was elected king; but his election was opposed by Austria and Russia, and in his place was chosen Augustus III. (son of the last sovereign), a weak and incapable man. The condition of the country was now deplorable. Towards the end of his reign the more enlightened Poles, seeing the radical defects of the constitution, the want of a strong government, and the dangers of the *liberum veto*, entered into a league for the establishment of a well-organised hereditary monarchy. The conservative party, however, was strong, and relied on Russian influence, while the reformers supported the Jesuits in their exclusion of dissenters from public offices. In 1764 Stanislaus Augustus Poniatowski was elected king, chiefly through the intrigues of the Empress Catharine. Although a man of refined manners, he was weak, and not fitted to serve the country at such a crisis. The reforming, or Czartoryski party (so called because it was headed by a member of this celebrated family), had succeeded in abolishing the *liberum veto,* and effecting many other improvements; but they at the same time more severely oppressed the Dissidents, whom the Russians pretended to protect.

The Confederation of Bar (so called from Bar in Podolia) was now (1768) formed by a few patriots, an army of about 8000 men was assembled, and war declared against Russia. But they were not successful, and a bold attempt to carry off the king also failed. Frederick the Great of Prussia, who had formerly gained the consent of Austria to a partition of Poland, made the same proposal to Russia in 1770, and in 1772 the *first partition* was effected. The territories seized by the three powers were as follows:

	English sq. miles.	Population.
Russia	42,000	1,800,000
Prussia	13,000	416,000
Austria	27,000	2,700,000

The whole country was now aroused to a sense of its danger; and the diet of the diminished kingdom laboured to amend the constitution. In 1788 a remarkable diet was opened which lasted four years. Many changes were introduced. The *liberum veto* was formally suppressed, and the throne was declared hereditary. The burghers were to send deputies to the diet on the same terms as the nobles; the peasants were not set free, but their condition was improved; and the Dissidents were granted complete toleration, although the Roman Catholic was declared to be the dominant religion. In this they were encouraged by Prussia, whose king, Frederick-William, swore to defend them against Russia. The new constitution was promulgated May 2, 1791. But some of the nobles were discontented at the loss of their privileges by the new order of things, and formed in 1792 the Confederation of Targovica (q.v.), and at their instigation Russian troops invaded Poland and Lithuania. Prussia now joined the Russians, and a second fruitless resistance to the united troops of Prussia and Russia, which was headed by Joseph Poniatowski (q.v.) and Kosciusko (q.v.), was followed by a *second partition* (1793) between those two countries as follows:

	English sq. miles.	Population.
Russia	96,000	3,000,000
Prussia	22,000	1,100,000

which the diet was forced to sanction at the point of the bayonet. The Poles now became desperate; a general rising took place (1794), the Prussians were compelled to retreat to their own country, and the Russians were several times routed. But Austria now appeared on the scene; her army advanced, and fresh Russian troops also arrived. Kosciusko was defeated at the battle of Maciejowice and taken prisoner. Suvorov (Suwarrow), the Russian general, took Warsaw, and the Polish monarchy was at an end. The *third and last partition* (1795) distributed the remainder of the country as follows:

	English sq. miles.	Population.
Russia	43,000	1,200,000
Prussia	21,000	1,000,000
Austria	18,000	1,000,000

King Stanislaus resigned his crown, and died at St Petersburg in 1798. He lies buried in the Roman Catholic church there.

The main causes of the fall of Poland appear to have been (1) the want of patriotism and cohesion among the nobles, each pursuing his own interests, and the country thus being divided among a number of petty tyrants; (2) the want of a *national* middle class, the trade of the country being almost entirely in the hands of Jews and Germans; (3) the intolerance of the Jesuits, who persecuted on the one hand the Dissidents, which caused them to sympathise with Prussia, and on the other persecuted also the Orthodox inhabitants of the eastern provinces and the Cossacks, who thus looked to Russia; (4) in a less degree than the first three causes, the weakness of character of the kings—though with such a turbulent nobility it must be confessed that they had no fair play; (5) the want of natural frontiers.

The subsequent success of the French against the Russians and the promises of Napoleon to reconstitute Poland rallied round him the Poles, who distinguished themselves in several campaigns against their old enemies; but all that Napoleon accomplished in fulfilment of his promise was the establishment, by the treaty of Tilsit (1807), of the duchy of Warsaw, chiefly out of the Prussian share of Poland, with a liberal constitution and the Elector of Saxony as its head. In 1809 Western Galicia was taken from Austria and added to the duchy, but the advance of the allied army in 1813 put an end to its existence. After the cessions by Austria in 1809 the duchy contained 58,290 English sq. m., with a population of about 4,000,000. Danzig was also declared a republic, but given back to Prussia (February 3, 1814).

The division of Poland was rearranged by the Congress of Vienna in 1815; the original shares of Prussia and Austria were diminished, and that part of the duchy of Warsaw which was not restored to Prussia and Austria was united as the kingdom of Poland to the Russian empire, but merely by the bond of a personal union (the same monarch being the sovereign of each), and the two states being wholly independent of each other. The remaining parts of Poland were incorporated with the kingdoms which had seized them. The partition of Poland as thus finally arranged was as follows:

	Eng. sq. m.	Pop.	Present Political Divisions.
Russia	220,500	16,000,000	Provinces of Courland, Vitebsk, Grodno, Minsk, Mohileff, Volhynia, Kieff, Podolia, and the Kingdom of Poland (see below). Of these portions of the original kingdom of Poland now belonging to Russia it must be remarked that Courland was ceded to Russia in the reign of Catharine by the free action of the inhabitants; Kieff had belonged to Russia by conquest since 1667.
Prussia	26,000	3,000,000	Posen, most of West Prussia, and several districts of East Prussia.
Austria	35,500	5,000,000	Galicia, Bukowina, Zips, &c.

Cracow, with a small surrounding territory, was declared independent under the protection of Austria. Alexander I. gave the Poles a constitution, including biennial diets, a responsible ministry, a separate army, and liberty of the press. General Zajacek was appointed viceroy, and the Grand-duke Constantine took command of the army. For some time matters seemed to go on smoothly, but a spirit of discontent soon developed itself. Complaints were made that the freedom of the press was interfered with, and secret societies were formed. An insurrection broke out in November 1830; the grand-duke was obliged to quit the city, and General Chlopicki was appointed dictator. Early in 1831 a large Russian army, under Diebitsch, entered the country. Chlopicki resigned his dictatorship, and Prince Czartoryski was appointed president of the provisional government. From January 1831 till 8th September of the same year a series of sanguinary engagements took place, in which the Poles were at first successful. On the 8th of September, however, Paskevitch (q.v.), who had succeeded Diebitsch, took Warsaw, and the insurrection was virtually at an end. The Poles had not succeeded in obtaining any assistance from foreign powers. From this time the independence of Poland was suppressed, and in 1832 it was declared an integral part of the Russian empire, with a separate administration, headed by a viceroy chosen by the czar; the constitution was annulled, and a strict censorship of the press was established. Many of the literary treasures were carried off to the public library of St Petersburg. Slight outbreaks occurred in 1846, which were severely repressed. Simultaneous disturbances in the Prussian and Austrian portions of Poland met with the same fate. Their leaders in Prussia were imprisoned, but released by the revolution of 1848 at Berlin. In no part of the lost provinces has the work of denationalisation been more complete than in Prussian Poland. It has proceeded quietly, but thoroughly. In Galicia the peasants at the same time massacred many of the nobles. On the 6th of November 1848 the republic of Cracow was incorporated with Austria.

After the accession of Alexander II. in 1855 the condition of the Poles was considerably ameliorated. An amnesty brought back many of those who had been expatriated, and various other reforms were hoped for. On the 29th November, on the thirtieth anniversary of the insurrection, many political manifestations took place, both in the churches and elsewhere. On these occasions riots took place, and some persons were unfortunately killed. Warsaw was now declared in a state of siege. In June 1862 an attempt was made to assassinate General Luders, the governor, who was succeeded by the Grand-duke Constantine, the brother of the emperor, the Marquis Wielopolski being appointed chief minister. Meanwhile Alexander II. had made great concessions; the public offices of the country were to be filled by Poles; the Polish language was to be the official one, and municipal institutions were granted to Warsaw and the chief cities. The people, however, received these overtures sullenly, and on the night of January 15, 1863, a secret conscription was held, and those suspected of disaffection to the government were seized in their beds to be enlisted. Attempts were made to assassinate the grand-duke and other Russian officials, and Lithuania and Volhynia were also declared in a state of siege. The committee of the National government issued its first proclamation in February 1863; and a week afterwards Mieroslawski raised the standard of insurrection in the north-east, on the frontier of Posen. The committee (*Rzad*) had secret sessions, and was for a long time able to defy the Russian government: its emissaries, called *stiletcziki*, put to death many obnoxious persons and Russian spies. It also issued proclamations from time to time; and many districts of Augustovo, Radom, Lublin, Volhynia, and Lithuania were speedily in insurrection. It was a mere guerilla war, and no great or decisive conflicts took place; but the sympathy of Europe was largely enlisted on behalf of the Poles. Incendiarism and murder were rampant; and at last, with the assistance of Prussia and the secret support of Austria, the czar's troops succeeded in trampling out (1864) the last embers of insurrection. Langiewicz, one of the leaders who had directed the struggle, held out for some time, but at length made his escape into Galicia. From the time of the suppression of the insurrection the kingdom of Poland has disappeared from all official documents. All education in the university and the schools is now carried on in the Russian language.

Among histories may be recommended *Histoire de Pologne*, by Lelewel (Paris, 1844); *Geschichte Polens*, by Röpell and Caro (vols. i.–vi., Gotha, 1840–88); *Dzieje Polskie w Zaryzsie* ('Sketch of the History of Poland'), by Bobrzynski. See also Count Moltke's *Poland* (Eng. trans. 1885), and the present writer's *Poland* (1893). For maps of Poland at various dates, see, besides that given above, the historical maps of Europe, Vol. IV. p. 466.

RUSSIAN POLAND.—The so-called 'Kingdom of Poland,' united to Russia in 1815, had its own constitution till 1830, and a separate government till 1864, when, after the suppression of the revolt, the last visible remnant of independence was taken away. The administration was at first given to eight military governors, and then to a commission sitting in St Petersburg. Finally, in 1868, the Polish province was absolutely incorporated with Russia, and the ten governments into which it was divided are grouped with the governments of Russia proper. In 1867 the area of the 'kingdom' was about 49,000 sq. m., with a population of about 5,700,000, of whom 4,330,000 were Roman Catholics, 780,000 Jews, 260,000 Greek Catholics (mostly United), and the rest Lutherans or other Protestants. In 1890 the ten Polish provinces—Kaliscz, Kielce, Lomza, Lublin, Piotrkow, Plock, Radom, Siedlce, Ssuwalki, and Warsaw—had a collective population of 8,105,000. The several areas and populations of these governments will be found in the table at RUSSIA. About 10,000,000 still here and in Prussia and Austria speak the Polish tongue. The surface and soil of the Russian Polish provinces resembles that of the rest of old Poland; the commerce is still mostly in the hands of the Jews.

POLISH LANGUAGE AND LITERATURE.—The Polish language is one of the most widely-spread branches of the Slavonic family; it forms the western branch together with Bohemian and Sorbish or Lusatian Wendish. Like all the Slavonic languages, it is highly inflected, having seven cases, and, by means of the so-called 'aspects,' expressing very delicate distinctions of meaning in the verb. Like Russian, however, it lacks the imperfect and aorist which are found in Bulgarian and Serbian. It has a rich vocabulary and great power of compounding words. It resembles the Old Slavonic in having two nasals, like the French *on* and *in*; these are found nowhere else among Slavs except in a Bulgarian dialect. After the introduction of Christianity Latin exercised a great influence on its vocabulary and literature, and subsequent to the 14th century it adopted into its vocabulary numerous German words. Already in the 16th century Polish was a highly cultivated language, and began to supplant Latin, until then the language of the state and of the learned. The best Polish grammars are those of Malecki, *Gramatyka Historyczno-Porównawcza Jezyka Polskiego* ('Historico-comparative Grammar of the Polish Language,' Lemberg, 1879), and C. W. Smith, *Grammatik der polnischen Sprache* (Berlin, 1845); the most comprehensive dictionary is that of Linde (new ed. Lemberg, 1854–60); that of Bandtke (2 vols. Breslau, 1806) is good, and so also is the English-Polish dictionary published at Berlin in 1849.

The history of Polish literature is divisible into five distinct periods. (1) From the earliest times to the middle of the 16th century, the epoch of the Reformation. The Poles, unlike most of their Slavonic kindred, are poor in legendary and popular poetry, and much of their early literature is in Latin. Casimir III. (q.v.), surnamed 'the Great,' did more than any other early Polish monarch for the encouragement of literature, and among other things founded the university of Cracow, which has continued to be the centre of intellectual life and culture in Poland. Among the very oldest literary monuments is a hymn to the Virgin Mary, ascribed to St Adalbert. The MS. in which it is preserved is dated 1408. Belonging to the middle of the 14th century is the so-called psalter of Queen Margaret, discovered at the convent of St Florian in 1826, which has been edited by Professor Nehring; there is also the Bible of Queen Sophia, which has come down in an imperfect copy, and is said to have been written about 1455; it has been edited by Professor Malecki. Writers of Latin chronicles were Martin Gallus, who flourished between 1110 and 1135, Kadlubek (1160–1223), and Jan Dlugosz or Longinus (1415–80), all of whom were ecclesiastics. The last is also worthy of remembrance as an able diplomatist. Jan Laski, Archbishop of Gnesen (1457–1531), published a valuable collection of the oldest Polish laws, *Commune Inclyti Poloniæ Regni Privilegium*. In 1474 the first printing-press was established at Cracow by Günther Zainer; the first book in the Polish language was published there in 1521. In 1543 died the great astronomer Nicholas Copernicus. Some other specimens of Old Polish before the 16th century will be found collected in the valuable work of Nehring, *Altpolnische Sprachdenkmäler* (Berlin, 1887).

(2) The second period of Polish literature embraces that which is called the golden age (1548–1606). The series of poets begins with Nicholas Rej (1505–69), commonly called the 'father of Polish poetry,' who spent his life at the courts of the Sigismunds. He was a Protestant. His best work is *Zwierciadlo albo zywot Poczciwego Czlowieka* ('The Mirror: or the Life of an Honourable Man,' 1567); he also wrote a play on the subject of Joseph. Although his language is rough and careless, there is much shrewdness and satire in his writings. Jan Kochanowski (1530–84), called the prince of Polish poets, has left a great deal of verse, the most beautiful of which are his *Treny* or Lamentations on the death of his daughter Ursula. His nephew Peter translated the *Jerusalem Delivered* of Tasso. Szarzynski (died 1581) introduced the sonnet into Polish. Szymonowicz (1557–1629) was a writer of good pastorals (*Sielanki*), as was also Zimorowicz (died 1629), a native of Lemberg. Sebastian Klonowicz, called Acernus (died 1602), is celebrated as a satirist and descriptive poet. The Reformation made rapid progress in Poland; many of the nobility were Calvinists, and the Socini came to reside in the country. Translations of the Bible appeared, but the Jesuit reaction soon made itself felt, especially under the influence of Skarga (1552–1612), renowned for his pulpit eloquence. Among the historians of this period the most celebrated are Martin Bielski, whose Chronicle was continued by his son Joachim; Lukas Górnicki (died 1591), author of a history of the Polish crown (*Dzieje w Koronie Polskiéj*, Crac. 1637); Stryikowski (died 1582), whose Chronicle of Lithuania (Königsb. 1582) is an admirable work; and Paprocki (died 1614).

(3) The third period of Polish literature, also called the Macaronic (1606–1764), is coincident with the rule of the Jesuits, who first obtained a footing in Poland about 1566, through the influence of Cardinal Hosius, soon got possession of the schools, and seriously checked the intellectual development of the nation. The literature of the period is for the most part poor, consisting mainly of bombastic panegyric; the language being corrupted by Latinisms and frequently by the introduction of whole Latin sentences—hence the term Macaronic. To this period belong Casimir Sarbiewski, known by his Latin name Sarbievius (1595–1640), a celebrated writer of Latin odes; Waclaw Potocki, now known to have been the author of the poem *Wojna Chocimska*, or War of Chocim, long preserved in manuscript; Kochowski (died 1699), a soldier-poet, who has left some sprightly odes; Twardowski (died 1660), a very prolific writer, author of a poem on Ladislaus IV.; Opalinski (1609–1656), who has left some bitter satires reviling his countrymen, whom he betrayed to the Swedes; Chroscinski, the translator of Lucan; Morsztyn, the translator of Corneille; and Elizabeth Druzbacka (died 1760), whose writings show some feeling for nature. History again took a Latin form, in spite of its having been written in the golden age in Polish: we may mention Starowolski (died 1656), author of *Polonia, sive Status Regni Poloniæ Descriptio* (Wölfenbuttel, 1656), and other works; Kojalowicz, a Jesuit (died 1677), who wrote a History of Lithuania; and Kaspar Niesiecki, a Jesuit (died 1744), whose *Korona Polska* (4 vols. Lemb. 1728–43) is the most important work on Polish heraldry.

(4) The fourth period is that of the reign of Stanislaus Poniatowski and the dismemberment of Poland, till the rise of romanticism (1764–1822); it owes its characteristics partly to the influence of French culture, partly also to the patronage of literature and science by King Stanislaus, the princes Czartoryski, Jablonowsk, and other noblemen, and the educational reforms of Stanislaus Konarski (1700–73). The good work begun by Konarski was carried on by Kopczynski (1735–1817), who was the first to establish on a scientific basis the grammar of the Polish language in his *Grammatyka Narodowa*; other authors were Bohomolec and Zablocki, who adapted a great many French pieces for the stage. But the best writer for the stage was Fredro, who belongs to a later period. The most noted dramatist, however, of this time, who may perhaps be called the real founder of the Polish stage, was Boguslawski (1759–1829), who wrote above eighty plays, the majority of which, under the title of *Dziela Dramatyczne*, were published at Warsaw (9 vols. 1820). The most conspicuous poet of this time was Ignacy Krasicki (1735–1801), who tried all kinds of literature—an epic on the war of Chocim, a weak production, and some satires and fables. We must also mention Trembecki; Cajetan Wegierski, the satirist; Godebski, and Wezyk. Adam Naruszewicz was but a mediocre poet, but he wrote a valuable *Historya Narodu Polskiego* ('History of the Polish People'), which he carried down to the year 1386. In 1801 the historian Tadeusz Czacki, Franciszek Dmochowski, and Bishop Jan Albertrandy founded at Warsaw the 'Society of the Friends of Knowledge,' which especially under the auspices of Staszyc bore good fruit till it was dissolved in 1832, when its library of 50,000 volumes was carried off to St Petersburg. At the same time Jozef Ossolinski, Hugo Kollataj, and Stanislaus Potocki by word and writing exercised a great influence on the renovation of the national spirit. Karpinski (1745–1825) was a very popular poet as a writer of sentimental elegies and idylls, and Woronicz (1757–1829) was celebrated both as a poet and divine. Niemcewicz (1757–1841) was a statesman and soldier, and is remembered for his historical songs (*Spiewy Historyczne*). Lastly, as the great precursor of the romantic school, must be mentioned Kasimir Brodzinski (1791–1835), whose idyll *Wieslaw* has been much admired.

(5) The fifth period comprises from 1822 to the present time; the era of romanticism, dating from the appearance of Mickiewicz, the greatest Polish poet. At Wilno, which after 1815 became the centre

of Polish literary activity, several young men united, with Adam Mickiewicz (1798–1855) at their head, in a crusade against the still dominant French school of literature. After a short stay in Russia, Mickiewicz emigrated and spent the latter part of his life at Paris. He died at Constantinople, whither he had gone on a political mission at the time of the Crimean war. We have only space to mention some of his chief works, his *Ballads*, *Sonnets*, *Konrad Wallenrod*, and *Pan Tadeusz*; the last probably the most popular poem in the Polish language. Anton Malczewski (1792–1826), remembered by his *Maria*, a pathetic story of the Ukraine, was a prominent poet of what has been called the Ukraine school; Goszczynski (1806–76) was author of the narrative poem *Zamek Kaniowski*; Bohdan Zaleski, author of *Duch od Stepu*; others are Odyniec, the friend of Mickiewicz, Siemienski, Garczynski, Gaszynski. The two names most worthy to be placed by the side of that of Mickiewicz are those of Sigismund Krasinski (1812–59), author of the strange poem *Nieboska Komedya* (the 'Undivine Comedy'), and Julius Slowacki (1809–49). Most of these men belonged to what was called the 'Polish Emigration,' whose headquarters were at Paris. Of the Polish novelists we have only space to mention the prolific Jozef Ignacy Kraszewski (1812–87), whose works amount to 312, and Henry Sienkewicz. The most original writer for the stage whom the Poles have produced is Count Alexander Fredro (1793–1876); he is a thoroughly national writer; although French influence is visible in his pieces, the characters are Polish. Many distinguished historical writers belong to this later period, of whom we may mention Joachim Lelewel (1786–1862), the author of many works of the greatest value, Szujski, Schmitt, Szajnocha, and Michael Bobrzynski, professor in the university of Cracow. By these men the history of Poland has been treated in all its details with great vigour. Among later poets may be mentioned Pol, Ujejski, and Lenartowicz; Adam Asnyk, the most popular of recent Polish poets; and the poetesses Gabriele Zmichowska (1825–78) and Marya Konopnicka.

The history of Polish literature has been written by Bentkowski and Wiszniewski. Mention may also be made of Nitschmann's *Geschichte der Polnischen Literatur* (1884), and the present writer's *Early Slavonic Literature* (1883) and *Poland* (1893).

Polar Bear. See BEAR.

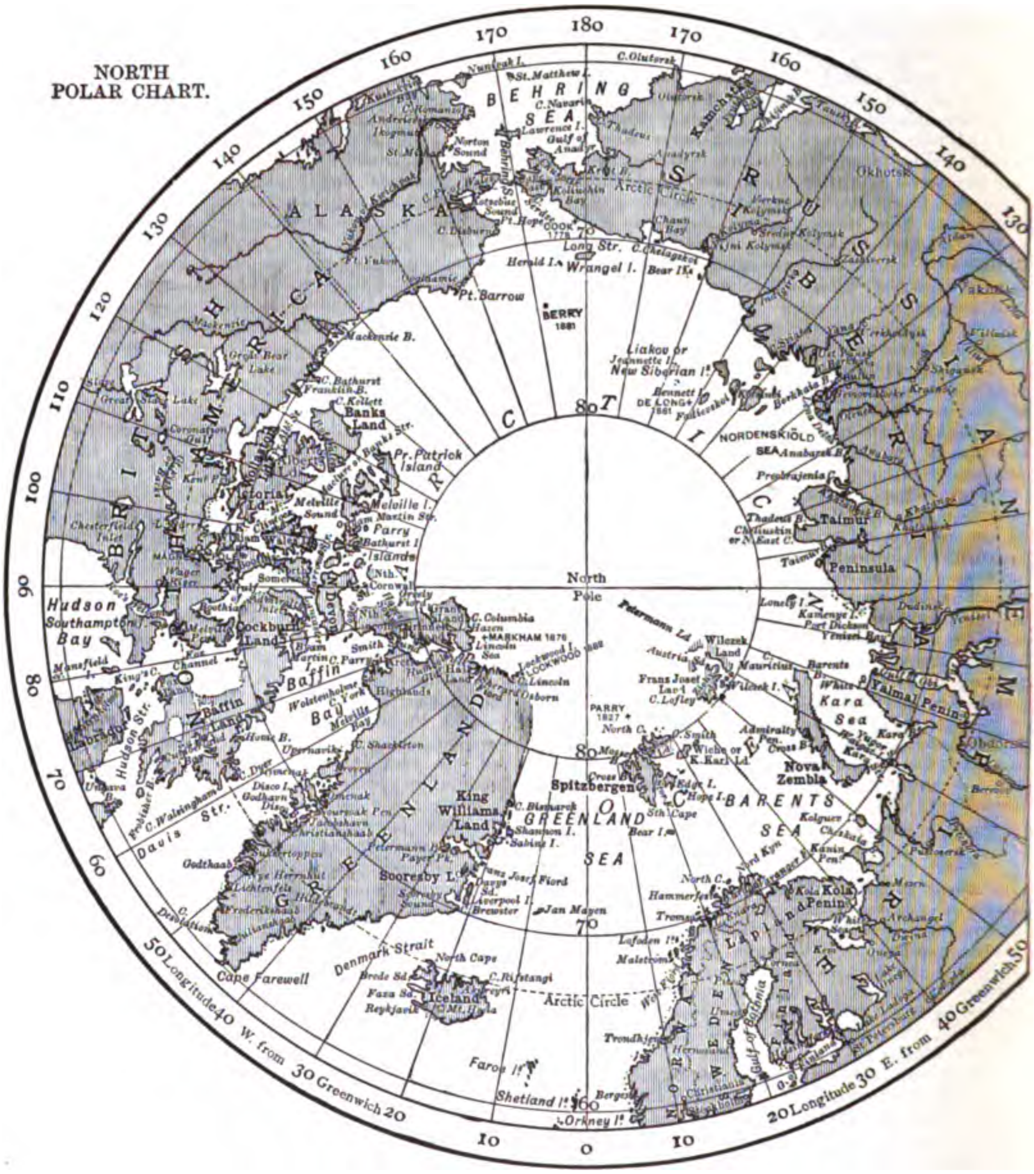
Polar Circle. See ARCTIC.

Polar Exploration. In scientific geography much of the best work done in the 19th century is due to discoveries made in the Arctic and Antarctic regions. In the former, more especially, not only have new lands been surveyed, but large and important accessions have been made to several branches of natural science. The original motive, however, in England at least, for exploring the Arctic seacoasts was to discover a route to the wealthy countries of eastern Asia, and to share in the traffic monopolised by Spain and Portugal when at the height of their power. Thus arose a double series of attempts, either to coast eastward along the north of Europe and Asia, or to sail westward across the Atlantic; the latter being afterwards modified into attempts to coast westward along the north of America. Hence arose the terms 'North-east Passage' and 'North-west Passage.'

Some have traced the history of Arctic exploration to the time of King Alfred, who, in his translation of Orosius (q.v.), inserted an account of the voyages of Othhere and Wulfstan, narrated to him by Othhere himself, who seems to have sailed round the North Cape to Lapland. The voyages of the Norsemen to Greenland (q.v.) and the opposite coasts of America in the 10th and following centuries may be regarded as to some extent coming within early Arctic attempts. Cabot's discovery in 1497 of Newfoundland and Labrador might, however, be termed the first step in the exploration of American polar regions—for the earlier expeditions claimed on behalf of Portugal must be regarded as mythical. Three years after Cabot, Gaspar Cortereal and his brother made three separate voyages in the same direction, sailing northwards by Labrador, where they were stopped in 60° N. lat. The expedition commanded in 1553 by Sir Hugh Willoughby led the way to the North-east Passage. Willoughby sighted Nova Zembla, but he and his men ultimately perished on the coast of Lapland. Chancellor, who accompanied him, landed in Russia near Archangel. Other Englishmen followed, Burroughs (1556), Pet and Jackman (1580), Henry Hudson (1608–9), Wood (1676), but none succeeded in getting much beyond Nova Zembla, though they did good work in exploring the north coast of Europe, Spitzbergen, and other islands in these seas. In 1594–97 Barentz, a Dutchman, led three expeditions, wintering on the north-east coast of Nova Zembla, 1596–97 (see BARENTZ). After the failures of Hudson and Wood in the 17th century, the attempt to sail eastwards came to be considered quite hopeless. In 1607 Hudson succeeded in reaching 81° 30′ N. in the neighbourhood of Spitzbergen.

Meanwhile some exploration of the Arctic parts of America had been going on. Frobisher first sailed in 1576, and in 1585–88 the great navigator Davis sailed up the strait bearing his name to 72° 41′ N. and coasted the west of Greenland, 'the land of desolation.' In a tract of Davis', published in 1595, there are arguments for a North-west Passage. Hudson, who had tried the North-east Passage, discovered in 1610 the strait and great bay which bear his name. From the size of the latter he concluded it to be part of the Pacific; but that was disproved by Button, the next English explorer (1612). In 1615–16 Baffin, who went out at first under Bylot, had had some scientific training, proved himself as skilful a navigator as Davis. He found the great northern outlet to Baffin Bay, and recorded some important magnetic observations. After the expedition of Fox and James in 1631, which only led to the partial exploration of what then was named Fox Channel, the North American coast was neglected for more than a century.

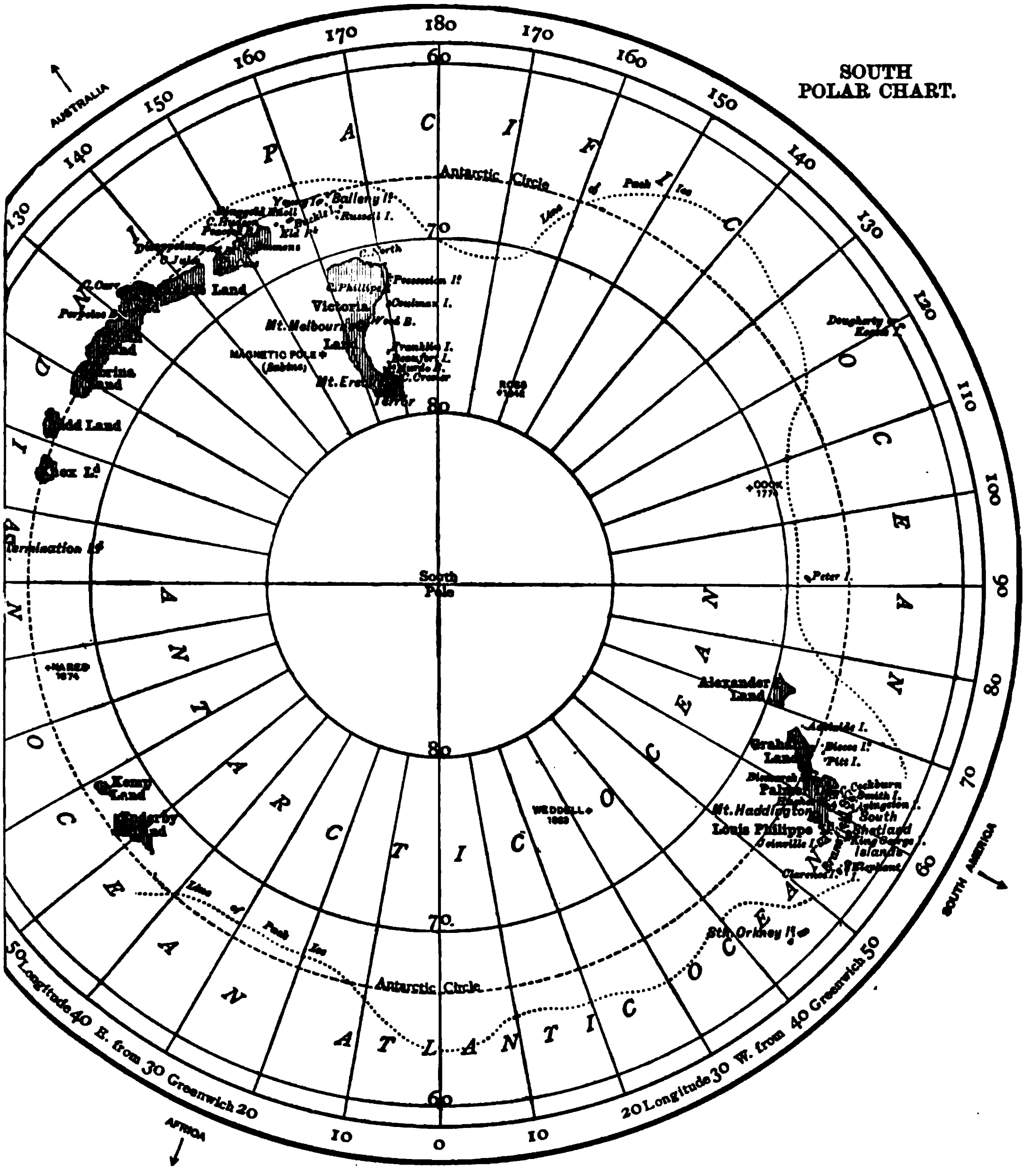
Russia was naturally interested in the exploration of the Siberian coast, and from Peter the Great's time took her proper share in the maritime discovery. Behring, after receiving instructions from Czar Peter on his death-bed, sailed from Okhotsk, and discovered the straits which bear his name. In a second voyage (1741) he sailed from Petropaulovski and explored part of north-west America. Another Russian expedition in 1742 found (but did not succeed in rounding) the most northerly point of Siberia, named from the discoverer Chelyuskin (or Severo); and an earlier one sailed from the Yenisei to 75° 15′ N. In 1765 Tchitsakoff sailed to Spitzbergen, and finally reached 80½° N. The New Siberian Islands were explored by Hedenström in 1809–11, by Anjou in 1823, and in 1884–87 by Bunge and Toll. Wrangel explored the Siberian coast between Cape Chelagskoi and the Kolyma in 1820–23, and in 1843 Middendorf laid down the unvisited coast in the neighbourhood of Cape Chelyuskin. In the reign of George III. there was a new revival of English zeal in naval adventure. Captain Phipps (afterwards Lord Mulgrave) sailed in June 1773 to Spitzbergen, where the heavy pack-ice kept him nearly a month from proceeding farther north. Finally he reached 80° 48′ N., and Cook, who next made the attempt, could only penetrate to 70° 45′. The government offered a prize of £5000 to any crew that should reach 89° N. long.; but after those failures there was no effort made till 1806, when Scoresby reached 81½° N. immediately above Spitzbergen. In following expeditions Scoresby explored Jan Mayen Island and the east coast of Greenland, largely adding to our knowledge of the physical geography and natural history of the Arctic regions. The expeditions of Buchan and Franklin in 1818, of Clavering in 1823, of Graah in 1828, of De Blosseville in 1833, did not reach higher latitudes than those which preceded them.


NORTH POLAR CHART.

BEHRING SEA
ALASKA
BRITISH AMERICA
ARCTIC
SIBERIA
RUSSIA
Arctic Circle
Pt. Barrow
Wrangel I.
Herald I.
Long Str.
BERRY 1881
New Siberian Is
Bennett I.
DE LONG 1881
NORDENSKIÖLD SEA
Banks Land
Pr. Patrick Island
Melville Sound
Melville I.
Parry Islands
Great Bear Lake
Great Slave Lake
Mackenzie B.
North Pole
Petermann Ld.
Franz Josef Land
Wilczek Land
PARRY 1827
MARKHAM 1876
LOCKWOOD 1882
Grinnell Land
Baffin Bay
Hudson Bay
Southampton I.
Cockburn Land
Davis Str.
Hudson Str.
Labrador
GREENLAND
King Williams Land
Scoresby L.
Spitzbergen
GREENLAND SEA
BARENTS SEA
Nova Zembla
Kara Sea
Taimur Peninsula
Jan Mayen
Iceland
Denmark Strait
Cape Farewell
Faroe Is
Shetland Is
Orkney Is
Kola Penin.
LAPLAND
SWEDEN
NORWAY
Gulf of Bothnia
Okhotsk
Kamchatka
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Longitude W. from Greenwich
Longitude E. from Greenwich

To encourage polar exploration on the North American coast the British government had promised a reward of £20,000; yet nothing was done till the Admiralty in 1818 sent out Ross and Parry, who only explored part of Lancaster Sound. Next year Parry alone discovered Prince Regent Inlet, Barrow Strait, and (110° W.) Melville Sound. Following up this line of exploration, Ross in 1829 at last reached a point only 200 miles from Turnagain Point, which had recently been found by another expedition sailing eastward from Behring Strait. Ross then named Boothia Felix, in which the magnetic pole lay, and King William's Island. In 1826–27 Franklin traced the North American coast from the Mackenzie River westwards to Cape Beechey, 860 miles, while his companions, Richardson and Kendall, proceeded eastwards towards the Coppermine River. Dease and Simpson in 1838 extended the survey of the American coast for about 100 miles, from Point Turnagain. In 1846–47 Dr John Rae explored the west shore of Boothia Gulf, and discovered Boothia Felix to be a peninsula. In 1851 the same explorer surveyed the coast from the Mackenzie River to King William Land, and also the south-east coast of Victoria Land.

The success of Ross led to Sir John Franklin's expedition (left England May 19, 1845), so unfortunate to him and his crew, so famous from the number of search-parties which it occasioned. His object was to penetrate to Behring Strait from Lancaster Sound (see **Franklin, Sir John**). In 70° N. lat., 98° 30′ W. long., on the west side of King William's Land, the ships were beset, and Franklin died June 1847. The survivors abandoned the ships, and all perished. Many search-expeditions were sent out. One of these, under Collinson and M'Clure, sailed from Plymouth to Behring Strait in 1850. Fixed in the ice on its eastward voyage, M'Clure's ship was rescued next spring by Sir Edward Belcher, about 60 miles west of Barrow Strait. Belcher now returned towards the Atlantic, and thus M'Clure with his crew reached England in 1854 after actually traversing the North-west Passage from ocean to ocean. He therefore received the honour of knighthood, and a sum of £10,000 was voted by parliament to him and the crew. One of the last search-expeditions was that in the *Fox*, under Captain (now Sir) Leopold M'Clintock, sent out by Lady Franklin in 1857. M'Clintock obtained many relics from the Eskimo of Boothia, and in a cairn in Point Victory found the record which told the story of the expedition. Perhaps we should here note the fact that afterwards, 1879–80, one of the United States search-expeditions, under Lieutenant Schwatka, found evidence that Franklin had really completed the discovery of the North-west Passage. Owing to the different Franklin expeditions from Great Britain and the United States the whole Arctic coast of North America was explored almost exhaustively, so that several routes are now completely mapped between Davis Strait and Behring Strait. For commercial purposes, however, the North-west Passage is of no value whatever.


SOUTH POLAR CHART.
180
170
160
150
140
130
120
110
100
90
80
70
60
50
10
0
AUSTRALIA
AFRICA
SOUTH AMERICA
P A C I F I C O C E A N
A N T A R C T I C O C E A N
A T L A N T I C O C E A N
Antarctic Circle
Pack Ice
Young I.
Balleny Is.
Russell I.
C. North
Possession Is.
Coulman I.
Victoria
Mt. Melbourne
Wood B.
Franklin I.
Beaufort I.
Mt. Erebus
Terror
C. Crozier
MAGNETIC POLE (Sabine)
ROSS 1842
Land
Adelie Land
Sabrina Land
Budd Land
Knox Ld.
Termination Ld.
C. Hudson
Porpoise B.
C. Carr
Disappointment B.
Kemp Land
Enderby Land
NARES 1874
COOK 1774
Peter I.
Dougherty I.
Alexander Land
Adelaide I.
Graham Land
Biscoe Is.
Pitt I.
Palmer Land
Mt. Haddington
Louis Philippe
Joinville I.
Cockburn
Smith I.
Livingston I.
South Shetland Islands
King George I.
Clarence I.
Elephant I.
WEDDELL 1823
Sth Orkney Is.
South Pole
80
70
60
50 Longitude 40 E. from 30 Greenwich 20
20 Longitude 30 W. from 40 Greenwich 50

And now to return to the North-east Passage. In 1827 Parry sailed to Spitzbergen, and after much toilsome effort reached 82° 40′ N. After that little was done in this region till Sweden began to take an active interest in the exploration, under the active guidance of Professor (afterwards Baron)

Nordenskiöld, who in 1858–72 did much exploring work in the Spitzbergen islands and seas. In two voyages he reached the Gulf of Obi. At last, in 1878, he rounded Cape Chelyuskin, 77° 41′ N., and after wintering near Behring Strait sailed into the Pacific and reached Yokohama, 2d September 1879. Thus, three and a quarter centuries after the attempt of Willoughby, the North-east Passage was at last completed. Before that date an Austrian expedition under Lieutenants Payer and Weyprecht had been singularly successful, having discovered an island about 200 miles north of Nova Zembla, as large apparently as Spitzbergen. This new country, Franz-Josef Land, extends from 80° N. to about 83°. At a later date (1880) this land was still farther explored to the north-west by Mr Leigh Smith; and in the winter of 1881–82 Mr Leigh Smith wintered at Franz-Josef Land, he and his companions having great difficulty in escaping.

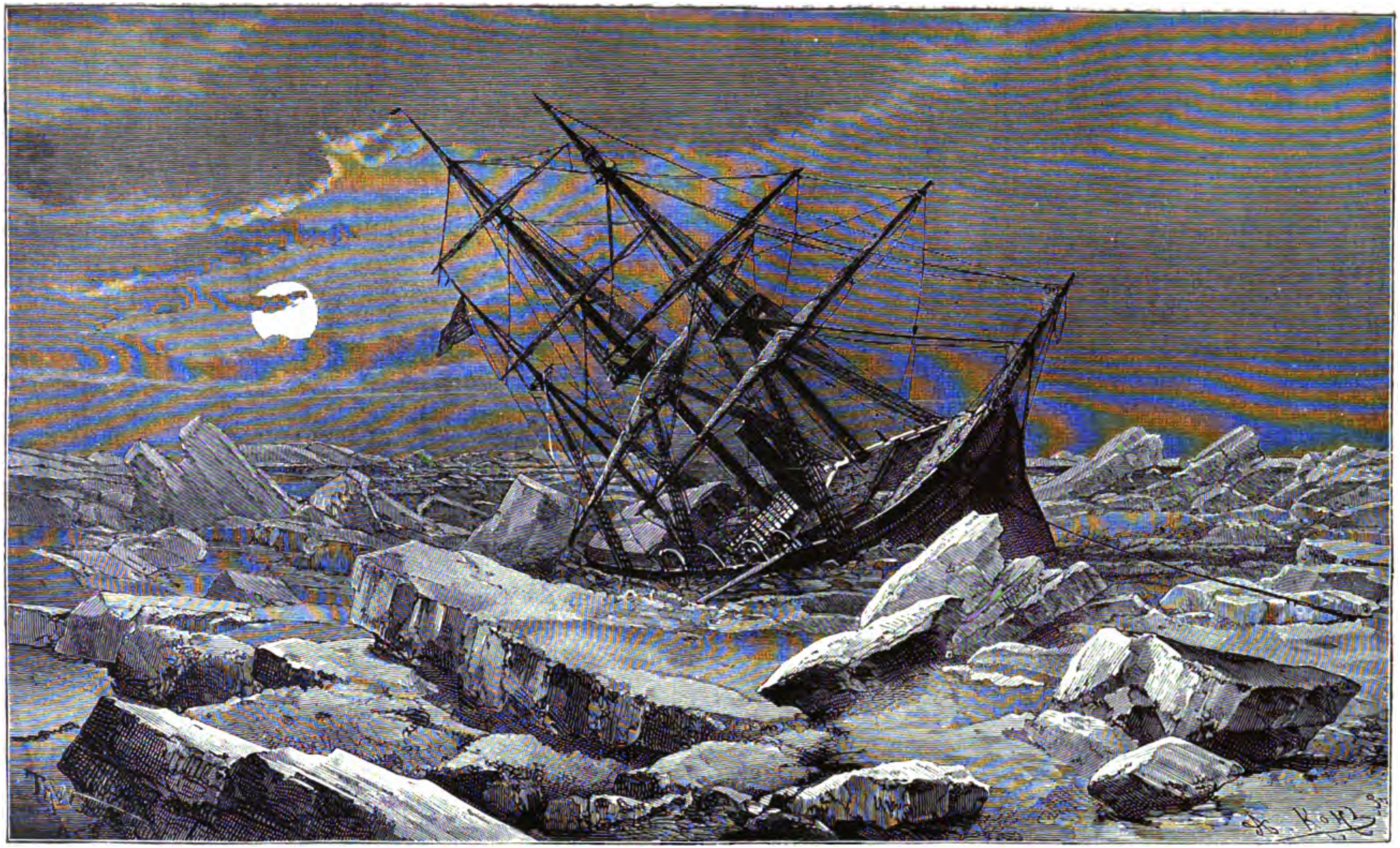
The more recent exploration to the north of America has added little to our geographical knowledge, however interesting in certain scientific aspects. The expedition of Kane and Hayes in 1853–55 reached in sledges Cape Constitution in 82° 27′ N., and saw what appeared to be an open polar sea. Hayes again (1860–61) reached 81° 35′ N. In 1871 the *Polaris*, under Captain C. F. Hall, sailed from New London, U.S., and reached the latitude 82° 16′, which was surpassed in 1876 by the English expedition under Captain Nares; Captain A. H. Markham, by means of sledges, reaching 83° 20′ N. At the same time Aldrich explored the north shore of Grinnell Land. More famous and more disastrous was the 'Lady Franklin Bay Expedition,' 1881–84, conducted by Lieutenant Greely; the relief party sent in the summer of 1883, being unfortunately entrusted to military men, failed to reach the explorers, who were, therefore, compelled to abandon their ships and find their way southwards through almost impassable ice. In October 1883 Greely and his brave companions landed at Cape Sabine, the bleakest spot probably in all the Arctic regions; and there in June 1884 Commander Schley found the six men who still survived. Greely and his assistants took scientific observations up to the day of their release. In the early part of Greely's exploration, when in Grinnell Land, one of his party, Lieutenant Lockwood, succeeded in reaching 83° 23·8′ N. lat., on the coast of Greenland, which is a few miles nearer the pole than the point reached by Markham. The Greely expedition also explored the interior and the west coast of Grinnell Land. In 1869–70 Captain Koldewey's expedition reached 77° N. on the east coast of Greenland, the highest latitude yet attained on that coast. The *Jeannette* expedition under Commander De Long, sent out by the *New York Herald* in 1879 to push north by Behring Strait, ended in disaster. The vessel was crushed in the ice in June 1882 in 77° N., 155° E. The crew made their way over the ice by the New Siberian Islands to the mouth of the Lena. De Long and many of his men perished. Lieutenant Berry, sent out to search for the *Jeannette*, explored Wrangel Land. The icy plateau which covers the archipelago of Greenland was in 1888 crossed from east to west by Nansen, a feat not to be accomplished without great energy, skill, and endurance. Nansen has planned an expedition for 1892 to reach the North Pole by way of Behring Strait and the New Siberian Islands.

At the suggestion of Lieutenant Weyprecht, an international series of polar observatories was established around the north polar area, for the purpose of taking a complete year's observations, beginning with August 1882. The stations selected were the following: Bossekop, in Lapland (Norwegians); Ice Fjörd, Spitzbergen (Swedes); Lena Mouth, Siberia, and Möller Bay, Nova Zembla (Russians); Dickson Harbour, mouth of the Yenisei (Dutch, but the expedition failed to reach its destination); Great Slave Lake (English); Point Barrow on north coast of America, east of Behring Strait, and Lady Franklin Bay, in Grinnell Land (the United States, the latter being Greely's expedition); Cumberland Bay, Davis Strait (Germans); Jan Mayen Island (Austrians); Godthaab, Greenland (Danes). The Germans had also a station on South Georgia Island, on the verge of the Antarctic, and the French on the south coast of Patagonia. The result was a series of observations of high value on the physics, meteorology, and natural history of the polar, especially the Arctic regions. The Russian expedition at the mouth of the Lena was continued for some years under Bunge and Toll, who not only explored the mainland, but made a thorough investigation of the New Siberian Islands.

It only now remains to survey shortly the polar explorations of the mighty Southern or Antarctic Ocean. Some of the earlier navigators of the 16th and 17th century were drifted south as far as South Georgia and South Shetland. Cook was the first to undertake a systematic exploration of the region, sailing all round at a high latitude, and so disproving the existence of the 'Great Southern Continent' to be found on old maps. Cook reached 71° 15′ S., in 106° 50′ W. In 1821 the Russian Bellinghausen discovered the islands named Alexander Land and Peter Land. Weddell afterwards sailed south to 74° 15′, and in 1831 Biscoe discovered Enderby Land, 65° 57′ S., and Graham Land, 67° S. The French expedition, 1838, under D'Urville, found its advance to the pole blocked by a bank extending east and west for 300 miles; La Terre Adèle, in 140° E., was first named in this voyage. In 1840 the United States expedition under Captain Wilkes discovered a long coast-line, apparently extending from Enderby Land eastwards to Ringold's Knoll, but the only part of this which has since been found was discovered by Balleny in 1839. The most important results obtained in the Antarctic region are due to Sir James Clarke Ross, who made three voyages in 1839–43, discovering Victoria Land, with a lofty range containing the volcanoes Erebus and Terror. He traced the coast from 71° S. to 78° 10′, the highest latitude yet reached in the Antarctic, after passing some ice-floes which were 1000 miles broad. These southern expeditions of Ross, like those of all the chief polar explorers, have supplied valuable information for students of magnetism, meteorology, geology, and natural history, besides extending the bounds of geographical science. The *Challenger* expedition only just crossed the Antarctic circle.

The general result of all the exploring work is that in the north polar regions the unknown has been pushed back to within 80° N. lat.; while in the Greenland and the Nova Zembla regions exploration has been carried to within about 400 miles from the North Pole. On the other side, with the exception of patches here and there, the south polar region is a great blank within the Antarctic Circle. The Australians have been making efforts within the past few years to take up Antarctic exploration afresh, but nothing has yet been done, although Baron Oscar Dickson, a wealthy Swede, has offered to defray the bulk of the expense, and has secured the services of Baron Nordenskiöld as leader.

The physical geography of the north and south polar regions is largely treated at **Arctic Ocean**, **Antarctic Ocean**. See also **Geography**, **Geographical Distribution**, **Greenland**, **Spitzbergen**, **Nova Zembla**, **Franz-Josef Land**, **Siberia**, **New Siberian Islands**, **Ob**, **Glacier**, **Ice**, and the articles on **Hudson**, **Cook**,



WRECK OF THE JEANNETTE.

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Franklin, Ross, Parry, M'Clure, M'Clintock, Hall, Nordenskiöld, Greely, and other Arctic and Antarctic explorers; Barrow's *History of Voyages to the Arctic Regions* (2 vols. 1818 and 1846); C. R. Markham's *Threshold of the Unknown Region;* A. R. Markham's *Life of Franklin; Edinburgh Review,* April 1891; *Journal and Proceedings, Roy. Geo. Soc.;* and the published narratives of the various Arctic and Antarctic explorations.

Polarisation. (1) *Of Light.*—An ordinary narrow beam of sunlight has no sides, and is always divided into two equal beams by a crystal of Iceland spar; but if it has once been reflected from glass or water, it will then be found in general that different results, as regards the intensities of these two beams, are produced by turning the crystal of Iceland spar round the axis of the beam into different successive positions. The beam is no longer the same all round, but has acquired sides. On the vibratory or undulatory theory of Light (q.v.) this shows that the vibrations must be transverse to the direction of propagation (see POLARITY). Suppose a long cord, fixed to a distant wall, to be held in the hand; apply a sharp up-and-down movement; an up-and-down wave will run along the cord to the wall; this illustrates the mode of vibration in a beam of *plane polarised* light. Make the hand move in a circle, in a direction contrary to that of the hands of a clock; a wave will run along in the form of a screw; this screw will have the form, and will advance after the fashion, of a corkscrew; this illustrates the mode of vibration in a *right-handed circularly polarised* beam of light. Make the hand move in a circle clockwise; the wave-screw advances in a left-handed fashion; this illustrates *left-handed circularly polarised* light. Make the hand move in an ellipse; an elliptical disturbance travels, screw-fashion, right- or left-handed as the case may be; this represents *elliptically polarised* light. Communicate a series of disturbances of the greatest irregularity in which no one direction, up or down, right or left, has on the whole any predominance; the irregular succession of transverse disturbances which will travel along the cord will represent the vibration in a beam of *common* or *natural* light. Assume that while communicating these irregular disturbances the hand is hampered but not disabled with reference to any particular direction, say up and down; the vibrations in that direction are on the whole less than those from right to left; and the whole complex of irregular disturbances would, if they wrote their own path, tend to fill up an ellipse with their trace-marking rather than to fill up a circle, as the vibrations in common light would tend to do; this would represent the nature of the vibrations in *partially polarised light.* Now suppose a slot in a board, which will allow the cord to swing from end to end of the slot, but will not allow the cord to swing athwart the slot; all those oscillations or components of oscillation which are parallel to the slot will be able to traverse the slot; but those which are at right angles to these will not be allowed to pass. On endeavouring to transmit through the slot the complex of oscillations which illustrate the vibrations of common or natural light, it will be found that no motion at right angles to the slot is transmitted, and that what does pass through is a complex of irregular oscillations restricted to the plane of the slot. A second slot, at right angles to the first, will cut off the whole of what passes through the first; and the propagation of transverse oscillations along a cord may thus be entirely checked. If, however, the second slot be parallel to the first, all the oscillations transmitted by the first may pass through it also; and if it lie in an intermediate direction, the second slot will allow a proportion to pass, which depends upon the angle between the two slots, being proportional to $\cos\theta$, where θ is that angle. The first slot illustrates the functions of a polariser; the second illustrates those of a second polariser or analyser. A polariser reduces incident common light to a plane polarised condition, and an analyser at right angles to the polariser will quench it altogether.

The phenomena of polarised light were first observed in sunlight reflected from water or glass. Common or natural light so reflected is always, except when it retraces its path by direct reflection, more or less partially 'polarised by reflection.' The polarisation is more or less complete according to the angle of incidence. At one particular angle of incidence the reflected light is as nearly plane polarised as the particular reflecting substance employed can make it. At this angle, the so-called 'angle of complete polarisation,' the reflected and the refracted rays are (or tend to be) at right angles to one another, and $\tan i = \mu$, where i is the angle between the incident ray and the normal, and μ is the index of refraction (see REFRACTION). Metal reflectors have no angle of complete, but only of maximum, polarisation; and even among such substances as glass, which are usually said to have an angle of complete polarisation by reflection, it is only those whose index of refraction = 1·46 which can completely polarise common light by a single reflection. In that case the intensity of the reflected plane polarised beam is to that of the original incident beam of common light as 6·52 to 100, or 6·52 per cent. The intensity of light polarised by one reflection is therefore a good deal less than the 50 per cent. which might be secured by any contrivance which effectually acted in a way analogous to the first slot above mentioned. The intensity of light polarised by reflection is greatly improved by using, instead of a single reflecting plate, a pile of plates. A crystal of tourmaline or of iodo-sulphate of quinine will, on the whole, allow only light polarised in one particular plane to pass through; but then it darkens it and colours it. Advantage is accordingly taken of the property of a doubly-refracting transparent crystal, such as Iceland spar, of dividing an incident beam of common light into two equal beams, which are, when they travel in principal sections of the crystal, polarised in planes at right angles to one another, and each of which possesses (absorption apart) half the intensity of the original beam. See REFRACTION (DOUBLE). As these two beams diverge from one another it is comparatively easy to arrange that one of them shall remain parallel to the axis of the incident beam and of the apparatus, while the other is allowed to wander away laterally: and this is the basis of the construction of the prisms of Nicol, Foucault, Wollaston, Rochon, and others, which receive incident ordinary light and transmit plane polarised light.

Two beams of plane polarised light can *interfere* with one another (see INTERFERENCE) when their vibrations are wholly or partly in the same direction, but not if they be at right angles to one another; and a beam of light polarised in any way can give rise to the phenomena of *Diffraction* (q.v.).

On interposing in the path of a plane polarised beam of light an analyser, so placed as to allow none of that light to be transmitted, and then placing in the course of the plane polarised beam before it reaches the analyser a thin film of a doubly-refracting substance, such as mica, the field of view may become filled with light. The doubly-refracting film generally breaks the incident plane polarised beam into two plane polarised beams, which are, after emergence from the film, parallel to one another and on the whole coincident if of sufficient breadth. These two beams are differently retarded in the mica; and, according to the amount of this relative retardation and to the position of the principal plane of the interposed film, their resultant, that which reaches the analyser, may be a beam plane polarised in the original plane, plane polarised in another plane, elliptically polarised, or circularly polarised. In all these cases except the first, the analyser lets some light through.—If we substitute for the analyser a doubly-refracting crystal, there will in general be two images seen on looking through; but as this crystal itself introduces relative retardations, the result of which depends on the wave-lengths—i.e. on the colours—the different wave-lengths may give different relative intensities in the two images: some wave-lengths may predominate in the one image, the rest in the other; the two images may thus be coloured; and when coloured they will be complementarily coloured. The phenomena of colour produced by the reaction of polarised light upon various doubly-refracting crystals and films, &c.—all which colour-phenomena are due to varying relative retardations of ordinary and extraordinary rays in doubly-refracting media, and are either uniform all over the resultant wave-front or vary with respect to particular parts of it—are of great variety and extreme beauty. For an account of these we refer to Thomas Preston's *Theory of Light* (Lond. 1890).

A beam of plane polarised light may be recognised by means of a crystal of Iceland spar. Paste a piece of paper with a pinhole in it on one end of the crystal; look through, turning the crystal round; each of the two images waxes and wanes and disappears alternately with the other. In partially polarised ordinary light, and in elliptically polarised light, the two images wax and wane alternately with one another, but do not disappear. In circularly polarised and in ordinary light the two images remain equal to one another, and present no variation of intensity. Circularly or elliptically polarised light is converted by a plate of mica of proper thickness into plane polarised light; natural light, unpolarised or partially unpolarised, is not so affected by the same plate of mica. These criteria enable the character of a given beam of light to be readily recognised.

The name of Rotatory Polarisation is given to the phenomenon observed when a beam of plane polarised light is sent through a slice of quartz cut parallel to the axis. The plane of polarisation is found to have been rotated, and that into a different position for each component colour; so that, with white light incident, a crystal of Iceland spar gives two images complementarily coloured, and varying in colour on rotation of the prism. This property of rotation is shared by many substances even in solution: cane-sugar, grape-sugar, camphor act like quartz, rotating the plane of polarisation to the right (dextro-rotatory); fruit-sugar and starch rotate the plane to the left (laevo-rotatory). Upon this property are based various instruments for the quantitative estimation of saccharine solutions, called saccharimeters. If the light whose plane has been rotated be reflected back through the plane-rotating medium, the rotation is reversed, and the light emerges polarised in the original plane. A somewhat similar phenomenon, though much less pronounced, is observed on passing a beam of light through heavy glass in a strong magnetic field; but here, if the path of the light be reversed by reflection, the rotation of the plane is not reversed but doubled.

As to the direction of vibration in a plane polarised ray, a ray polarised by reflection is said to be polarised in the plane of incidence—i.e. in a plane containing both incident and reflected rays: the question is whether the vibration is in this plane or at right angles to it. Fresnel worked out the consequences of the vibration being at right angles to this plane, and arrived (on the assumption that the density of the ether in two media, at whose bounding surface reflection takes place, is different in the two media, while its elasticity is the same in both) at consequences consistent with experiment. Neumann and MacCullagh, from a contrary hypothesis as to the elasticity and density of the ether, and on the hypothesis that the vibrations are parallel to the plane of polarisation, arrived at optical conclusions which, so far as it is possible to test them by experiment, are equally consistent with observation. Clerk-Maxwell's electric or electro-magnetic theory of light, confirmed by Hertz's researches (see MAGNETISM), requires that there should be an undulatory propagation of electric disturbances at right angles to the plane of polarisation, and of magnetic disturbances parallel to that plane.

Polarisation of light is useful in several ways. A polariser can be made to cut off the glare from the surface of water while we look into its depths; or to cut off a large portion of the light which is reflected from haze and obscures our view of landscape; or it may be used in examining the light of the sky, which is partly polarised, because due to reflection (see SKY). A polariser and analyser are of use in examining the strained condition of glass which, when heated or bent, &c., or too suddenly cooled, will give rise between crossed prisms to phenomena analogous to those produced by a doubly-refracting crystal; and they are also of use in low-power microscopic work for the examination or identification of crystals and of many organic structures. Crossed prisms have also been used to reduce the intensity of a beam of light to any required percentage for photometric purposes.

(2) *Polarisation of Dielectric.*—The condition of the dielectric or medium between two opposite charges of electricity: a condition of stress.

(3) *Polarisation of a Galvanic Cell.*—Production of a reverse 'electromotive force' by the deposition of elements of the electrolyte upon, or their combination with, the plates of the cell.

(4) *Polarisation of Electrodes.*—An entirely similar phenomenon in an electrolytic cell. When the battery is taken off, a reverse current flows from the electrolytic cell; this is the basis of the gas battery and of the modern accumulator (see ELECTRICITY).

Polarity, in physical science, a word of various application; but in all its uses there is present the idea of a directed quantity or Vector (q.v.). A sphere, situated in space, is a perfect type of all-sidedness, presenting the same aspect in every direction. Let this sphere, however, begin to rotate about some diameter, and at once it becomes a polar body; it becomes possessed of polarity (see POLES). Looked at from one end, it appears rotating clockwise; looked at from the other, it appears rotating counter-clockwise. A similar polarity is acquired by a body of any shape when it is set spinning about some axis. Hence we may take rotation as a very perfect illustration of kinematic polarity.

Perhaps the most familiar example in physics of a polar body is the magnet. Its polarity is a force-polarity, the ends or *poles* of one magnet having a selective action upon the ends or poles of another. This particular action is, however, only one of a host of manifestations of what is known as Magnetism (q.v.); and the general tendency in modern theory is to explain all magnetic phenomena as being essentially rotational. Thus, again, from a physical or dynamic point of view, we conceive of rotation as a true type of polarity. The phenomena of statical electricity have also been discussed as analogous to certain phenomena in vortex motion.

In electrolytic polarisation, however, it is difficult to see any rotational analogy. Here the electrodes which bring and carry away again the electric current flowing through the decomposing liquid acquire new properties and functions which have distinct directive relations to the current that produced them. See ELECTRICITY, INDUCTION, MAGNETISM.

In all the cases so far mentioned the polarity or polarisation involved is of such a nature as that originally typified by the sphere's rotation; there are two ends which in some respects have opposite characteristics. In polarisation of Light (q.v.), however, this condition is no longer always fulfilled. For instance, a plane polarised ray of light which is stopped by a Nicol prism passes more or less completely as soon as the prism is rotated round an axis codirectional with the ray. The ray has, in fact, peculiarities as regards its sides—its 'polarity' is strictly speaking lateral, not polar. On the other hand, in a circularly polarised ray we have, according to the ordinary theory, a true kinematic polarity of a rotational kind, so that, looking along the ray, we are able to distinguish right-handed and left-handed circular polarisations. It may be mentioned as a final illustration that the rotation of the plane of polarisation by means of quartz or a saccharine solution is not a real polar phenomenon, the rotation being for any one substance always in the same sense relatively to the travelling ray; but that the rotation of the plane of polarisation in a magnetic field is a true polar phenomenon, changing sign with the direction of the field.

Polar Lights. See AURORA BOREALIS.

Polder, in the Netherlands, is land below the level of the sea or nearest river, which, originally a morass or lake, has been drained and brought under cultivation. An embankment, forming a canal of sufficient height to command a run towards the sea or river, is made, and when carried quite round, as in the case of the Haarlem Lake, it is called the *Ringvaart*. At one or more points on the embankment apparatus for lifting water is placed, and worked by wind or steam power. If the lake deepens towards the centre, several embankments and canals are necessary, the one within the other, formed at different levels as the water-surface becomes lessened, a connection being maintained with the outer canal, which secures a run for the drainage water. In the Schermer polder in North Holland are four canal levels, the land between forming long parallelograms. The water from the inner space is lifted into the first canal; that again, with the drainage of the second section, is thrown into the second, and so on until the outer canal is reached, and a fall obtained. The polders in the Netherlands are very numerous, the most important being the Haarlem Lake (q.v.), possibly to be surpassed by that of the Zuider Zee (q.v.). See also HOLLAND, Vol. V. p. 739.

Pole. See ROD.

Pole, DE LA, a family descended from William de la Pole, a Hull merchant, whose son Michael in 1383 became chancellor under Richard II., in 1385 was made Earl of Suffolk, and in 1389 died an exile in France. His grandson William (1396–1450) was the year before his death raised from Earl to be Duke of Suffolk, having since 1445 been practically prime-minister. His administration was a disastrous one; and he was on his way to a five years' banishment in Flanders, when he was captured by a ship sent after him, and beheaded. John de la Pole, Duke of Suffolk (died 1491), married Elizabeth, sister to Edward IV. and Richard III.; and from this marriage sprang John, Earl of Lincoln (died 1487), Edmund, Earl of Suffolk (executed by Henry VIII., 1513), two churchmen, four daughters, and Richard, on whose death at the battle of Pavia in 1525 the line became extinct.

Pole, REGINALD, 'Cardinal of England,' was the son of Sir Richard Pole, and Margaret, Countess of Salisbury, the daughter of the Duke of Clarence and niece of Edward IV. He was born in Staffordshire, March 1500. He received the rudiments of his education from the Carthusians at West Sheen, and at twelve years of age he was sent to Magdalen College, Oxford. His relationship to the crown made him an important person, and being destined for the church, he was presented at an early age with several benefices. At nineteen he went to Italy with a pension from the king to finish his studies at Padua. He returned to England in 1525. He was then high in Henry's favour, while Queen Catharine was much attached to his mother. Pole's position, when the question of the king's divorce was raised, became a difficult one. He appeared at first disposed to take the king's side. In 1530 we find him in Paris endeavouring to obtain from the university a decision favourable to the divorce, but shortly afterwards he became disgusted with the policy of Cromwell, refused the archbishopric of York which was offered to him on the death of Wolsey, and remonstrated with the king upon the course he was pursuing. Henry, however, made no open quarrel with him; and Pole left England in 1532, and after a short stay at Avignon took up his residence in Italy. Here he formed intimate friendships with a number of men of learning and piety—Sadoleto, Contarini, Morone, Flaminio, Priuli, and others—who were urgent for an internal reformation of the church, and whose views on justification by faith as a rule approximated closely to the doctrine of Luther. Pole still retained his English ecclesiastical revenues, and made no hostile demonstrations against Henry, but in 1535 he entered into a political correspondence with the Emperor Charles V. Pole was now compelled by Henry to declare himself, which he did in a violent letter addressed to the king, afterwards famous in its revised form as the treatise *De Unitate Ecclesiastica*. The king withdrew Pole's pension and preferments. Paul III., on the other hand, made him a cardinal (22d December 1536), and sent him as legate to the Low Countries to confer there with agents of the English malcontents. Henry retaliated by causing a bill of attainder to be passed against him, and by setting a price on his head. His mother, with other relatives, was thrown into the Tower on the ground of treasonable correspondence with the cardinal, and subsequently beheaded. Pole's diplomatic career was not, however, a brilliant one. His several attempts to procure the invasion of England were not successful. From 1539 to 1542 he acted as governor of the 'Patrimony of St Peter,' of which Viterbo was the capital. He took an active part in the discussions on the Interim, and when the Council of Trent was opened in 1545, he was one of the three cardinals who acted as legate-presidents. In the conclave which followed on the death of Paul III. in 1549, Pole was at one moment on the point of being elected pope; after the election of Del Monte, as Julius III., he lived in retirement at a Benedictine monastery at Maguzzano on the lake of Garda, until the death of Edward VI., when he was at once commissioned to proceed to England as legate *à latere*, to assist Queen Mary in the reconciliation of the kingdom to the Church of Rome.

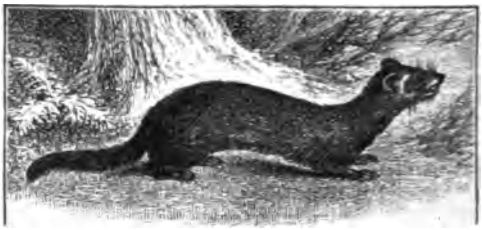
Pole was still only in deacon's orders, and had not abandoned the idea which he had apparently entertained from his youth, of marrying Mary Tudor. The queen for a moment considered the project of obtaining a dispensation for this union with favour, but the influence of Charles V. prevailed in favour of his son Philip. The emperor's fear of Pole's interference or precipitancy led to the legate being prohibited from entering England for more than a year. Philip was married July 25, 1554. Pole's attainder was removed by parliament, November 22, and two days later he arrived in London. He was provided with ample powers to allow the owners of the confiscated church property to retain their possessions, a condition which was understood to be absolutely necessary to secure the submission of parliament. On the 30th Pole solemnly absolved the Houses of Parliament and country from their schism, and reconciled the Church of England to Rome. As long as Cranmer lived Pole would not accept the archbishopric of Canterbury, although the see was vacant by the former's degradation, but after Cranmer was burnt Pole was ordained priest, 20th March 1556, and on the 22d consecrated archbishop. In the meantime Giovanni Pietro Caraffa, once a friend of Pole and afterwards his bitter enemy, had become (May 1555) Pope Paul IV. The pope was indignant at the concessions made by the authority of his predecessor to the holders of church property; and he revived the accusations of heresy which had been in former days brought against Pole, both on the ground of his leniency towards Lutherans when papal governor at Viterbo, and of his well-known opinions on justification. Paul IV. was, moreover, now at war with Spain, and could not tolerate Pole as his ambassador at the court of Philip and Mary in England. The cardinal's legation was accordingly cancelled, and he was summoned before the Inquisition, into the prisons of which the pope had already thrown Pole's friend, the Cardinal Morone. Mary angrily protested, and the pope somewhat relented. He would not reinstate Pole, but appointed William Peto, a Franciscan friar, as cardinal and legate in his place. The queen gave orders that the papal messenger bearing the hat should be stopped at Calais, and Peto died without receiving it. When peace was made between the pope and Spain, Paul still refused to reinstate Pole as his legate, and he did not withdraw the odious and unjust accusation of heresy. When the queen died, 17th November 1558, Pole, whose health had been long feeble, was lying dangerously ill. The impending failure of all his hopes no doubt hastened his end. He died on the following day, sixteen hours after the queen, in his fifty-eighth year.

It has been a disputed question how far Pole was responsible for Mary's persecution of Protestants. His leniency towards heretics in Italy had even brought him into trouble. Nevertheless it is remarkable that after Philip's departure from England and Gardiner's death (November 1555), when Pole became the queen's supreme adviser and her inseparable companion, the persecution increased in violence. If it was not instigated by Pole, it could not have continued without his sanction and support. In his diocese of Canterbury he issued in the last year of the reign a fresh commission against heretics, and in July he delivered over to the secular arm five persons, who were burnt alive at Canterbury a week before his death.

Besides the above-mentioned *De Unitate*, Pole was the author of *De Concilio* (Rome, 1562), *De summi Pontificis officio* (Louvain, 1560), and *De Justificatione* (Louvain, 1569). His letters, with a life prefixed, were published by Quirini (Brescia, 1744). Beccatelli's life of Pole, originally written in Italian, was published in a Latin translation at London in 1690, and in an English translation by B. Pye in 1766. The first edition of Phillipps' life, which occasioned much controversy, appeared in 1764–67. The fullest recent life of Pole is that by Hook, vol. viii. of his *Archbishops of Canterbury*. Compare Ranke's *Lives of the Popes*, Froude's *History*, and Dixon's *History of the Church of England*, vol. iv.

Pole-axe (originally *pollax*, from *poll*, 'the head,' and *axe*). See BATTLE-AXE.

Polecat, or FITCHET (*Mustela putorius*, or *Putorius fœtidus*), a quadruped of the Weasel family (Mustelidæ), and commonly referred to the same genus with the weasel, stoat or ermine, &c. It is the largest of the six British species of that genus, the length of the head and body being about 1½ foot, the length of the tail more than 5 inches, the form stouter than that of the weasel or of the ermine. Its colour is a deep blackish brown; the head, tail, and feet almost black, the under parts yellowish, the ears edged with white, and a whitish space round the muzzle. The hair is of two kinds —a short woolly fur, which is pale yellow, or somewhat tawny, and long shining hairs of a rich black or brownish-black colour, which are most numerous on the darkest parts. The nose is sharp, the ears short and round, the tail pretty equally covered with longish hair. There is a pouch or follicle under the tail, which exudes a yellowish, creamy substance of a very fetid odour; and this odour is particularly strong when the animal is irritated or alarmed. Hence, apparently, its name *Foumart* ('Foul Marten'), which, with various provincial modifications, as *Fulimart*, *Thoumart*, &c., is prevalent in most parts of Britain. The origin of the names Polecat and Fitchet is much more uncertain.



Polecat (*Mustela putorius*).

The polecat was much more common in Britain in former times than now, and is almost extirpated from some districts, through the constant war waged against it by gamekeepers and others; and yet it is very prolific, bearing five, six, or even seven young at one birth. It is extremely destructive in the poultry-yard, the abundance present there inviting it to drink blood and eat brains, which seem to be its favourite luxuries. The rabbit is followed by the polecat into its burrow, and its ravages among poultry are partly compensated by its destruction of rats. The taming of the polecat does not seem to have been attempted. The smell prevents it. The skin is imported from the north of Europe under the name of *fitch*, and is used as a kind of fur, similar but inferior to that of the Marten (q.v., and see FURS). To artists the hair of the *fitch* or *fitchet* is well known as that of which their best brushes are made; the hairs used for this purpose being the long hairs already noticed, which grow through the lighter-coloured fur of the animal. The Ferret (q.v.) is supposed by some to be a mere variety of the polecat. A dark-coloured kind of ferret is commonly regarded as a cross between the polecat and the ferret, and is sometimes called the *polecat-ferret*.

Polemoniaceæ, a natural order of plants, mostly herbaceous, allied to Convolvulaceæ, and containing more than 100 known species, natives of temperate countries, and particularly abundant in the north-western parts of America. *Polemonium cæruleum* is Jacob's Ladder (q.v.); Phlox is also of the order.

Polenta, an Italian dish, the chief ingredients of which are maize meal and salt. Sometimes wheat or chestnut meal is used. It is made into a thick paste, cut into finger-like strips, and baked, generally with an addition of cheese. It is eaten either by itself or with roast liver or steamed meat and sauce. A similar dish, called Mamaliga, is eaten in Transylvania and Lower Hungary.

Poles (Gr. *polos*, a 'turning-point'), in Geography, are the two extremities of the axis round which the earth revolves; they are therefore situated the one on the north, and the other on the south side of the equator, and equidistant from all parts of it, or in 90° N. lat. and 90° S. lat. They are called the north and south poles of the Earth (q.v.).—In Astronomy the poles, which, for distinction's sake, are frequently denominated 'celestial poles,' are those points in the heavens to which the earth's axis is directed, and round which the heavens seem to revolve. The celestial poles are valuable points of reference to astronomers and geographers, so that the determination of their position in the heavens is a matter of the utmost importance. Unfortunately, no stars mark their exact situation (see POLE-STAR)—though there is a minute telescopic star only a few seconds from the north pole, which may be employed instead of it in rough observations—and therefore it is necessary to adopt some means for discovering its precise position. This is effected in the following manner: A bright star (generally the pole-star) is selected, and its position in its upper and its lower *Culminations* (q.v.) is accurately noted; the point midway between these two positions of the star is the pole of the heavens. The observation of the star's two positions must be corrected for refraction, and it is for this reason that the pole-star is selected, since the effect of refraction is much the same in both positions of the star. The term 'poles' has, however, a wider application, as denoting the extremities of a line passing through the centre of a great circle perpendicular to its plane; thus, we have the poles of the horizon (viz. the zenith and nadir), the poles of the ecliptic, the poles of a meridian; and, in the same sense, the terrestrial and celestial poles are spoken of as the poles of the equator and equinoctial respectively.—Pole, in Physics, denotes those points of a body at which its attractive or repulsive energy is concentrated; see POLARITY, and MAGNETISM.

Pole-star, or POLARIS, the nearest conspicuous star to the north pole of the celestial equator. The star which at the present time goes under the name of the 'pole-star' is the star α in the constellation of Ursa Minor. By examining attentively the general movement of the stars throughout a clear winter's night, we observe that they describe circles which are largest at the equator, and become smaller and smaller as we approach a certain point (the north pole of the celestial equator), close to which is the star above mentioned. This 'pole-star' is, however, a little less than 1¼° from the pole, and has a small but sensible motion round it. Owing to the motion of the pole of the celestial equator round that of the ecliptic (see PRECESSION), this star will in course of time (about 2100 A.D.) approach to within 28′ from the north pole, and will then recede from it. At the time of Hipparchus (156 B.C.) it was 12°, and in 1785 2° 2′ from the north pole. Its place can easily be found in the heavens, for a line drawn between the stars α and β (called the two *pointers*, from this peculiarity) of the constellation Ursa Major, or the Great Bear, and produced northwards for about 4½ times its own length, will almost touch the pole-star. Two thousand years ago the star β of Ursa Minor was the pole-star; and about 2300 years before the Christian era the star α in the constellation of the Dragon was not more than 10′ from the north pole; while 12,000 years after the present time the bright star Vega in Lyra will be within 5° of it. See star-map at URSA MAJOR.

The south pole of the celestial equator is not similarly marked by the near neighbourhood of a bright star, the only star deserving the name of the south pole-star being of the sixth or least visible magnitude.

Polianthes. See TUBEROSE.

Police (Gr. *politeia*) is in modern times held to be synonymous with the whole body of men employed as constables, or with the system under which such constables perform their duties in connection with the maintenance of law and order and the prevention and detection of crime. Originally, however, the *politeia* of the Greeks had a much wider signification, and what we now term *police* formed but a part of the regulation of the affairs of a state or country, which was the meaning of the original word. The Greeks, by the adoption of this term, says an old writer on police administration, apparently intended to indicate that the 'execution of those laws which make up public rights, the maintenance of that civil society which is the essence of every city, were two things inseparable from each other.' The strictly executive character of police duties, however, as performed in Great Britain of the 19th century, was not always recognised in ancient times, and whether at Athens, under officers called *archōn* or *nomophylax*, or at Rome, under consuls, prætors, quæstors, censors, or ædiles, the judicial functions of a police-magistrate, or the responsibilities of a public prosecutor, devolved to a greater or less extent upon those officials who were entrusted with police administration. It is difficult to refer to any country in which the separation of executive from judicial or magisterial functions has so strictly been carried out as would appear to be required under our modern interpretation of police duties in England. The French system of police, which is based on the old Roman administration, unites to a very considerable extent executive with judicial functions. The same remark applies to continental police administration generally; and even in the great dependency of British India, which is governed by English law, the district magistrate, who is *ex officio* head of the police within the limits of his jurisdiction, is also a judicial officer with extensive powers. In the capital of England itself, where the distinction between executive and magisterial functions is specially marked, the chief of the police is still, by virtue of his office, a justice of the peace, although the exercise of his powers in that capacity is restricted by certain conditions.

The existing system of police administration in the United Kingdom is of very recent origin; it arose within the 19th century, and in many instances was developed within the reign of Queen Victoria. In the early period of English history there was no such institution as a separate body of police. The responsibility for maintenance of the peace was imposed on each hundred or tithing, and the members of these divisions were held jointly liable for the consequences of any infractions of the laws which took place within their limits. Self-interest made every member of the association a constable; and although the collective responsibility of the tithing or hundred was for executive purposes represented by the headman of each, such transfer of liability was not recognised by the law when any penalty for breach of the peace was incurred. As time went on the place of the headman of the local division was taken by a constable or constables in the various villages or parishes of the country. In the larger towns the members of the various wards at first maintained order and kept watch within their various limits; gradually separate watchmen, very inadequately paid, were introduced; but the inefficiency with which watch and ward duties were performed, and the impunity with which crimes were committed, were conspicuous, and in no place more so than in the metropolis itself. During the 18th century spasmodic attempts were made to improve the administration in London, both as regards prevention and detection of crime. Horse patrols were introduced; a detective staff was organised; but the whole system was fragmentary and disjointed, and the results attained under it were pre-eminently unsatisfactory. The decrepitude of the old 'Charlies,' as the watchmen were called, and their inability to afford protection to the inhabitants of London, were proverbial; and as to Edinburgh we may read in the pages of the *Heart of Midlothian* Sir Walter Scott's description of 'that black banditti,' the 'City Guard,' who were in his days the 'alternate terror and derision of the petulant brood of the High School,' and objects of scorn to the citizens generally. At last in 1829 Sir Robert Peel constituted the Metropolitan Police, abolishing local police administration in the metropolis outside of the narrow limits of the City of London itself, and placing the control of the new force in the hands of the Secretary of State. Counties and boroughs followed suit in remodelling their police on the administrative principles adopted—save with reference to local control—by Sir Robert Peel in 1829, and since then the present system of police administration throughout the country has been developed on the lines of the original statute, 10 Geo. IV. chap. 44, amplified by 2 and 3 Vict. chap. 47. 'The new guardians of the peace in the metropolis, retaining the comparatively ancient name of constable, were called police-constables, and were in a sense a development of the tithing-man of old; but they resembled him even less than a member for a metropolitan borough resembles the burgesses who appeared before the chief-justices at Westminster with a statement of accounts in the reign of John. Yet the stages of growth are sufficiently well marked—from the responsibility of the tithing to the responsibility of its head, from the functions of the head borough or tithing-man to the functions of the constable, from the election of a constable to the election of a plurality of constables, and finally from a plurality of constables, deputy constables, and watchmen, under parochial or other local authority, to a plurality of constables under the central authority of a Secretary of State' (Pike's *History of Crime in England*, ii. 460).

According to the statistics available before the census of 1891, the total number of the police forces in the United Kingdom stood as follows: England and Wales, 37,957; Scotland, 4194; Ireland, 13,977; costing respectively £3,734,916, £381,283, and £1,412,947. The proportion of police engaged in ordinary duties, with reference (*a*) to population and (*b*) to £10,000 of rateable value in the following cities and large towns, is as follows:

Place.	Pop.	Daily Number.	Proportion to Pop.	Number per £10,000.
Metropolitan Police District	5,500,000	12,576	1 to 435	3·60
City of London	50,000	800	1 " 63	2·10
Liverpool	600,000	1059	1 " 566	3·20
Glasgow	526,000	1060	1 " 496	3·16
Birmingham	450.000	550	1 " 814	3·10
Manchester	380,000	870	1 " 434	3·60
Leeds	352,000	421	1 " 834	3·41
Sheffield	322,000	360	1 " 896	3·35
Edinburgh	255,000	466	1 " 546	2·55
Newcastle	160,000	255	1 " 628	2·97
Dundee	160,000	163	1 " 968	2·50
Dublin	360,000	1195	1 " 297	10·69

The above figures show that in determining the number of the police the authorities of each city and town have taken into consideration the varying needs and circumstances of each place, rather than to have aimed at subordinating their requirements to a theoretical proportion of police to population.

The police force throughout the country is in all respects a civil body. In the metropolis and in the larger towns it is of course necessary that the constables should be more or less drilled, to enable them when called on to act together in bodies, but the force is in its essence, constitution, and performance of duty, civil and non-military. In exigencies the military forces of the crown can be called out by magistrates to supplement the police in the maintenance of law and order, but, thanks to the law-abiding character of the people, such occasions are of rare occurrence. The only branch of the force of which the constitution is more military than civil is the Royal Irish Constabulary, which will be noticed further on.

The control of the various police forces throughout the country rests with local authorities; the only exception to the rule being the Metropolitan Police, who remain, as they were originally designed to be by Sir Robert Peel, under the authority of Her Majesty's Secretary of State for the Home Department. On the continent of Europe the police forces still remain under the direct control of the state, and to a greater or less extent are frequently used for political purposes, as well as in the conservation of the public peace. In the United States (see below) the principle of local control is general, but in many of the larger cities police appointments are not altogether unconnected with services rendered to local politicians.

Metropolitan Police.—The total strength of the Metropolitan Police in 1890 exceeded 15,000 officers and men, costing more than 1½ million sterling per annum. The Metropolitan Police District (exclusive of the City of London, which has a separate police force), as established by 2 and 3 Vict. chap. 47, extends over a radius of 15 miles from Charing Cross, and embraces a radius of about 700 sq. m. The population of the district may be estimated at not less than 5½ millions; its acreage is about 441,000 acres; and the length of beats covered in the various streets, squares, and roads amounts to 8200 miles. Under 23 and 24 Vict. chap. 135, Metropolitan Police are also employed in Her Majesty's dockyards and in the principal stations of the War Department. The cost of police per inhabitant is about 4s. 8½d. Since 1868 the cost of the force has been limited to the proceeds of a 9d. rate on the rental assessed in the Metropolitan Police district, of which 4d., till 1889 contributed by the Treasury, is now paid by the county councils, out of the Exchequer Contribution Account, and 5d. by the parishes. In 1890 an annual sum of £150,000 was allotted out of the proceeds of the Local Taxation Act, to defray part of the expenses of police superannuation, so that the amount now available for police purposes in the metropolis may be put down as the total proceeds of the 9d. rate under the original statute, plus £150,000.

That the police of the metropolis is a costly body is apparent. Not only is the population which the force is called on to protect enormous, but it is also exceptionally congested in many localities. The locomotion of such enormous masses of people develops difficulties in dealing with traffic unknown elsewhere. The annual charge for buildings, rents, and taxes is, and must be, higher than in other cities of less magnitude. The necessity for providing a higher organisation to cope not merely with an exceptionally numerous and skilful class of criminals, but to secure the safety of the largest body of citizens in the world while engaged in their lawful occupations, creates sources of expense peculiar to London; indeed, so many circumstances, non-existent elsewhere, combine to render the administration of this force expensive that in many respects its cost can only be contrasted and not compared with that of even the largest cities and towns of the kingdom.

The system of administration is a development of the principle on which the force was first established by Sir Robert Peel—'unity of design and responsibility of its agents.' The chief officer is the commissioner, who, acting under the immediate authority of the Secretary of State, is responsible for the administration of the system throughout the Metropolitan Police District. The commissioner is vested with the power of a justice of the peace for Middlesex and the home counties, but is debarred from acting in this capacity at general or quarter sessions, or in any manner out of sessions except for the preservation of the peace, or for the prevention of crimes generally. Under the commissioner are three assistant-commissioners, also vested with powers of justices, two of whom deal with details of discipline and ordinary business, the third being specially entrusted with the control of the criminal department.

The whole of the Metropolitan Police District is marked off into twenty-two divisions, each having a force of several hundred men under the charge of a superintendent, aided by a chief-inspector, inspectors, and sergeants. The superintendent is responsible for all the details of police administration within his division. For executive purposes the divisions are brigaded into four police districts, each district comprising several divisions, and being in charge of a superior officer termed chief-constable.

Attached to each of the exterior divisions is a force of mounted men, aggregating in all about 250. The services of this force for ordinary purposes are of more use in outlying places where the beats are long, and where a constable on foot must take a long time to cover his ground, than on the crowded and slippery streets of interior districts; but on occasions of processions, public meetings, and similar demonstrations the mounted force are brought in and perform valuable service. The Thames or River Police are recruited from sailors, and patrol the river in boats and steam-launches. Each principal station is in direct communication by telegraph with the headquarters' office, which, since November 1890, has been situated on the Thames Embankment, and is known as New Scotland Yard; and between every divisional station and its subdivisions the same system of telegraphic communication is maintained. For the detection of crime a special staff of officers is located in each division. Local crime is dealt with by these officers; for the conduct of special cases a separate detective staff is maintained at headquarters, under the control of the superintendent of the Criminal Investigation Department, and the whole detective organisation is specially under the charge of the chief-constable of the Criminal Department and of one of the assistant-commissioners. The supervision of habitual criminals is specially looked after at headquarters by the Convict Supervision Office, under a chief-inspector. The strength of the detective department is above 300 men.

County and Borough Police.—The total number of county and borough police in Great Britain is:

	Counties.	Boroughs.
England and Wales	12,102	10,596
Scotland	1,697	2,675

All such police are under the control of local authorities. By the Local Government Acts of 1888 great changes were made as to the bodies entrusted with such control, and the county councils superseded in many instances the previous agencies for regulating police administration. With reference to counties, the control of the police is vested in a standing committee, consisting of an equal number of justices appointed by the quarter sessions and by the county council. In the case of cities and larger boroughs, which are termed county boroughs, the local councils retain the power which they formerly had, and smaller boroughs are treated as parts of the counties in which they are situated. The control of the Corporation of the City of London over the 'City Police' was in no way affected by the Local Government Acts of 1888. The cost of police, as before, is paid from rates levied in counties and boroughs, supplemented by a contribution from the 'Exchequer Contribution Account' of half the cost of pay and clothing of every force certified to be in an efficient condition. Such contribution was formerly made directly by the Treasury in aid of the local rate under the County and Borough Police Acts. Under the Local Government Acts of 1888, however, such sums, consisting of duties on local taxation, licenses, and the probate-duty grant, are now placed to the credit of the police account of the county fund in counties, and by the county councils disbursed to county police. In boroughs having a separate police force the amounts are paid to and expended by the local councils.

The chief executive officers of county and borough police forces, who are appointed by local authorities, are styled chief-constables; superintendents or head-constables; and for inspection purposes, connected with the grant of a certificate of efficiency, two officers for the whole of England and Wales, and one for Scotland, are appointed by the Secretary of State. The system of administration in cities and large towns is based, as far as circumstances admit, on that which prevails in the Metropolitan Police; in counties where concentration of police is not required the duties are arranged to suit the requirements of each locality. Some of the more important railway companies employ a special staff of railway police.

Police in Ireland.—There are only two police forces in Ireland: the Dublin Metropolitan Police, which has jurisdiction within the limits of the capital, and the Royal Irish Constabulary, which, as an imperial force, performs police duty for the whole of the rest of Ireland.

The Metropolitan Police in Dublin numbers 1214 men, under the command of a commissioner, and its administration is on the lines of the Metropolitan Police.

The Royal Irish Constabulary is the only force in the kingdom which is practically on a military footing, and the members of which are armed, drilled, and disciplined as soldiers. Ordinary civil police duties, both in towns and counties, are performed by this force, but it is unfortunately too often that they are called upon to act as soldiers in repressing organised disturbance. The force is directly under the Irish government. It consists of 12,763 members, officers and men, and is commanded by an inspector-general. Under this officer is a deputy inspector-general, who again is aided by three assistant inspectors-general at headquarters. Each county is supervised by a superior officer called county inspector, and counties again are subdivided into districts, over each of which a district inspector is placed. Below these officers come head-constables, sergeants, and constables, all trained to the use of arms, and disciplined as soldiers.

Police-courts.—These may be termed courts of first instance for hearing criminal cases. In counties such courts are held by justices of the peace, sitting at either petty or special sessions; in boroughs by stipendiary magistrates, or by members of the local councils in their magisterial capacity. For the city of London there is one police-court held at the Mansion House, and presided over by the Lord Mayor or one of the aldermen. In the Metropolitan Police District there are fourteen police-courts, the chief of which is held at Bow Street by the chief-magistrate, assisted by two magistrates. To each of the other Metropolitan police-courts two stipendiary magistrates are attached. In Scotland sheriff-courts, both in towns and counties, dispose of a large number of criminal cases remitted to them. The number of persons proceeded against summarily, according to the statistics for the year 1890–91, was: England and Wales, 689,158; Scotland, 142,145; Ireland, 233,060.

France.—In France the police are divided into two great branches—(1) The *Police Judiciaire*, whose business is to discover offenders, gather evidence against them, and hand them over to the proper tribunal (see France, Vol. IV. p. 776); (2) the *Police Administrative*, whose functions correspond more closely to those of the English police forces in maintaining order. They have, however (as *police générale* and *police municipale*), wider powers and more varied duties, having to superintend public meetings, inspect public food-supplies, administer the laws as to the publication of printed matter, the watching of foreigners, the examination of passports, and regulate the sale of firearms. There is a special department of *police politique*. The armed police, with military organisation, on foot or mounted, known as *gendarmerie* (21,000 men), together with *gardes forestiers* (8000) and *gardes champêtres* (31,000), the *commissaires de police* (1100), and the *agents de police* (14,000), belong to the judicial police. The nearest equivalents to English constables are the *gardiens de la paix*, formerly called *sergents de ville*, of whom Paris has some 6000. The *Service de Sureté* is the detective department.

United States.—In the United States, where each state and each city has its own separate administration, the police system closely resembles that of England. The organisation of a uniformed municipal police is comparatively recent, even in the large cities; in New York it was not substituted for the inefficient night-watch until 1845. The present police organisation of that city may be taken as representative of the American system generally. The department of police of the city of New York consists of a 'board of police,' comprising four commissioners appointed by the mayor, and the 'police force' and officers appointed by the board. The city, with an area of 41¼ sq. m. and a population of 1,515,000, is divided into four inspection districts, which are subdivided into thirty-five precincts. At the head of the force is a superintendent, under whom there are four inspectors, a captain over each precinct, sergeants, roundsmen (visiting officers), patrolmen (the body of the force), and doormen at the stations. There are also about a score of police surgeons. The general administration of the force is vested in the board of police, who make appointments, transfers, &c., hear charges against members of the force, and make rules and regulations for the discipline of the department. The orders, however, must not conflict with the constitution of the Union or of the state. The superintendent is the chief executive officer, and is appointed by the board, to whom he makes written quarterly reports; and he receives similar quarterly reports in writing from each of the inspectors. The captains report every morning to the central office. The roundsmen must see that the patrolmen are properly performing their duty, and the sergeants again are responsible for both roundsmen and patrolmen. Besides the general force, there are several 'squads' organised for special duties. These include the 'sanitary police company,' whose members inspect buildings premises, employments, ventilation, sewerage, &c. which are supposed to be dangerous to life or detrimental to health, report nuisances, and seize food unfit for consumption; officers of this company also act as school-board officers, and others, qualified as engineers, inspect steamboats and stationary steam-boilers used for motive power in the city. The detective force is also a separate 'squad;' and others are the mounted squad for duty near Central Park, the mounted patrol for rural precincts, the harbour police, the 'ordinance squad' (for enforcing city ordinances), the Broadway squad (for aiding pedestrians in crossing during the day), special service squads, and others. On the board of police falls the duty of seeing that the streets are kept clean, and a bureau of street cleaning is appointed by the board to supervise this department. Another duty imposed upon the New York police relates to elections: all elections within the city are held under their direction; election officers are appointed by the board, to whom the returns are transmitted. In 1890 the police force of New York numbered 3421 men, of whom 2922 were patrolmen; this is one man to every 414 of the population, and allows five patrolmen to every mile of street; the average annual cost of the force is $4,391,766. The police force of Chicago in the same year numbered 1624 (including a general superintendent, one inspector, a chief of detectives, and ten captains), and cost $979,894; of Philadelphia 1717, cost $1,000,000; of Brooklyn 1157, cost $859,184; of St Louis 613, cost $475,408; of Boston 916, cost $963,355; of Baltimore 782, cost $677,914; of San Francisco 406, cost $545,500 a year.

Polignac, an ancient French family, which claims to derive its name from a castle—the ancient *Apolliniacum*—in the department of Haute-Loire, and which since the 9th century possessed the district of Velay. Among its most famous members was Cardinal Melchior de Polignac (1661–1742), who was employed in diplomatic missions in Poland and at Rome, and received a cardinal's hat after acting as plenipotentiary of Louis XIV. at the peace of Utrecht (1712). From 1725 till 1732 he was French minister at the court of Rome, and he was appointed Archbishop of Auch. Polignac succeeded Bossuet at the French Academy in 1704, and left unfinished the *Anti-Lucretius* (1745), a poem intended for a refutation of Lucretius.

Some other members of the Polignac family are more notorious than noteworthy.—In the reign of Louis XVI. Iolanthe-Martine Gabrielle de Polastron, Duchesse de Polignac (born 1749; died at Vienna, 9th December 1793), and her husband, Jules, Duc de Polignac (died at St Petersburg, 1817), grand-nephew of the cardinal, were among the worst, but unhappily most favoured, advisers of Marie Antoinette. They obtained vast sums of the public money from their royal master and mistress, and were largely responsible for the shameful extravagance of the court. The Polignacs knew how they were hated, and were the first of the *noblesse* to emigrate. From the Empress Catharine of Russia the duke received an estate in the Ukraine, and did not return to France at the Restoration.—His son, Auguste Jules Armand Marie, Prince de Polignac, was born at Versailles, 14th May 1780. On the Restoration he returned to France; became intimate with the Comte d'Artois, afterwards Charles X.; from his devotion to the policy of Rome received from the pope in 1820 the title of Prince; was appointed ambassador at the English court in 1823; and finally, in 1829, became head of the last Bourbon ministry, in which capacity he promulgated the fatal ordonnances that cost Charles X. his throne. He then attempted to flee, but was captured at Granville on the 15th of August, was tried, and condemned to imprisonment for life in the castle of Ham, but was set at liberty by the amnesty of 1836. He took up his residence in England, but died at St Germain, 2d March 1847. He was a puzzle-headed man; 'a mere idiot' Guizot called him to Bishop Wilberforce.—His son, Prince Armand (1817-90), was a leading monarchist.

Polishing. See FRENCH POLISHING; also DIAMOND, GLASS, GRANITE, &c.

Polishing Slate, a mineral composed chiefly of silica, with a little alumina, lime, oxide of iron, and water; white, yellowish white, or yellow; and of specific gravity about half that of water. It is used for polishing glass, marble, and metals.

Politian. ANGELO POLIZIANO (Latinised *Politianus*) was born at Montepulciano in Tuscany, on the 14th July 1454. His real name was Ambrogini, but, in accordance with a common practice at the Renaissance, he early called himself by the Latinised form of his native town, which Italianised into Poliziano is the name by which he is known in his own country. His father, Benedetto Ambrogini, a jurist of some distinction, was assassinated by certain of his fellow-citizens, and left his widow and five children so scantily provided for that, even after Angelo the eldest had given the most signal proofs of his genius, he was on the point of being taken from his studies and put to a trade. At the age of ten he was sent to Florence, then under Lorenzo de' Medici, the brilliant centre of the Italian Renaissance. Here he had as his teachers the most famous scholars of his time, the Greeks Argyropoulos and Kallistos, and the Italians Landino and Ficino. His progress in the ancient languages, the special studies of the period, was extraordinary even in that age of precocious talents. By his sixteenth year he wrote epigrams in Latin and Greek that excited the wonder of his teachers. At seventeen he began the translation of the *Iliad* into Latin hexameters, a work which it had been the ambition of all the Italian humanists to achieve. The first book had already been translated by another scholar, and Politian at different periods carried on the work to the end of the fifth. By his success with the second book he became known as the 'Homeric youth,' and attracted the attention of the great Lorenzo himself, who now stood his firm friend and patron. Thus secure of a settled position his life was thenceforward devoted to incessant study, and he was soon recognised as the prince of Italian scholars, and the most remarkable literary genius of his time. At the age of thirty he became professor of Greek and Latin in the university of Florence, and the fame of his prelections drew students from every part of Europe, among whom, by reason of their own services to learning, Reuchlin, Grocyn, and Linacre may be specially mentioned. Politian was also entrusted with the education of Lorenzo's sons, Piero and Giovanni (afterwards Leo X.); but their mother Clarice, who had excellent reasons for doubting the great scholar's fitness to be the director of her boys, insisted on his being removed from their immediate superintendence. In such occupation, varied by occasional visits to other towns of Italy, Politian lived at Fiesole in a villa assigned to him by Lorenzo, whose familiar intercourse he daily enjoyed. The death of that prince in 1492 was the most serious trial of his life, and he mourned his death in a Latin elegy, which has been described as unique alike in form and feeling in modern Latin poetry. Two years later he himself died during the temporary supremacy of Savonarola, whose religious zeal was directed against every principle of that pagan revival which it had been the life's work of Lorenzo and Politian to forward. Politian's epitaph on his tomb in San Marco, at Florence, is so entirely in the ironical and sceptical spirit of that movement of which he was so brilliant a representative that it fitly closes any account of himself. It is as follows: 'Politian lies in this grave, the angel who had one head and, what is new, three tongues.'

Politian has the double distinction of being both a scholar of the first rank and a poet of high merit alike in Latin and in his mother tongue. Of his industry as a scholar his translations of classical authors (Epictetus, Herodian, Hippocrates, Galen, Plato's *Charmides*, to mention a few of the long series) are ample evidence, while his edition of the *Pandects* of Justinian is regarded by modern scholars as excellent even when tried by the latest tests. His original works in Latin fill a thick and closely-printed quarto, half of which is made up of twelve books of letters, and the rest with miscellanies in prose and verse. Among Neo-Latin poets Politian holds perhaps the first place, his peculiar distinction being that, while he is not careful of classical purity, he has charged his verse with his own individual thought and feeling. In Italian literature also he takes a high rank, both in virtue of his own poetic production and as having at a critical period given an impulse to the cultivation of the Italian language. Before him the Italian humanists regarded their native tongue simply as a bastard Latin, which might serve the needs of the people, but was beneath the attention of scholars. The weight of Politian's name and example moved them to think differently, and thenceforward Italian was secure of a place among the other modern literatures. Of his productions in Italian his *Orfeo* deserves special mention as having been the first secular drama in the language. As to his personal character, Politian had in full measure the two great blemishes of the scholars of the Revival of Letters, and notably those of Italy. He was addicted to the lowest forms of vice, and he knew no bounds to his abuse of those who had the ill-fortune to offend him.

See *Opera Ang. Politiani* (Florence, 1499); *Le Stanze, l'Orfeo e le Rime di Messer Ang. Ambrogini, illustrate da Giosuè Carducci* (Florence, 1863). For accounts of Politian, see Roscoe, *Life of Lorenzo de' Medici*; J. A. Symonds, *Renaissance in Italy*, vol. ii.; Von Reumont, *Lorenzo de' Medici* (vol. ii. Eng. trans. 1876).

Political Economy is variously defined. According to the definition most generally accepted in England, it is the science which is concerned with the production, distribution, and exchange of wealth. In Professor Marshall's *Principles of Economics* it is defined as 'a study of man's actions in the ordinary business of life; it inquires how he gets his income, and how he spends it.' The name 'Political Economy' dates only from 1615, having been first used (in this special sense, as distinguished from domestic economy and moral economy and from political theory) by Montchrétien de Vatteville in his *Traité de l'Économie Politique*.

The science of political economy is a branch of the study of man. Man is a creature with many needs, which he seeks to satisfy by applying his labour to the nature by which he is surrounded. These needs are not a fixed quantity, but grow and change with the development of society; and man's devices for their satisfaction receive a corresponding development. In the growth of these needs and of the devices to satisfy them we can trace the economic development of the human race. Political economy may be regarded as the systematic and comprehensive study of the phenomena connected therewith. There have been economic facts therefore ever since the origin of man; but there was no real science of political economy till it was constructed by Adam Smith and his forerunners in France in the 18th century. Science generally is the systematic study of facts which existed before the study began. Yet, while political economy did not exist as an independent and comprehensive branch of human knowledge before the 18th century, much attention had been given to particular economic facts. Various economic problems had received great and serious attention.

The history of political economy naturally falls into three divisions, *the ancient*, *the mediæval*, and *the modern*. We shall treat them briefly in their order.

(1) *The Ancient Period.*—As in other sciences, the first notable efforts in economic reflection were made by the ancient Greeks. The leading Greek thinkers who handled economic questions were Plato, who in the economic as in other spheres represented the idealism of the ancient world; Aristotle, the exponent of scientific realism; and Xenophon, who expounded the plain common sense of his time and country. Of the problems which they treated with the insight peculiar to their race we may mention the following: the economic aspects of the origin of society; the division of labour; the function of money; economics of slavery, which they considered a natural thing; property and the related question of communism; the dependence of political change and of revolution on economic causes; the population question. On these and other subjects the teaching of the great Greek writers is most valuable; nor is its value lessened by the fact that their discussion of economic facts forms only a part of the science of politics. And, while the conditions of the modern world differ so vastly from the Greek world, the economic views of thinkers like Plato and Aristotle will always have an interest for us, inasmuch as the solid groundwork of human nature continues substantially the same through the changing conditions of history.

Roman economics had no special interest or originality. The main contribution of the Romans in connection with political economy was to give legal form to the prevalent ideas of property.

(2) *The Mediæval Period.*—During this period there was little discussion on economic problems that could now be called scientific. The most interesting feature of the economic views that then existed was the influence exerted on them by Christian teaching. This influence was most profound and greatly affected also the economic thinking of subsequent times. The influence of Christianity was especially manifest in relation to the weak and oppressed classes. It tended to soften and then to abolish slavery and serfdom; it raised the position of women and gave a new refinement to family life; the care of the poor became a first duty of men and of human institutions. The ideas and institutions of property prevalent in the Roman world, which were often harsh, severe, and cruel, were corrected by the spiritual ethics of Christianity. To the struggling and half barbarous feudal world it taught a nobler life and a higher conception of duty in the economic as in other spheres. It inculcated righteousness and charity, forbade usury and luxury, exalted poverty and resignation. In their opposition to the rigorous ideas of property some of the Fathers even advocated communism. The mediæval period was a time of confused struggle, in which Christian ethics were often opposed not only to the rough and warlike egoism of the feudal races, but to the harsh economic ideas that were incorporated in the Roman law.

(3) *The Modern Period.*—The feudal communities were superseded by centralised monarchies; and this great political change was an organic one, being attended by important changes in other spheres. The church lost much of its power. The feudal nobles were transformed into courtiers. The feudal militia gave place to professional armies in the pay and in the immediate service of the monarch. For the maintenance of the army and of the court and other dependents of the centralising ruler it was necessary first of all to have a sufficient revenue. And, as the old revenue in kind was neither convenient nor effective, it was found particularly desirable to have a revenue in money. Accordingly it was one of the greatest and most pressing functions of the statesmanship of that time to foster and to secure an ample revenue in money. The rise of the Colonial System (q.v.) consequent on the discovery of America and of the sea-route to India, the great expansion of commerce thence resulting, the growth of manufactures, the development of the banking system, all these were regarded as elements in the strength of the centralised state, and were made subservient to its policy. Under these circumstances it was natural that special attention should be paid to the balance of trade; that trade should be so regulated by statesmen as to secure for their own country a good balance of the precious metals. Thus it became a special note of economic theory to place an exaggerated value on the precious metals. The Mercantile System (q.v.) was an expression of this exaggeration in the sphere of political economy. Economists differ as to the precise meaning and application of the phrase, and indeed it had no very precise meaning or application. The meaning of the phrase will naturally vary according as we confine the application of it to the exaggeration to which it specifically relates or extend it to the whole system of which the exaggeration was a conspicuous feature. But there can be no doubt that the system grew out of the needs and circumstances of the time. Its chief expounders were Bodin and Montchrétien de Vatteville in France, Antonio Serra in Italy, and Thomas Mun in England. In practical statesmanship it is associated chiefly with the great names of Cromwell and Colbert.

Even during the prevalence of the mercantile system a new way of thinking on economics had arisen in England and France. Its keynote was freedom, and it too was an organic part of the social and political evolution of the time. The expounder of the new system was Adam Smith, but he was only the chief representative and culminating point of a movement which had been growing for more than a century. In England men like Locke, Joshua Child, William Petty, and Dudley North had been struggling more or less successfully towards a similar point of view. In France the school of Physiocrats, headed by Quesnay, had taught many of the new ideas; in particular they had been set forth with perfect lucidity and conciseness by Turgot in his *Réflexions sur la Formation et la Distribution des Richesses* (1766). In fact, Turgot's little book might be regarded as the first scientific exposition of political economy. Adam Smith's achievement was to give the fittest form to ideas which were becoming current among the most progressive minds of his time. If Turgot's work may be regarded as the first brief statement of political economy, Smith's *Wealth of Nations* was the first thorough and comprehensive exposition of the subject by a man who had ample leisure and capacity, a remarkable knowledge of history, and an adequate philosophic training.

The teaching of Adam Smith was by himself weal defined as a system of natural liberty. In view of the ill-judged or antiquated regulations of the past he advocated liberty; and to all that was artificial in such regulation he opposed a natural order, thus following the school of Rousseau in the return to nature from a perverted civilisation. Indeed, both in his assertion of freedom and in the appeal to nature, Smith was only applying to political economy principles that were dominant in other spheres of thought. Smith also followed the example of his predecessors, and showed himself in harmony with the new era, in regarding labour as the source of wealth. With regard to other economic questions relating to capital, rent, interest, &c. Smith has said much which, though it has not always gained the assent of subsequent economists, has at least had the merit of starting important discussion. Smith's pre-eminence as an economist lies in the fact that he summed up and presented in lucid perspective the best economic thought of the times preceding, while his writings were the starting-point of all further development.

The greatness of Smith becomes all the more apparent when we contrast him with his successors, for in none of them do we see the same combination of humanity, moderation, and open-mindedness, fullness of knowledge, width of view, and philosophic culture. Malthus had many of the same qualities, but he fully applied them only to the elucidation of a single aspect of the subject, the population question. In Ricardo the historic factor almost disappears in the abstract; his theory of rent, for which he has been most celebrated, is particularly abstract and artificial, and has been much overrated. The main body of J. S. Mill's economic work was simply a re-statement of the traditionary doctrine, and as an achievement for his time cannot be compared with what Smith did for the 18th century. His later writings as well as the later editions of his *Political Economy* show a perception of the fresh problems which are opening up to the economist, but he never brought his economic system as a whole into harmony with his new views. His economic writings represent a process of transition, in which the old was not fused or transformed by the new.

The political economy of Adam Smith had great influence on the continent of Europe. J. B. Say in France, and Rau and Hermann in Germany, followed Smith more or less faithfully. But Smith's teaching, or what is alleged to have been his teaching, has also met with strong opposition. His doctrines have been variously criticised as being too abstract and individualistic, as inculcating selfishness, as based on doubtful theological assumptions. It is a special objection that his tendency to individualism and cosmopolitanism prevents him from seeing the importance of the nation as an element in economic development. Here we find the most fundamental point of difference between the economics of Germany and of England, plainly arising out of the different circumstances of the two countries. The national element found conspicuous expression in the system of List, who has been followed by the American economist Carey, the gist of this doctrine being that the political economy of each country is and must be adapted to the particular conditions of its national development; in other words, that circumstances render protection necessary to the national life and growth of Germany and the United States.

The school of political economy which has long been most prevalent on the continent of Europe is usually described as *historical*. It holds that economic factors must be studied in the light of the historic conditions of each time and country—conditions legal, political, social, and ethical. The historical school is a protest against abstractness and absoluteness in economic science. No reasonable adherent of the school would deny that there are permanent factors in economics, but all would assert that even the most stable elements are subject to continual variation. That being so, much will depend on whether the economist is disposed to dwell on the stable or the variable elements in economic development. Roscher was the founder of the school. He and Adolf Wagner are its greatest recent representatives. Their works are true to the leading principle of the school; they are studies of economic principles conducted with all the lights which a vast historical learning can supply. Schäffle is more than historical, as he has given ample recognition to the evolution principle in his *Bau und Leben des Sozialen Körpers*.

At present it will be generally admitted by students of political economy that the subject is in an unsettled and unsatisfactory condition. Various explanations of this may be given, but the real and substantial grounds must be found in the following great facts which have emerged since the time of Adam Smith, and which seem to necessitate a reconstruction, or at least a large modification, of the science.

(1) The greatly improved study of history, and the application of the historical method to all departments of inquiry. The charge of neglecting the teachings of history can be urged justly enough against many of Smith's school; against Smith himself it is most unfair. It would be absurd to say that an age which produced Smith and Gibbon was entirely lacking in the historical spirit; both men are amongst the finest examples of it that have appeared. Yet they were only isolated instances of a method which has now become universal among competent inquirers. The comparative study of history, and especially of historical institutions, has practically come into existence since their time, and has thrown entirely new light on the growth and working of economic forces.

(2) The general acceptance of the theory of evolution, especially as taught by Darwin. We can now see that Smith's theory of natural liberty really meant that individual struggle for existence carried on within the limits prescribed by law which we call the competitive system; and that the protective system favoured on the European continent is only a moment in the struggle for existence carried on between vast organised communities like France, Germany, and Russia. In the United States it may be considered as a moment in the struggle for a better national existence against the industrial power of England.

(3) The industrial revolution, whereby hand labour has been superseded by machinery, and individual effort has given place to labour organised in vast industrial and commercial undertakings, such as factories, railway and shipping companies. This revolution was just beginning when Adam Smith wrote his *Wealth of Nations*, which was published in the very year when Watt produced the first effective steam-engine (1776). The change in industrial *technique* and organisation have been vastly greater since Adam Smith's time than they were in the whole period between Aristotle and Smith.

(4) The growth of democracy, which took a fresh start with the American revolution also in the same year that saw the publication of the *Wealth of Nations*, in 1776, to be followed thirteen years later by the great French Revolution of 1789.

(5) The increasing prominence of the social question, of which we need not further speak here.

It cannot be said that the current English economics have given due recognition to any of the above facts. Professor Marshall's important *Principles of Economics* (1890), while it is learned, thorough, and progressive in tone, and does considerably show the influence of new movements, is in the main merely a reproduction of the traditionary doctrine. The only prominent thinkers who give due recognition to the evolution principle in economics are Herbert Spencer and Schäffle.

It will be clear that the old abstract economics, of which Ricardo was the signal example, is now being abandoned by all competent economists. Most students of the subject will admit that we can best comprehend the present if we consider it as having grown out of the past; and if we can throw any light on the future, we can do so only by studying both the past and the present. In other words, the great function of the economist is to collect and analyse facts and to inquire into the action of the forces, whatever they may be, that determine the economic well-being of mankind. His aim must be on the one hand to avoid a servile adherence to the historical method, through which the discussion of economic theories is overburdened by a too elaborate apparatus of historical learning, and on the other hand to avoid the assumption that the economic conditions of our own time and country are and must be normal for all other times and countries. While the main body of economic inquiry must be the collection and analysis of facts, the best and most fruitful achievements in political economy accomplished by men like Quesnay, Turgot, Adam Smith, and J. S. Mill have been in forwarding human progress. Thus the ethical or ideal element has not been excluded from political economy at its best. On the contrary, it has informed and inspired the science in its noblest efforts. While political economy must start from an adequate basis of facts supplied by the cognate or subsidiary sciences, geology, geography, statistics, history, it must own allegiance to the supreme science of ethics. Progress in economic science will move in harmony with and promote the social and moral progress of the human race.

Political economy may be regarded as concerned with a vast process which is incessantly going on. This process begins and ends with human beings. The starting-point is found in the needs which stimulate men to those efforts for their satisfaction which are termed labour. But labour can create nothing; it operates by utilising natural objects, or as economists briefly express it, the land, which includes mines and the sea as well as agricultural land. In the history of civilisation a vast system of appliances have, under the name of capital, been developed and accumulated by the labour, ingenuity, and foresight of men for more effective operation on nature; thus we have the three factors of production, land, labour, and capital.

In the system of economics that prevails in the most advanced countries these three factors of production are supplied by as many different classes of individuals, whose relations to each other are determined by free competition. Hence it is that the problems connected with distribution attain to primary importance in political economy. The share of the results of production obtained by the owner of land is rent; the share of the capitalist is called profits, consisting of interest, wages of management, &c.; the share of the labourer is simply termed wages.

One of the most marked features in the recent economic history of the world is the enormous development of the means of communication and transport both by sea and land. In former times the bulk of the produce of labour was locally consumed by the producers themselves. The growing utilisation of steam and electricity has given rise to the great markets of the world, or we should rather say, to a great world-market, in which the exchange of the most varied commodities is carried on. Exchange had long been an important department of economics; it is now a dominant one. Out of exchange arise the problems connected with value. The medium of exchange is money, also involving a wide complex of questions—banking, credit, &c.

The final aim of the whole economic process is the satisfaction of the needs from which it started. This satisfaction is gained in the consumption of the commodities which are produced, distributed, and exchanged; but they are used up not only for enjoyment, but for the production and maintenance of human energies. All human activity, whether it be viewed as the activity of individuals or of the great organised communities, such as states and nations, must rest on an economic basis, and must be more or less limited by the economic resources which it can command. As wealth consists of commodities which are derived from external nature and transformed in the process of production, so in the process of consumption they are returned to nature in a greatly altered form. The subject of consumption has been much neglected by political economists. The utilisation of the materials returned to nature, which are often considered as mere waste, but which could be scientifically applied to the recuperation of the often exhausted powers of nature, has also been greatly neglected in economic *technique*.

The vast process which we have thus briefly sketched is for the most part a private matter. It rests with each individual to determine how he shall relate himself to it. But there is also a large public sphere connected with the state, the municipality, and other local bodies. It has almost universally been admitted that the state must provide for defence, justice, education, the larger means of communication, &c.; and the necessary revenue is mostly drawn from the wealth of the citizens under the name of taxation. An enlarging set of functions, connected with lighting, water-supply, police, and to some extent education, are generally performed by municipalities and other local bodies, the funds for these being styled rates.

Many of the older forms of society were marked by stability or stagnation, and the economic conditions under which they existed underwent little change. Yet economic history has also been a record of development. Labour in particular has gone through a distinct succession of changes, through slavery, serfdom, and the guild system, into the present system of free labour. Discontent has always been the mother of progress, and it is obvious that the economic changes of the present and the future must largely proceed from the discontent of the labouring class, especially from their discontent with the prevailing system of distribution. Hence a group of most important questions connected with trades-unions, co-operation, socialism.

It should also be said that the economic process is an organic one, that each part of it is vitally connected with every other, and that the whole process is intimately related to the entire social, political, artistic, moral, and religious development of mankind. One of the greatest dangers to political economy (as to other sciences) is the excessive specialisation by which certain departments of it are studied in isolation from the other branches of the science, and from the cognate provinces of human knowledge.

Larger works on political economy: **Adam Smith**, *Wealth of Nations*; J. S. Mill, *Principles of Political Economy*; Cairnes, *Some Leading Principles of Political*

Economy newly expounded; Jevons, *Theory of Political Economy;* Sidgwick, *Principles of Political Economy;* Marshall, *Principles of Economics;* Roscher, *Grundlagen der Nationalökonomie* (Eng. trans.); Adolf Wagner, *Grundlegung;* Schäffle, *Bau und Leben des Sozialen Körpers;* Schönberg's *Handbuch der Nationalökonomie*, which is really an encyclopædia of the subject. Manuals and smaller works: Fawcett, *Manual of Political Economy;* Mrs Fawcett, *Political Economy for Beginners;* Marshall, *Economics of Industry;* F. A. Walker, *Political Economy;* Joseph Garnier, *Traité d'Économie Politique;* Laveleye, *Elements d'Économie Politique* (Eng. trans.). Histories of political economy: Roscher, *Geschichte der Nationalökonomik in Deutschland;* Kautz, *Die geschichtliche Entwickelung der Nationalökonomik;* L. Cossa, *Guide to the Study of Political Economy;* J. K. Ingram, *History of Political Economy; Dictionary of Political Economy*, edited by R. H. Inglis Palgrave. See also the articles BANKING, BOUNTY, CAPITAL, COMMUNISM, CONSUMPTION, CO-OPERATION, CORN LAWS, DIVISION OF LABOUR, EXCHANGE, FREE TRADE, LABOUR, LAND LAWS, MONEY, MONOPOLY, PROTECTION, RENT, SOCIALISM, TAX, TRADE-UNIONS, WAGES; and the articles on the more important economic thinkers—Smith, Malthus, Ricardo, Mill, Lassalle, Marx, &c.

Political Offences are usually exempted from treaties of Extradition (q.v.), by which a government agrees to arrest and surrender persons who have broken the law of a foreign state. A political offence may be defined as an offence committed in carrying on civil war or open insurrection. In November 1890 the English judges had to decide whether the Swiss government could demand the extradition of one Castioni, who was proved to have shot a member of the ministry during a revolution excited by the Liberals in the canton of Ticino. There was some evidence that the prisoner was moved by private malice; but the judges held that his act was *primâ facie* political, and gave him the benefit of the exception in the treaty. The Conspiracy Bill of 1858, introduced after Orsini's attempt on the life of Napoleon III., proposed to make conspiracy to murder a felony instead of a misdemeanour. It was intended to secure the French emperor against plotters in England, and caused the fall of Palmerston's government, as being contrary to English traditions. As between a government and its subjects political offences have often been treated with extreme severity, as may be seen on referring to the Roman law relating to *perduellio* and *læsa majestas*. In France and Scotland the law of treason was framed on the model of those laws which had been made to protect the person and government of the Roman emperor and the interests of the Roman state; the old English law of treason was also extremely severe. In modern times the tendency is to treat offences against the state according to the ordinary principles of criminal law. There are, however, two kinds of crime which raise political questions of some interest. (1) Crimes committed in the territory of one state against the government of another. The Foreign Enlistment Acts were passed to enable the British government to deal with persons who levy troops and prepare armaments against a foreign government within British territory. Some writers of authority have censured the American government for permitting Fenians within its jurisdiction to levy war against the British empire. (2) Crimes committed by persons who honestly think they have a grievance against the government of their own country. In such cases the political motive is not, in law, regarded as an excuse; if e.g. a member of parliament incites to a breach of the law, magistrates and prison authorities must deal with him as with any other offender. A humane government will often extend special indulgence to political offences. Whether such indulgence should be granted (whether e.g. an Irish member in prison should be exempted from ordinary prison rules) is a question of discretion, not of legal right. The dynamiters who in 1882–85 attempted the destruction of English public buildings were properly treated as mere criminals, without regard to any alleged political aims.

Politics (Gr. *polis*, 'city' or 'state'), that branch of ethics which has for its subject the proper mode of governing a state, so as to secure its prosperity, peace, and safety, and to attain, as perfectly as possible, the ends of civil society. Among the subjects which political science embraces are the principles on which government is founded, the hands in which the supreme power may be most advantageously placed, the duties and obligation of the governing and governed portions of society, the development and increase of the resources of the state, the protection of the rights and liberties of the citizens, the preservation of their morals, and the defence of the independence of the state against foreign control or conquest. While the philosophy of governing constitutes the *science* of politics, the *art* of politics consists in the application of that science to the individual circumstances of particular states. The ancient Greek writers treated politics with reference to an ideal perfect state, which each propounded according to his own speculative views, pointing out the variation of every existing government from his standard. The 'politics of a country' implies the course of its government, more especially in its relations with foreign powers.

In the articles on the several countries a sketch of the constitution is given. See also the articles AMBASSADOR, ANARCHISM, ANTHROPOLOGY, ARISTOCRACY, BALANCE OF POWER, CABINET, CONGRESS, DEMOCRACY, ENGLAND (HISTORY OF), FAMILY, FEUDALISM, GOVERNMENT, INTERNATIONAL LAW, NIHILISM, PARLIAMENT, REPUBLIC, REPRESENTATION, SOCIALISM, TRIBE, WHIGS AND TORIES, &c.; and the articles on the expounders of famous political theories—Plato, Aristotle, More, Machiavelli, Bentham, Lassalle, Marx, &c.

Poliziano. See POLITIAN.

Polk, JAMES KNOX, eleventh president of the United States, was born in Mecklenburg county, North Carolina, November 2, 1795. His ancestors, who bore the name of Pollock, emigrated from the north of Ireland; his father was a farmer in moderate circumstances. Polk was educated in the University of North Carolina, and studied law with Felix Grundy of Tennessee, an eminent lawyer and statesman. Admitted to the bar in 1820, he was three years after elected a member of the legislature of Tennessee, and in 1825 returned to congress by the Democratic party. In 1835 he was chosen speaker of the House of Representatives, a position he filled during five sessions with firmness and ability. After serving fourteen years in congress, he was in 1839 elected governor of Tennessee; but he failed to secure re-election in 1841 and 1843. In 1844 he was nominated as a compromise candidate for the presidency, against Henry Clay, and elected by a popular majority of only 38,000, but by 175 electoral votes to 105. His cabinet included James Buchanan as secretary of state and Bancroft, the historian, as secretary of the navy. Polk's firm attitude with regard to the annexation of Texas had mainly secured his election, and he carried out the policy to which he was committed with promptness and vigour. In his first message to congress, in December 1845, he announced that the western bank of the Nueces River, beyond which Texas had not exercised jurisdiction, was already occupied by American troops. On 29th December Texas was admitted to the Union; on the 31st jurisdiction was extended to the disputed territory beyond the Nueces.

These proceedings failing to goad the Mexicans into a declaration of war, the president forced on hostilities by advancing the American army, at the suggestion of General Taylor, to the Rio Grande. Palo Alto and Resaca followed, and the Mexican war was successfully started; the capital was taken in September, and its fall enabled the conquerors to dictate terms of peace, by which the United States acquired California and New Mexico. During Polk's term the Oregon boundary was settled by a compromise (49°) offered by England, though the party cry ('Fifty-four-forty or fight') which helped to elect him was a claim for the entire territory to 54° 40′ N. lat. In 1846 a revenue tariff, in which *ad valorem* were substituted for specific and minimum duties, was adopted—in the senate, however, only by the casting vote of Vice-president Dallas. Polk consistently condemned the anti-slavery agitation; he did not believe in the possibility of a United States all slave or all free, and considered the *modus vivendi* between North and South quite satisfactory. Having pledged himself to a single term of office, he refused a renomination, and retired to his home in Nashville, Tennessee, where he died three months afterwards, June 15, 1849. Polk was a man of good abilities, and of a solid, firm, honest, and religious character. He was devoted to the principles of the Democratic party of Jefferson and Jackson—state rights, a revenue tariff, independent treasury, and strict construction of the constitution.

See Life by J. S. Jenkins (1850), and a History of his administration, by Lucien B. Chase (1850).

Polk, Leonidas, the Antony Bek of the Confederacy, was born at Raleigh, North Carolina, 10th April 1806. He was a cousin of President Polk, and grandson of Colonel Thomas Polk, an officer of the Revolution. Graduating at West Point in 1827, he received a commission in the artillery, but was induced to study for the ministry, and in 1830 received deacon's and in 1831 priest's orders in the Episcopal Church. In 1838 he was consecrated Bishop of Arkansas and Indian Territory, with charge of the dioceses of Alabama, Mississippi, and Louisiana; in 1841 he resigned all these except the bishopric of Louisiana, which he retained—even when at the head of an army corps—until his death. Soon after the outbreak of the civil war he was offered a major-generalship by Jefferson Davis, and, accepting it, proceeded to strongly fortify strategical points on the Mississippi. At Belmont, in November 1861, he was driven from his camp by Grant, but returned and eventually compelled him to retire. At Shiloh and at Corinth he commanded the 1st corps; in October 1862 he was promoted to lieutenant-general, and in November he conducted the retreat from Kentucky. After Chickamauga, where he commanded the right wing, he was relieved of his command; but in December 1863 he was appointed to the department of Alabama, Mississippi, and Eastern Louisiana, and he afterwards joined Johnston in opposing Sherman's march to Atlanta. He was killed while reconnoitring on Pine Mountain, 14th June 1864, by a cannon-shot fired by some Northern officers who wished to give the bishop's party a fright. See the *Life* by W. M. Polk (1894).

Polka, a species of dance, of Bohemian origin, invented in 1830, and introduced into England in 1843, the music to which is in $\frac{2}{4}$ time, and has the rhythmical peculiarity of being accented on the third quaver of the measure.

Pollack (*Gadus pollachius*), a common fish on British coasts, belonging to the cod, haddock, and whiting genus. It is about the size of the coal-fish, is active in habit, and is frequently caught. The lower jaw projects beyond the upper, and there is no barbel. In Scotland and in some parts of Ireland it is called *Lythe*.

Pollaiuolo, Antonio, goldsmith, medallist, metal-caster, and painter, was born at Florence in 1429, and died at Rome in 1498, whither he had been summoned to cast a sepulchral monument for Pope Sixtus IV., and where he also cast a similar one for Pope Innocent VIII. (died 1492), both in St Peter's, and both works of great merit. Antonio's pictures—the best being 'Hercules slaying the Hydra,' 'Hercules destroying Antæus,' and 'St Sebastian'—are distinguished for the life and vigour of their drawing.—His brother Pietro, born at Florence in 1443, and died at Rome in 1496, was generally associated with him in his work, though he devoted most attention to painting. To him are attributed an altarpiece introducing SS. James, Vincent, and Eustace (if indeed it is not mainly by the other brother), an Annunciation, a Coronation of the Virgin, and the Five Virtues.

Pollan (*Coregonus pollan*), a fresh-water fish of the family Salmonidæ, a native of lakes in Ireland. It is particularly abundant in Lough Neagh, where great numbers are often netted, and sold in the neighbouring country. The fish is from 10 to 12 inches in length, and is well flavoured. See Coregonus.

Pollanarrua, a ruined city of Ceylon, 60 miles ENE. of Kandy, with a massive dagoba, a rock-cut temple, masses of sculptured stones, and a wide area of ruined buildings that attest the size and importance of the city, which became the capital of the kingdom about 770, after the Malabar invasion ruined Anuradhapura, the former capital. The city stood on the site of an immense tank, still called Topaweva or Topare. The place was first made known to Europeans in 1820.

Pollarding (*to poll*, to cut off, or shave the head) is the cutting off of the whole crown of a tree, leaving it to send out new branches from the top of the stem. Trees thus treated are called *pollards*. The new branches are never equal in magnitude to the original branches of the tree, although often more numerous, and when pollarding is often repeated the scars and stumps form a thick ring at the top of the stem, from which many small branches spring. Pollards are not beautiful; but pollarding is practised with advantage in districts where fuel is scarce, the branches being cut off in order to be used for fuel, and the operation repeated every third or fourth year. Willows, poplars, alders, elms, oaks, and limes are the trees most frequently pollarded, and in some parts of Europe the white mulberry. The trees of most rapid growth are preferred where fuel is the object; and willows, poplars, and alders are planted along water-courses, and in rows in moist meadows and bogs. Oaks are sometimes pollarded, chiefly for the sake of the bark of their branches, and the whole treatment very much resembles that of copse-wood. See Copse.

Pollen. See (under Flower) Fertilisation of the Flower; also the article Stamens.

Pollio, Caius Asinius, an orator, poet, historian, and soldier, was born in Rome, 76 B.C. He sided with Cæsar in the civil war fought at Pharsalia, and commanded in Spain against Sextus Pompeius, but was defeated. He sided with the triumvirs against the oligarchic senate, and was appointed by Antony to settle the veterans on the lands assigned them in Transpadane Gaul. It was now that he saved the property of the poet Virgil at Mantua from confiscation. After Antony and Octavian had quarrelled, it was Pollio who effected their temporary reconciliation at Brundusium (40). This year he was consul, when Virgil's fourth eclogue was addressed to him. The year after he went to Greece as legate of Antony, and defeated the Parthini, a people of Illyria. This was the period of Virgil's eighth eclogue, also addressed to Pollio. Thereafter he withdrew altogether from political life, and survived till 4 A.D. Pollio was the first to establish a public library at Rome, and was the patron of Virgil, Horace, and other poets. His own orations and tragedies and history have perished, and it is most probably no great loss. The severest critics are seldom themselves even decent writers, and he, we are told, detected *Patavinitas* in the limpid style of Livy, and censured Cicero, Sallust, and Cæsar.

Pollock, an illustrious family descended from Mr David Pollock, saddler to George III. in the later part of the 18th century, who kept a shop near Charing Cross. Three of his sons rose to eminence—Sir David Pollock, Chief-justice of Bombay (died 1847); Sir Frederick Pollock; and Field-marshal Sir George Pollock.—The second, Frederick, was born 23d September 1783, and in 1802 passed from St Paul's School to Trinity College, Cambridge, where in 1806 he graduated B.A. as senior wrangler and first Smith's prizeman. Next year he was elected a fellow of his college, and called to the bar at the Middle Temple. He travelled the northern circuit; in 1827 became a K.C.; in 1831 was returned as a Tory for Huntingdon; was Attorney-general 1834–35 and 1841–44; and in the last year succeeded Lord Abinger as Chief Baron of the Exchequer. He had been knighted in 1834, and on his retirement in 1866 he received a baronetcy. He died 23d August 1870.—His eldest son, Sir Frederick Pollock, born 3d April 1815, was educated at Trinity College, Cambridge (1832–36), and in 1838 was called to the bar at the Inner Temple. He was appointed a master of the Court of Exchequer (1846), and Queen's Remembrancer (1874); in 1876 became senior master of the Supreme Court of Judicature; in 1886 resigned his offices; and died 24th December 1888. Besides a good many quarterly and magazine articles, he published a blank verse translation of Dante (1854), and two pleasant volumes of *Personal Remembrances* (1887).—His eldest son, also Sir Frederick Pollock, third baronet, was born 10th December 1845, and from Eton passed to Trinity, where in 1868 he obtained a fellowship. He was called to the bar at Lincoln's Inn in 1871, and became professor of Jurisprudence at University College, London (1882), Corpus professor of Jurisprudence at Oxford (1883), and professor of Common Law (1884). Besides *Spinoza: his Life and Philosophy* (1880), he has published, among other valuable legal works, *Principles of Contract* (1875), *Digest of the Law of Partnership* (1877), *Law of Ports* (1887), and *Oxford Lectures* (1891).—His younger brother, Walter Herries Pollock, born 21st February 1850, and likewise educated at Eton and Trinity, was called to the bar at the Inner Temple in 1874, and from 1884 till 1894 was editor of the *Saturday Review*. He is author of *Lectures on French Poets*, *The Picture's Secret*, *Verses of Two Tongues*, *A Nine Men's Morrice, Old and New*, &c.—George Frederick Pollock (born 1821), third son of the first baronet, became a master of the Supreme Court of Judicature; and the fourth son, Sir Charles Edward (born 1823), became a baron of Exchequer and judge of the High Court.

Sir George Pollock, field-marshal, was born in Westminster on 4th June 1786, and entered the army of the East India Company as lieutenant of artillery in 1803. Almost immediately after his arrival in India he was engaged in active warfare, in the battle and siege of Deig in Bhartpur (1804), at the siege of Bhartpur (1805), and in other operations in the war against Holkar. Nine years later he saw some service in the Nepal (Goorkha) campaigns of 1814–16, and in the first Burmese war (1824–26) he took an active share, winning his colonelcy. In 1838 he reached the rank of major-general. After the massacre of General Elphinstone and his forces in the passes of Afghanistan (q.v.), the Indian government decided to send a force to the relief of Sir Robert Sale, who was shut up in Jelalabad. The command of the relieving force was given to General Pollock. In April 1842 (5th to 16th) he forced the formidable Khyber Pass, and reached Sir Robert Sale; then, after a few months' delay, he pushed on to Kabul, his object being to restore the prestige of the British arms and to rescue the British prisoners in the hands of Akbar Khan. Both purposes were crowned with success; he defeated the Afghan chief at Tezeen, and destroyed the bazaar in Kabul, and he recovered 135 British prisoners. Then, after being joined by the forces of General Nott, who had marched from Kandahar, he successfully conducted the united armies back to India. He was rewarded with a G.C.B. and a political appointment at Lucknow. He returned to England in 1846, was director of the East India Company for a couple of years (1854–56), and was created a field-marshal in 1870, and a baronet in 1872; in 1871 he was appointed to the honourable office of Constable of the Tower. He died on 6th October 1872, and was buried in Westminster Abbey. See Life by C. R. Low (Lond. 1873).

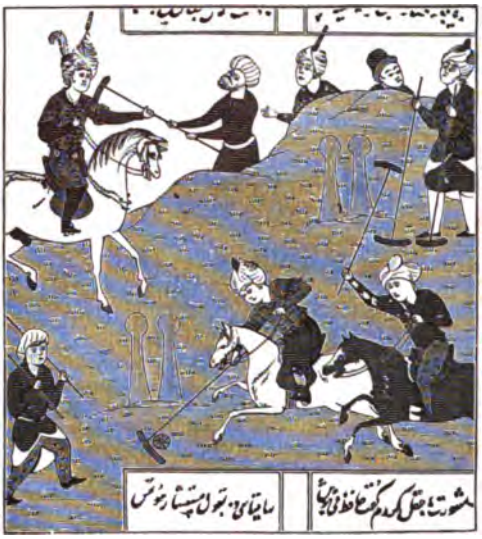
Pollok, Robert, a minor Scottish poet, was born in 1799 at Muirhouse, in the parish of Eaglesham, Renfrewshire. He studied at the university of Glasgow and the Divinity Hall of the Secession Church, and was licensed to preach in 1827. In the same year he published, by the advice of Professor Wilson, *The Course of Time*, in ten books, an attempt at a poetical description of the spiritual life and destiny of man. It was warmly received, but its praises fell on a dying ear, for the poet had meantime been seized with a fatal consumption. He set out, accompanied by his sister, in the hope to reach Italy, but found himself unable to leave England, and died at Shirley Common, near Southampton, 18th September 1827. The *Course of Time*, which is still read in Scotland, is curiously unequal in merit, as we might expect when we remember that its two sources of inspiration were Milton and the *Shorter Catechism*. It contains eloquent and spirited passages, but considerable portions of it read like a dull sermon in poor blank verse.

Pollok's Memoir, written by a brother, was published in 1843. His feeble *Tales of the Covenanters* was published anonymously before his poem.

Pollokshaws, a manufacturing town of Renfrewshire, on the White Cart, 3 miles SSW. of Glasgow. It derives its name from the 'shaws' or woods of the estate of Pollok, held for more than six centuries by the Maxwells. It was made a burgh of barony in 1814; and its industries, first started in 1742, now comprise power-loom weaving, dyeing, tapestry and chenille manufacturing, bleaching, iron-founding, paper-making, &c. Pop. (1841) 4627; (1881) 9363; (1891) 10,228.

Poll-tax, or Capitation Tax, a tax levied by the *poll* or head (*per capita*). In England the imposition of a graduated poll-tax (varying from 4d. to £4, according to rank and wealth) in the time of Richard II. led to Wat Tyler's rebellion in 1381. A similar tax was imposed in 1513; and an unpopular tax (varying from 12d. for a private person to £100 for a duke) was assessed in 1678 and abolished in 1689. In the United States most states impose a poll-tax or capitation tax as a condition of the suffrage; the sum being generally $1, but in some states only 50 cents, and in others varying from year to year, but not exceeding $3. A considerable number have no such tax; in others the imposition of a poll-tax is expressly prohibited by the constitution. TAX.

Polo, an equestrian game, which may be shortly described as hockey on horseback. It is of oriental origin and of high antiquity; indeed, it has been claimed that it can be traced back to 600 B.C. The accompanying illustration is from a beautifully illuminated Persian MS. of the poems of Háfiz, executed in the year 956 of the Hegira or 1549 of the Christian era, and now in the Bodleian Library, Oxford, by the permission of whose authorities it has been specially photographed to illustrate this article. It bears the following legend: 'Welcome to the *meidán*, thou chief of horsemen: strike the ball.' Polo was first played by Europeans in 1863 in Calcutta, whither it had been brought by officers who had been stationed in Cachar in Assam, where polo has been played since time immemorial by the hill-tribe of Manipuris. Almost the same game exists in Tibet; whilst native equestrian games more or less closely resembling polo are played in Japan and other parts of the East. Since 1871 many polo clubs have been started in Britain and, since 1876, in America, as well as wherever Britons are found in the East. The principal British club, which makes the rules of the game, is at Hurlingham, near London. The following is a short description of polo: An oblong space of turf is marked out, of which the proper size is 300 yards by 200 yards; at each end in the centre of the line two poles are fixed 22 feet apart, forming the goals through which it is the object of the opposing sides to strike the ball. The players are mounted on ponies, the size of which, according to rule, should not exceed 14 hands; and each player is armed with a polo-stick, consisting of a strong cane about 4 feet long with a cross head about 8 inches long, with which to strike the ball of light wood. The proper number of players is four a side, each of whom has a definite place (numbered one, two, three, and back) in relation to friends and opponents; and in polo, as in most games, combination is perhaps the first condition of success. The ponies have to be carefully trained, and some acquire wonderful cleverness in understanding what is required of them. It is part of the game so to ride alongside an opponent as to prevent him from hitting the ball, but it is not allowed to ride across in front of an opponent. To become a good player requires strength, good horsemanship, a quick eye, and much practice.



See Captain G. F. Younghusband's *Polo in India* (1890), and the chapter on 'Polo' by J. Moray Brown in *Riding* (Badminton Library, 1891).

Polo, MARCO, the greatest of mediæval travellers, was born of a noble family of Dalmatian origin, at Venice, in 1254. His father, Nicolo Polo, and his uncle, Maffeo Polo, both enterprising merchants, had, previous to his birth, set out on a mercantile expedition, visiting Constantinople, the Crimea, and the court of Barka Khan at Sarai. Thence they travelled round the north side of the Caspian Sea to Bokhara, and here they fell in with some envoys returning from Hulagu in Persia to his brother the Great Khan Kublai, and by them were persuaded to accompany them to Cathay. They were well received by Kublai, then either at Cambaluc (Peking) or his summer residence at Shangtu (Coleridge's *Xanadu*), north of the Great Wall. He listened eagerly to their reports concerning the peoples and mode of government in Europe, and commissioned them as envoys to the pope, bearing letters requesting him to send 100 Europeans learned in the sciences and arts, to act as instructors to the Mongols. They reached Venice in 1269, found Rome in the confusion of a long interregnum, and, after the new pope (Gregory X.) was elected, could only get two Dominicans, and even these had hardly commenced the journey when they lost heart and turned back. The Polos made their final start in the November of 1271, taking with them young Marco, and arrived again at the court of Kublai Khan in the spring of 1275, after travelling by Sivas, Mosul, Bagdad, Hormuz, through Khorassan, up the Oxus to the Pamír, by Kashgar, Yarkand, and Khotan, Lob Nor, and across the great desert of Gobi to Tangut, thence to Shangtu. Their second reception was still more honourable than the first, and the khan took special notice of Marco, from the rapidity with which he learned the customs and language of the Mongols. His wisdom and intelligence also recommended him as a fit envoy to the various neighbouring rulers; and during his residence at their several courts Marco observed closely the manners and customs of the country, and delivered on his return a detailed report to the khan. In various missions he visited the western provinces on the borders of Tibet, Yunnan, northern Burma (Mien), Karakorum, Champa or southern Cochin-China, and Southern India. For three years he served as governor of the town of Yang-chow, and with his uncle helped to reduce the city of Saianfu by constructing mangonels for casting stones. The khan long refused to think of the Polos leaving his court, but at length in the beginning of 1292 they succeeded in obtaining permission to join the escort of a Mongol princess, who was travelling to marry Arghun, khan of Persia, grandson of Kublai's brother Hulagu. They sailed from Chwan-chow in Fu-kien (*Zaitún*), but were detained long on the coasts of Sumatra and Southern India, and only reached Persia after two years had passed. Two of the three envoys and most of their attendants had perished. Arghun Khan himself was dead, but the three Polos and the young princess were safe, and she married the late khan's brother and successor. The Venetians finally reached their native city about the end of 1295, and Ramusio tells the story how like Ulysses they were recognised by none of their kinsfolk, and repulsed from the door. They brought with them much wealth in the portable form of precious stones, the fruits of their trading. In 1298 Marco fought his own galley in the great battle of Curzola, in which the Venetians under Dandolo were defeated by the Genoese under Doria, and was taken prisoner and immured for a year in a dungeon at Genoa. Here he dictated to another captive, one Rusticiano of Pisa, an account of his journey through the East. After his liberation he returned to Venice, where he died in 1324, and was buried in the church of S. Lorenzo. The traveller bore among his contemporaries the surname or nickname of Marco *Millioni*, most probably from his having frequently used that word in his attempts to describe the wealth and splendour of the khan. The wonders he narrated seem to have excited incredulity—even long after Sir Thomas Browne commends the circumspection of the reader who 'shall carry a wary eye on *Paulus Venetus*, Jovius, Olaus Magnus, Nierembergius, and many others.'

Marco Polo's book consists of two parts: (1) a Prologue, the only part containing personal narrative; (2) a long series of chapters descriptive of notable sights, manners of different states of Asia, especially that of Kublai Khan; and ends with a dull chronicle of the internecine wars of the House of Genghis during the second half of the 13th century. Ser Marco Polo succeeds in almost entirely effacing himself, yet despite his modesty is unconsciously revealed to the eyes of his reader as a man truthful, brave, shrewd, keen-eyed, grave, of few words, fond of sport, with all the due respect of the prosperous man for wealth. He shows throughout a singular lack of humour—Sir Henry Yule cites as almost the solitary instance that in speaking of the khan's paper-money he observes that Kublai might be said to have the true Philosopher's Stone, for he made his money at pleasure out of the bark of trees. Nothing disturbs the even tenor of his narrative—not even when he has to tell of so strange a custom as the couvade among the Gold-teeth on the frontier of Burma. He is no less sparing of scientific observations, and his geographical data are not infrequently the reverse of clear and adequate. He tells us that he acquired several of the languages current in the Mongol empire, and as many as four written characters, but of these Sir Henry Yule thinks Chinese was not one. His work is poorer in information relating to the Chinese proper than anywhere else. Thus, he does not mention the Great Wall, nor yet customs so striking and distinctive as the use of tea, the compressed feet of the ladies, the fishing cormorant, artificial egg-hatching, nor the printing of books. An absurd assertion has been made that block-printing was carried to Europe by our traveller, by him shown to one Panfilo Castaldi, from whom it was learned by John Faust of Mainz; and indeed the printers of Lombardy, misled by patriotic feelings, have stultified themselves by erecting a statue at Feltre to Castaldi, 'the illustrious inventor of movable printing types.' Polo had learned more from men than books, yet it is evident that he had read romances, especially those dealing with the fabulous adventures of Alexander. To these he refers in his notices of the Iron Gate and of Gog and Magog, and of the Dry Tree (*Arbre Sol* or *Arbre Sec*) on the Khorassan frontier. Such stories as these, that of the Land of Darkness, of tailed men, of the great Roc, of trees yielding wine, and the like, go far to account for the grave and matter-of-fact Messer Marco Polo's nickname of *Millioni*.

Ramusio (1485–1557) assumed that the book was first written in Latin, Marsden supposed in the Venetian dialect, Baldelli-Boni showed in his edition (Flor. 1827) that it was French. There exists an old French text, published by the Paris Société de Géographie in 1824, which M. Paulin-Paris describes as the French of a foreigner. This Colonel Yule believes the nearest possible approach to Marco's own oral narrative. About eighty MSS. are in existence, showing considerable variations. These fall naturally into four groups: (1) the old French version already mentioned; (2) a revised French version, the basis of M. Pauthier's edition (1865); (3) a considerably abridged Latin version by Francesco Pipino (about 1490)—not identical with, although similar to, the Latin version published by Grynæus at Basel in the *Novus Orbis* (1532), itself the parent of the 16th-century French editions; (4) a form of the text now alone represented by the Italian recension of Ramusio, published (1559) in vol. ii. of the *Navigationi e Viaggi*. This last text has been subjected to considerable literary modifications, but undoubtedly contains many new circumstances which are substantially supplementary recollections of Marco Polo himself.

The notes of Marsden's excellent English edition (1818) were abridged by T. Wright for Bohn's 'Antiquarian Library' (1854). Another good English edition is that of Hugh Murray (1844); but all its predecessors were set aside by the admirable edition of Colonel Sir Henry Yule (1871; 2d ed. 1875), containing a faithful English translation from an eclectic text, an exhaustive introduction, notes, and other illustrations from the editor's wide learning and intimate knowledge of the East. French or Italian editions worthy of mention are those of the Soc. de Géog. of Paris (1824), Baldelli-Boni (1827), Lazari (1847), Bartoli (1863), and Pauthier (1865). Sir Francis Palgrave's *Merchant and Friar* (1837) is of course a mere work of imagination, in which Roger Bacon and Marco Polo are brought together.

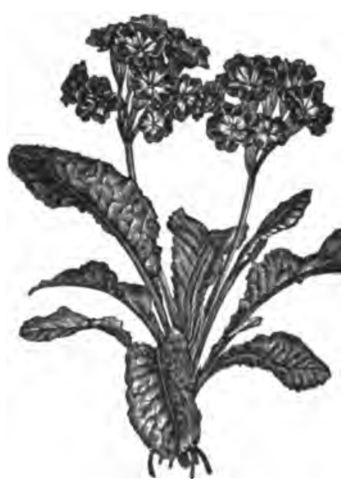
Polonaise, or POLACCA, a Polish national dance of slow movement in $\frac{3}{4}$ time.

Polotsk, a town of Russia, on the Düna (Dwina), by rail 62 miles NW. of Vitebsk and 228 SE. of Riga, is the seat of a bishop of the Greek United Church. Pop. (1885) 19,134.

Poltava. See PULTOWA.

Polyandry, the social usage of certain races in stages of civilisation in which the woman normally forms a union with several or many husbands—a condition proved by the researches of M'Lennan and others to be much more important in the development of the social organism than was formerly understood. See FAMILY, MARRIAGE.

Polyanthus (Gr., 'many-flowered'), a kind of Primrose (q.v.), much prized and cultivated by florists. It is generally believed to be a variety of the Common Primrose (*Primula vulgaris*), produced by cultivation, in which an umbel of numerous



Polyanthus.

flowers is supported on a common *scape* (leafless flower-stem), instead of each flower rising on its own stalk from the crown of the root; a modification to which a tendency often appears in the wild plant itself. Thus in its habit it somewhat resembles the cowslip and oxlip, whilst in the size of its flowers it is more like the common primrose; but instead of the pale uniformity of the wild plant it exhibits great variety of delicate and beautiful colours. The subvarieties are innumerable, new ones being continually produced from seed, and of short duration. The seed is sown about midsummer, and flowers may be expected in abundance next year, if the young plants are properly planted out. A rich free soil is most suitable. The polyanthus loves shade and moisture more than its congener, the auricula. It is very hardy, and seldom suffers from the most severe winters. Fine kinds are preserved for a time by dividing the root. The cultivation of the polyanthus is prosecuted with particular assiduity and success in England. For the Polyanthus Narcissus, see NARCISSUS.

Polybius, the Greek historian, was born about 204 B.C. at Megalopolis in Arcadia. From his father Lycortas, one of the leading men of the Achæan League, he received valuable instruction in the science of politics and in the art of war. He was one of the 1000 noble Achæans who, after the conquest of Macedonia in 168, were sent to Rome on the ground that the Achæans had failed to assist the Romans against Perseus. Without any trial the Greeks were detained in an honourable captivity. Polybius was the guest of Æmilius Paulus himself, and became the close friend of his son, Scipio Æmilianus, accompanying him in his military expeditions. Polybius in his turn derived much advantage from the protection and friendship of Scipio, who gave him access to public documents, and aided him in the collection of materials for his great historical work. In 151, after sixteen years in Italy, the surviving Achæan exiles were permitted by the Roman senate to return to Greece; Polybius, however, soon rejoined Scipio, followed him in his African campaign, and was present at the destruction of Carthage in 146. But the outbreak of war between the Achæans and Romans summoned him again to Greece, where he arrived soon after the taking of Corinth. All his influence was now exerted to procure from the conquerors favourable terms for the vanquished; and so grateful were his countrymen for his services in their behalf that they erected statues in his honour at Megalopolis and elsewhere. It must have been about this time that Polybius undertook the writing of his great historical work, the materials of which he had so long been collecting; and in furtherance of his plan he undertook several long journeys—to Asia Minor, Egypt, Upper Italy, southern France, and even Spain—where it has been supposed he witnessed the capture of Numantia by Scipio in 133. He died about 122 B.C.

His history, the design of which was to show how and why it was that all the civilised countries of the world fell under the dominion of Rome, includes the period between 220, where the history of Aratus concluded, and 146 B.C., the year when Corinth fell, and with it the independence of Greece. Much the greater part of the work has perished. Of forty books only the first five are preserved complete; but the plan of the whole work is fully known. Of the two parts into which it was divided the first (books iii.-xxx.; the introductory books i. and ii. being a sketch of the earlier history of Rome) embraced a period of fifty-three years, commencing with the second Punic War and the Social War in Greece, and concluding with the subjugation of the kingdom of Macedonia in 168. The last ten books deal with the years 168–146. The great merits of Polybius are the care with which he collected his materials, his strong love of truth, his breadth of view, and his sound judgment, which was materially assisted by his familiarity with political and military life. He was an excellent authority on the art of war. His tone is didactic, dull, and wearisome; he is too anxious to draw consequences and deduce lessons, and has been called 'the first pragmatical historian.' His method of exposition is careless, somewhat confused, and inartistic; his style, occasionally pithy, but usually bald to a degree, belongs to the period of beginning decadence.

Of the thirty-five books which have not been preserved entire we possess merely fragments or extracts. Fragments were found by Cardinal Mai, and published as late as 1827. Valuable editions have been published by Schweighäuser (1789–95; new ed. Oxford, 1831), Bekker (1844), Dindorf (1862–68; new ed. 1882), Hultsch (1868–72; 2d ed. 1888). The portion on the history of the Achæan league has been edited by W. W. Capes, and selections (based on Hultsch) by Strachan-Davidson (1888); there is a readable English translation by E. S. Shuckburgh (1889). See Mahaffy, *The Greek World under Roman Sway* (1890); German works on Polybius by La Roche (1857) and Pichler (1860); and R. von Scala, *Die Studien des Polybius* (1891 *et seq.*).

Polycarp, one of the 'Apostolic Fathers,' was bishop at Smyrna in proconsular Asia during the earlier half of the 2d century. His is an important name, for he bridges the little known and much controverted period lying between the age of his master the Apostle John and that of his own disciple Irenæus, and his testimony is only the larger, clearer, and more valuable because of his rigid conservatism and lack of intellectual individuality. The 'Life' by 'Pionius' is utterly untrustworthy. All that is really known of Polycarp's origin is gathered from his dying declaration, which shows that he was born about 69 A.D., and probably of Christian parents. By the migration of apostles and others from doomed Jerusalem, Ephesus and the neighbouring districts became the new home of the faith, and there Polycarp was 'taught by Apostles,' John above all, and 'lived in familiar intercourse with many that had seen Christ' (Irenæus, *Heresies*, iii. 3, 4). The further statement that he was appointed bishop in Smyrna 'by Apostles' ('by John'—Tertullian) is probably coloured by the later conception of the episcopate, but he certainly appears to have been head of the church from early manhood.

Among contemporaries he was intimate with Papias. More interesting is his brief intercourse with Ignatius, who, on his way from Antioch to martyrdom at Rome, made a short stay at Smyrna, where Polycarp and the church ministered to him. The tone of his *Epistle to Polycarp*, written shortly after from Troas, is that of a letter to one less experienced, if not younger, and less energetic than the writer, but high respect is paid to Polycarp's stedfastness, piety, and position. In consequence of a request which Ignatius was making to the churches to send messages to Antioch, the Philippians wrote to Polycarp asking that their letter to Antioch might be forwarded by the Smyrnæan messenger, at the same time inviting exhortation, and further asking for any of the epistles of Ignatius that he might have. Hence Polycarp's *Epistle to the Philippians*, in which he accedes to their various requests, and solicits further news of Ignatius. His influence on a younger generation, and his importance as a faithful preserver of the apostolic tradition, are vividly delineated by his greatest disciple Irenæus in his *Epistle to Florinus*, quoted in Eusebius, *Hist. Eccl.* v. 20: 'I can tell the very place where the blessed Polycarp used to sit and discourse. . . . Whatsoever things he had heard from them (John and others) about the Lord . . . Polycarp, as having received them from eye-witnesses of the life of the Word, would relate altogether in accordance with the Scriptures.' These valuable reminiscences relate to a period somewhere between 135 and 150 A.D.

At the very close of his life Polycarp visited Rome, where he conferred with the bishop Anicetus, chiefly on the vexed question of the time for commemorating the Passion. On this point neither yielded to the other, yet their relations remained so cordial that Anicetus allowed Polycarp to take his place in celebrating the eucharist (see Irenæus quoted in Eusebius, *Hist. Eccl.* v. 24). After turning many Valentinians and Marcionites from their heresies by his preaching, the aged bishop returned to Smyrna, only to win the martyr's crown in a persecution which broke out during a great festival. Unsatiated with meaner victims, the mob called for Polycarp, 'the father of the Christians.' With truest dignity and modesty does Polycarp play the man. Betrayed by his servant-boy, but offered his life by the proconsul if he will revile Christ, he answers: 'Fourscore and six years have I been His servant, and He hath done me no wrong. How then can I blaspheme my King, who hath saved me?' As the games were over, death by fire was substituted for death by wild beasts, and Jews vied with heathens in providing fuel. But the fire arched itself about the martyr, and he had to be despatched with a dagger. The graphic *Letter of the Smyrnæans* tells the story of the martyrdom to the Philomelian church. A chronological appendix to this letter has been elucidated by Waddington's skilful dating of the 'proconsul,' and his conclusions have been confirmed by the discovery of inscriptions relating to the 'high-priest,' also mentioned therein, so that the martyrdom may, with strong probability, be dated 23d February 155 A.D.

The only writing of Polycarp extant is the *Epistle to the Philippians*, incomplete in the original Greek, but complete in a Latin translation. Its genuineness has been assailed, but unsuccessfully. Somewhat commonplace in itself, it is of great value for questions of the canon, the origin of the church, and the Ignatian Epistles. More New Testament phrases are here inwoven than are found in any other work of the time. Their wider range, and especially the prominence given to Paul and his epistles by this disciple of John, tell heavily against Tübingen theories of the origin of the church and the canon. The letter bears so closely on the Ignatian Epistles that, while apart from it the *external* evidence for their genuineness is weak, with it that evidence is very strong. The grounds, however, for assigning the epistles of Ignatius and Polycarp to the reign of Trajan are not beyond question, while among other things a certain reference to heresy in Polycarp's epistle would better accord with a time about 130 A.D., or even later.

For one of the best editions of the *Epistle* (first edited by Halloix in 1633 and frequently since), see *Patrum Apostol. Opera* (ed. Gebhardt, &c., vol. ii. 1876); for the date of the martyrdom, Waddington's *Fastes des Provinces Asiatiques* (Paris, 1872), and the Oxford *Studia Biblica* (1885 and 1890). But the best and most exhaustive work on all the parts of the subject is Lightfoot's *Apostolic Fathers*, part ii. (2d ed. 1889). An ingenious, scholarly, and able attempt is made by the Rev. J. M. Cotterill in the Cambridge *Journal of Philology* (1891) to attribute the extant epistle to Antiochus, a monk of St Saba, who flourished under Heraclius, and from whose pen is still extant, 'if,' in Gibbon's phrase, 'what no one reads may be said to be extant,' a dull and feeble work entitled *Πανδέκτης τῆς ἁγίας γραφῆς*, divided into 130 homilies.

Polycotyle'donous Plants are those whose embryos have more than two seed-leaves (cotyledons). Examples are found occasionally, or as monstrosities, among Dicotyledons. In the Pine (Pinus) group of the Coniferæ (q.v.), however, the polycotyledonous condition is the normal one, and the cotyledons occur in whorls of from three to ten. Multiplication of cotyledons occurs in a few other groups of the Coniferæ. Sometimes the numerous cotyledons unite in pairs, and this leads to the suggestion that they originally sprang from two; but many botanists believe that the cotyledons arise as separate leaves.

Polycrates, 'tyrant' of Samos from about 536 B.C. to 522. He conquered several islands of the Archipelago, and even some towns on the Asiatic mainland, waged war successfully against the inhabitants of Miletus, and defeated their allies, the Lesbians, in a great sea-fight. His intimate alliance with Amasis, king of Egypt, proves the importance in which this daring island-prince was held even by great monarchs. According to Herodotus, Amasis dreaded the misfortunes that the envious gods must be preparing for so lucky a mortal, and wrote a letter to Polycrates, earnestly advising him to throw away the possession that he deemed most valuable, and thereby avert the stroke of the spleenful gods. Polycrates, in compliance with this friendly advice, cast a signet-ring of marvellously beautiful workmanship into the sea, but next day a fisherman presented the tyrant with an unusually big fish that he had caught, and in its belly was found the identical ring. It was quite clear to Amasis now that Polycrates was a doomed man, and he immediately broke off the alliance. When Cambyses invaded Egypt (525) Polycrates sent him a contingent of forty ships, in which he placed all the Samians disaffected towards his tyranny, hoping they might never come back; but mutinying they returned to Samos, and made war against the tyrant, but without success. Hereupon they went to Sparta, and succeeded in securing the help of both Spartans and Corinthians. A triple force of Samians, Spartans, and Corinthians embarked for Samos, and besieged Samos in vain, and Polycrates became more powerful than ever; but Nemesis overtook her victim after all. Orœtes, the Persian satrap of Sardis, had conceived a deadly hatred against Polycrates, and, having enticed the latter to visit him at Magnesia by appealing to his cupidity, he seized and crucified him.

Polydipsia. See Diabetes.

Polygalaceæ. See Milkworts.

Polygamous, a term applied to plants which bear both unisexual and hermaphrodite flowers, either on the same or on different individual plants. For example, the maple produces male, female, and hermaphrodite flowers on the same tree; while some ash-trees sometimes bear male only, others female, and others hermaphrodite flowers.

Polygamy (Gr. *polys*, 'many,' *gamein*, 'to marry') includes etymologically the social arrangement by which one wife has many husbands, now usually termed Polyandry (q.v.), as well as that in which a man has or may have several or many wives. To the latter the term polygamy is, however, practically restricted. Formerly polygamy was thought to be probably the original type of the development which has culminated in the marriage relations of civilised peoples; that this is not so is shown somewhat fully in the articles Family and Marriage.

Polygamy certainly obtained at one time over a very large area of the world's surface; in general it may be said still to be the rule not merely amongst most African races, but amongst the peoples, both more and less civilised, of 'the East' generally, and to a certain extent in Australia and Polynesia, though it is rare amongst American Indians. That this custom was usual in Old Testament times is obvious from many references; the New Testament seems to indicate that monogamy was universal amongst the Jews of the 1st century, though the Talmud contains no positive prohibition against a plurality of wives. Christianity has never tolerated polygamy; even Concubinage (q.v.) has been always treated as sinful, and polygamy is a crime by the law of Christian states. Greeks and Romans did not practise polygamy within historical times; the ancient Germans were the only barbarians known to Tacitus who were content with a single wife. Moslem law and usage permit a man to have four wives, but such plurality is confined to the rich; poor men have seldom more than one wife (see MOHAMMEDANISM). There is no limit to the number of wives a Hindu may keep, without taking account of concubines. Instances still occur of a high-caste man of wealth having a hundred wives. But in this connection it should be remembered that in hot countries girls become marriageable at an early age, and soon lose their youth and attractiveness; a man's first wife may remain his confidante and real companion through life, though he provides himself with a succession of girl favourites. In China there is but one rightful wife in a household, though a man may, if he will, keep secondary wives or concubines.

In Christian countries, even in those where concubinage and adultery are lightly regarded and divorce very easily obtained, polygamy is dealt with as a criminal offence. In Britain and the United States Bigamy (q.v.) is severely punished; under the same head any polygamous union is included. Nevertheless there have occasionally been found divines to defend polygamy or something like it. The Anabaptists insisted on such freedom; Ochino (q.v.) wrote in defence of it. When in 1540 Philip the Magnanimous, the reforming landgrave of Hesse, resolved with the consent of his wife (then a confirmed invalid) to marry a second wife, Luther and Melanchthon approved the step 'as his personal friends,' though not as doctors of theology;' and Bucer (q.v.) promoted, approved, and witnessed the bigamous union. The first wife survived the second marriage for nine years. As late as 1667, when Catherine of Braganza miscarried, some Anglican divines suggested polygamy as the best way of securing a direct heir to the throne.

Morganatic Marriage (q.v.) and Handfasting (q.v.) greatly simplified divorce, and often preceded a more binding and legitimate union; but another union at the same time was not compatible with either. In 1780 the Rev. Martin Madan, chaplain to the Lock Hospital in London, startled the world and raised a violent controversy by arguing in favour of polygamy as a means of diminishing prostitution and saving human souls from guilt; the work in which these views were advocated was called *Thelyphthora, or a Treatise on Female Ruin* (3 vols. 1780–81). In recent times the Mormons (q.v.) by their practice of polygamy created a troublesome question for the administrators of United States law; but in 1890 they agreed to cease from making plural marriages. It has always been a difficulty for Christian missionaries when converts with several wives desired baptism. As a rule the convert was treated as married only to the first wife in point of date, and was required absolutely to put away all the others—a rule that was inevitably harsh and inequitable in its operation. Bishop Colenso declined to make the convert part from wives he had married in good faith; so did the American missionaries in Burma; and M'Farlane, in *Among the Cannibals in New Guinea* (1888), says that he and the other missionaries of the London Missionary Society 'resolved not to interfere with those social relations in which the gospel found the people of New Guinea.' See ANTHROPOLOGY, FAMILY, MARRIAGE, HAREM, and the works cited there.

Polyglot (Gr. *polys*, 'many,' and *glōtta*, 'tongue') means a collection of versions in different languages of the same work, but is almost exclusively applied to manifold versions of the Bible. The Hexapla of Origen (q.v.) contained, besides the Hebrew text, several other Greek versions, but is not commonly reckoned among the polyglots. The most famous polyglots are (1) the Complutensian, published under the auspices of Cardinal Ximenes (q.v.) at Alcala (Lat. *Complutum*), in 6 vols. folio, 1502–17, with Hebrew, Greek, Chaldee (each with Latin versions), and the Vulgate Latin; (2) the Antwerp Polyglot, printed at the Plantin press, at the cost of Philip II. of Spain, in 1569–72, edited by Arias Montanus; (3) the Paris Polyglot, edited by Le Jay in 1645, in 6 splendid volumes; and (4) the London Polyglot, edited by Brian Walton, in 6 vols. folio, 1654–57, and containing the Bible, or parts of it, in nine languages. Of modern works of this kind the most convenient is Bagster's Polyglot, first published by Bagster at London in 1831 (new eds. 1874, &c.), which gives the Old Testament in eight languages (Hebrew, Greek, Latin, English, German, Italian, French, and Spanish), and the New Testament in nine (the Syriac version being added).

Polygnotus, a Greek painter who flourished in the middle of the 5th century B.C., was born in the isle of Thasos, and belonged to a family of painters. He was a friend of the Athenian general Cimon, and is said to have been attached to his sister, Elpinice. His principal works were at Athens, at Delphi, and at Platæa. In the first-named city he executed paintings in the temple of Theseus; in the Stoa Poikile (or Painted Portico), the Greek Princes assembled to judge of the Violation of Cassandra by Ajax; in the temple of the Dioscuri, the Rape of the Daughters of Leucippus; and in the Propylæa on the Acropolis, a series from the old Greek legends. At Platæa he painted, in the temple of Athena, Ulysses and the Slain Suitors of Penelope. His greatest work is said to have been in the Leschē, a court or peristyle at Delphi, built by the Cnidians, the walls of which he covered with a series representing the Wars of Troy and the Visit of Ulysses to the Lower World. Polygnotus was a great advance on any of his predecessors. He was the first who gave life, character, and expression to painting. Aristotle extols the dignity and beauty of his conceptions.

Polygon (Gr. *polys*, 'many,' *gōnia*, 'corner'), a plane figure, bounded by a number of straight lines; the name is conventionally limited to those plane figures whose bounding straight lines are more than *four* in number. Polygons of 5, 6, 7, 8, &c. sides are denominated pentagons, hexagons, heptagons, octagons, &c.; and when the number of sides exceeds twelve the figure is merely mentioned as a polygon of so many sides.

Polygonaceæ, a natural order of plants, mostly herbs, but including a few shrubs. The leaves are alternate, with stipules cohering around the stem, though sometimes reduced to a mere ring. The flowers are not unfrequently unisexual: the fruit generally a nut, often triangular, the seed with farinaceous albumen, which has an economic importance in buckwheat. The genus Polygonum comprises numerous species, of which several are natives of Britain; in North America twenty-five species are found east of the Mississippi. Knot-grass (*P. aviculare*) is a very common British weed, and is found in cultivated and waste places in all parts of the world from the tropics to the Arctic regions. The stems of *P. amphibium*, an inhabitant of ponds and watery ditches all over Britain and Europe, central Asia, and North America, have been used as a substitute for sarsaparilla on the continent of Europe. *P. hydropiper*, often called Water Pepper, a plant common by sides of lakes and ditches in Britain and North America, is acrid enough to be used as a vesicant. Several species are occasionally used for dyeing, as the Spotted Persicaria (*P. persicaria*), a very common weed on dunghills and in waste places in Britain; but the only species really important on this account is that called Dyer's Buckwheat (*P. tinctorium*), a native of China, the cultivation of which has been successfully introduced in France and Flanders. It yields a blue dye scarcely inferior to indigo. *P. orientale* has long been occasionally cultivated in flower-gardens in Britain, and is quite hardy, although a native of the West Indies. The Bistort (q.v.) belongs to the genus. *Fagopyrum cymosum*, a species of buckwheat abundant on the mountains of the north of India, affords an excellent substitute for spinach. *Fagopyrum esculentum*, or *Polygonum Fagopyrum* (Buckwheat), is cultivated for the sake of its fruit, which furnishes a nutritious diet used in the countries of northern Europe. The Garden Sorrel (*Rumex acetosa*) and some other species of Rumex have a singular combination of properties in their roots and in their leaves. In the former there is greater or less astringency, due to the presence of tannic and gallic acid; the latter are more or less acidulous, owing to their containing oxalic acid. Rhubarb (q.v.) belongs to this natural order; so does the Dock (q.v.). The root of *Pterococcus aphylla*, a native of the sandy steppes of Siberia, when cut exudes a clear viscid gum similar to Tragacanth (q.v.), which swells in water and forms a mucilage of a brownish-yellow colour; it is eaten by the Kalmucks in times of scarcity. Its fruit, which is acid, is eaten to quench thirst. *Triplaris americana* and *T. Bonplandiana*, both natives of South America, are small trees with hollow branches which are the haunts of small venomous ants that shower themselves on the unwary who may attempt to shelter themselves under their shade. *Mühlenbeckia adpressa* is the Macquarie Harbour Vine of Tasmania, an evergreen climbing or trailing shrub of most rapid growth, sometimes 60 feet in length. It produces racemes of fruit somewhat resembling grapes or currants, the nut being invested with the large and fleshy segments of the calyx. The fruit is sweetish and subacid, and is used for tarts. *Coccoloba uvifera* is the Seaside Grape (q.v.) of the West Indies. See also CALLIGONUM.

Polyhymnia, one of the nine Muses (q.v.).

Polymerism. See ISOMERISM.

Polynesia (Gr. *polys*, 'many,' *nēsos*, 'island'), a term applied collectively by some writers to all the Pacific islands of strictly oceanic character—i.e. either of volcanic or coralline origin; by others restricted to the eastern groups inhabited by the brown Polynesian race. Here it will be taken in the broader sense so as to include all the Pacific lands east of the Philippines, New Guinea, and Australia, except Japan, the Kuriles, Aleutians, Queen Charlotte, Vancouver, Revillagigedo, and Galapagos, which are geographical dependencies of the surrounding Asiatic and American continents. These Polynesian, or 'South Sea' islands, as they are also called, are distributed over a vast space, stretching across a hundred degrees of longitude from New Britain (149° E.) to Easter Island (109° 17′ W.), and across seventy degrees of latitude from Hawaii (23° N.) to Stewart Island at the southern extremity of New Zealand (47° 20′ S.). But the aggregate extent of dry land in this boundless expanse of some 11 million square miles scarcely exceeds 170,000 sq. m., of which nearly two-thirds are comprised in the New Zealand Archipelago, while the total population is probably less than 1,500,000. See the map at WORLD, and also the physical map at AUSTRALIA.

Polynesia comprises the three broad divisions of Micronesia, Melanesia, and East Polynesia, which are determined partly by geographical position, and partly by ethnological conditions, and each of which is again subdivided into several secondary groups. Thus, Micronesia (Gr. *mikros*, 'small,' *nēsos*, 'island') lies in the extreme north-west almost entirely north of the equator, and consists exclusively of small volcanoes and atolls, forming the five archipelagoes of the Marianas (Ladrones), Pelew, (Palaos), Carolines, Marshall, and Gilbert, all inhabited by heterogeneous populations in which most of the oceanic and perhaps some of the continental elements are represented. So also Melanesia (Gr. *melas*, 'black') lies in the extreme west entirely south of the equator, and consists mainly of comparatively large upraised crystalline, coralline, and volcanic islands disposed in parallel chains from north-west to south-east, forming the eleven archipelagoes of the Admiralty, Bismarck (New Britain and New Ireland), D'Entrecasteaux, Louisiade, Solomon, Santa Cruz, Banks, New Hebrides, New Caledonia, Loyalty, and Fiji, all inhabited by the Melanesian or dark Oceanic race. Lastly, East Polynesia lies on both sides of the equator, mainly east of a line drawn from New Zealand between Fiji and Samoa to Hawaii, and consists of the twelve volcanic and coralline archipelagoes of Hawaii (Sandwich), Phœnix, Ellice, Tokelau, Samoa, Tonga, Kermadec, Austral (Tubuai), Cook, Tahiti, Tuamotu (Paumotu), and Marquesas, besides the large sedimentary and igneous region of New Zealand and numerous sporadic islets, such as Norfolk, Chatham, Rapaiti, Easter, Manihiki, Tongareva, Uvea, and many others. This division is the exclusive domain, apart from recent white immigrants, of the large brown race, commonly called 'Polynesians' in a special sense.

Subjoined is a table of these multitudinous insular groups, with their areas, populations, and political status.

Group.	Area in sq. m.	Pop.	State.
I. MICRONESIA—			
Mariana	450	10,000	Spain.
Pelew	200	12,000	Spain.
Caroline	400	30,000	Spain.
Marshall	160	11,000	Germany.
Gilbert (Kingsmill)	170	41,000	England.
II. MELANESIA—			
Admiralty	770	2,000	Germany.
Bismarck	16,000	70,000	Germany.
D'Entrecasteaux	1,100	1,000(?)	England.
Louisiade	870	2,000(?)	England.
Solomon	16,300	175,000	England and Ger.
Santa Cruz	0,200	5,000	England.
Banks	190	4,500	England.
New Hebrides	5,000	62,000	Independent.
New Caledonia	6,500	43,000	France.
Loyalty	1,100	20,000	France.
Fiji	8,000	125,000	England.
III. EAST POLYNESIA—			
Hawaii	6,700	81,000	Kingdom.
Phœnix	15	60	Independent.
Ellice	14	3,300	England.
Tokelau	12	520	England.
Samoa	1,000	35,000	Kingdom.
Tonga	450	30,000	England.
Kermadec	40	100	England.
Austral	105	1,400	France.
Cook (Hervey)	140	11,500	England.
Tahiti (Society)	600	17,000	France.
Tuamotu (Low)	360	5,600	France.
Marquesas	480	6,000	France.
New Zealand	104,000	604,000	England.

Lying almost entirely within the tropics, and consisting nearly everywhere of igneous or coralline groups exposed to the same atmospheric and marine currents, Polynesia presents great uniformity in its climatic and biological conditions. In these respects, however, New Zealand belongs to a separate world, thanks to its large extent, lofty ranges, different geological history, and high southern latitude. But even in Fiji, Tahiti, Samoa, the Solomon and Hawaiian groups, with volcanic cones ranging from 1000 to nearly 14,000 feet, less variety is presented by the different local floras than might be expected from their great altitude. Almost everywhere the prevailing winds are the moist south-east trades, which in summer veer round to the west and north-west. But these winds also bring moisture-bearing clouds, so that the rainfall is generally high, in the Solomons excessive (150 inches), in Hawaii 60 to 80, and in New Caledonia over 40. But many of the atolls, being too low to arrest the currents, receive very little moisture, and in some places constitute a rainless zone, as indicated by the accumulated deposits of guano. The mean temperature is about 70° F. both in Hawaii and New Caledonia (about the two tropics), with an extreme range from 50° to 90° F. But the climate, except in New Caledonia and New Zealand, is everywhere relaxing, and in the Solomons and other large islands malarious up to considerable altitudes.

In the coralline groups the flora is essentially oceanic, the prevailing species being the cocoa-nut and one or two other palms, the pandanus and bread-fruit tree, and such edible roots as yams, taro, and sweet potatoes. Besides these forms, the large archipelagoes have a rich forest vegetation, mostly belonging to the Papuasian and Australian zones, with some American and a few indigenous plants. Hence the prevalence of casuarinas, dammaras, araucarias, tree-ferns, besides myrtles, ebony, and the banyan fig. Highly specialised forms are the New Caledonian *niauli* (*Melaleuca leucadendron*), which yields the cajeput-oil, and the Hawaiian oleaginous *kukiu* and gigantic *halapepe* (Branchleya), with foliage like that of the pandanus. As many as 1300 distinct species have been discovered in New Caledonia, and nearly 1400 in Fiji, of which 1100 are phanerogamous.

In contrast with the relatively rich flora is the remarkably poor fauna, especially in mammals. The dog and pig were found both in the Solomons and Hawaii at the time of their discovery; but both appear to have been introduced in comparatively recent times. The only undoubtedly indigenous mammals in these and the other Polynesian groups are two or three species of rodents (rats and mice) and a few varieties of the bat family. Even reptiles and insects are rare, being chiefly represented by three small lizards in Hawaii, one snake, one scorpion, one centipede, and a spider in New Caledonia, a few snakes and frogs in Fiji, and in East Polynesia by only one venomous animal, a centipede. Fiji is the easternmost limit of the frog and the Solomons of the crocodile, which here adapts itself both to fresh and salt water about the rivers and estuaries. Birds are everywhere more numerous, 107 species occurring in New Caledonia, 46 in Fiji, and 40 in Hawaii, these last including the oo (*Moho nobilis*), whose lovely black and yellow plumage is used for decorating royal mantles.

In recent times no branch of ethnology has been more carefully studied than that which deals with the origin, migrations, physical features, languages, and traditions of the Oceanic peoples. But so intricate are their mutual relations that the difficult anthropological and linguistic problems suggested by a comparative study of these peoples are still far from solved. There is, however, a general consensus that Polynesia has been occupied from prehistoric times by two distinct races, the dark Melanesians, who belong to the same stock as the Papuans of New Guinea and Malaysia, and the brown Polynesians, called also Mahori and Sawaiori, whose racial affinities have not been satisfactorily determined. By different writers they have been allied to the Mongoloid Malays, to the Aryans or Caucasians, to the American aborigines, and even to the Melanesians. But the difference between the Polynesians and Melanesians must be regarded as fundamental. The former are brachycephalous (round-headed, with high cephalic index), orthognathous, narrow-nosed, of a light-brown *café-au-lait* colour, with round orbits and black lank hair, and next to the Patagonians the tallest people on the globe (mean height, 5 feet 10 inches). The Melanesians are dolichocephalous (long-headed, with the lowest cephalic index of any race), prognathous, broad-nosed, of a sooty black colour, with low orbits, black frizzly hair, and low stature (mean height, 5 feet 5 inches).

The Melanesians appear to be the indigenous element in the Pacific, where they formerly occupied a much wider domain than at present, for traces of black blood are found in Samoa, New Zealand, and even as far east as the Marquesas (Whitmee). They also stand at a lower stage of culture, being undoubted cannibals, in many places head-hunters, extremely savage, blood-thirsty and treacherous, scarcely recognising any hereditary chiefs, and often forming independent hostile groups at perpetual feud with their neighbours.

The Polynesians, who closely resemble the Indonesians of the Malay Archipelago (see MALAYS), seem to be later arrivals almost certainly from Malaysia to Samoa, whence they gradually spread from island to island over all the eastern archipelagoes, more recently sending colonies westwards to Melanesia and even to New Guinea. Hence Sawaiori settlements and mixed Sawaiori-Melanesian communities are now found in the eastern parts of Fiji, in the New Hebrides (Niuē, Futuna, Mel, and Fil), in the Loyalty group (Uvea), in British New Guinea (Motu), and generally in Micronesia. That Samoa was the centre of dispersion is shown by the recurrence of such geographical terms as Samoa and Savaii (originally Savaiki), the largest island of the archipelago, under diverse dialectic forms (Hamoa, Amoa, Hawaii, Havaiki, Hawaiki, Avaiki), either in the geographical nomenclature or in the traditions and mythologies of all the Polynesian islanders from New Zealand to Hawaii.

In Easter Island (Rapanui) and the Carolines (Ponapé, Lelé, Ualan) are found numerous cyclopean monuments, huge monolithic statues, paved avenues, ramparts or walls of basalt blocks over 30 feet long, brought from great distances. None of the present races could erect such structures as these, all memory of which has died out. They have been referred to the cultured peoples of America, and the features of the Easter Island (q.v.) statues are said to resemble the Bolivian Aymaras, though others have recognised a Papuan cast in the specimens preserved in the British Museum. Skulls of a Papuan type have also been found in Easter Island, but if the monuments were erected by these natives, it must have been under the direction of builders such as the Hindu missionaries who raised the stupendous temples of Java and Indo-China by training Malay and Cambodian craftsmen for the work.

Nearly all the Pacific languages appear to be members of the great Malayo-Polynesian family, which stretches across two oceans, from Madagascar to Rapanui. However it is to be explained, the fact is now established that both the dark and brown peoples speak idioms derived from a common stock; and Mr Codrington has even shown that the Melanesian are of a more archaic type than the Polynesian tongues. Perhaps this is the most inexplicable of all the problems presented by the Oceanic peoples, for here anthropology and philology are found to be in direct antagonism. At first sight it would appear as if the lower had imposed its speech on the higher race, by whom it became profoundly modified both in its phonetic system and grammatical structure. But the reverse and less violent process is conceivable, and it may be assumed that during their endless migrations over the Pacific the more enterprising and intelligent Polynesians transmitted their speech to the more passive Melanesians at a very remote period, the former afterwards modifying it in the direction of greater simplicity and harmony, the latter preserving it in its more pristine inflectional form.

For over a century the Oceanic peoples have been in contact with Europeans, and nearly all the Polynesians, as well as many of the Melanesians, profess some form of Christianity—the first mission established being that to Tahiti in 1797 by the London Missionary Society. But as western influences increase the races themselves appear to decrease. Thus, the population of Hawaii had fallen from about 300,000 at the time of Cook's visit (1778) to 40,000 in 1884; the Maoris of New Zealand, who numbered probably 400,000 in 1769 (Cook's first visit), were reduced to 42,000, including half-castes, in 1886, and the Tahitians from 240,000 in 1776 to less than 10,000 in 1888. Here and there the returns show an apparent increase, as in some of the Ellice and Marshall islands, but only amongst the half-castes. Everywhere the pure Polynesian race seems to be rapidly disappearing, a phenomenon attributed partly to the introduction of alcoholic drinks, partly to the abrupt change of habits, dress, diet, &c. enforced or encouraged by the missionaries, but mainly to the ravages of leprosy, smallpox, syphilis, measles, and especially pulmonary affections, by which whole communities have been decimated.

Formerly the political organisation was based on a distinction between two classes, the nobles and the common people. The Maoris had developed a sort of democracy; but elsewhere the archipelagoes constituted one or more monarchies of a somewhat feudal character, with powerful hereditary rulers under a king, whose authority had been much reduced in Samoa, the Marquesas, and some other groups. Their subjects were a gay, pleasure-loving people, engaged chiefly in fishing, agriculture, and navigation. Their diet was largely vegetarian (yams, taro, batatas, bananas, cocoa-nuts, &c.), varied with fish, pork, poultry, and, in some places, human flesh. Human victims were also offered on solemn occasions, and a prominent feature of the primitive religion was the so-called *Tabu* (q.v.), in virtue of which certain persons and objects acquired a sacred character. But there was nowhere a distinct sacerdotal class, and most of the old beliefs had resolved themselves into a system of ancestor-worship. Other distinctive institutions were certain orders of knighthood, secret societies with peculiar semi-religious rites, and tattooing, which, especially in Micronesia, acquired the character of a fine art, rivalling the Burmese and Japanese systems in its elaborate designs and skilful execution. Few other arts were practised, and letters were unknown, although a national folklore, tolerably rich in historic legends and myths, was orally preserved, and has now been mostly committed to writing by European scholars.

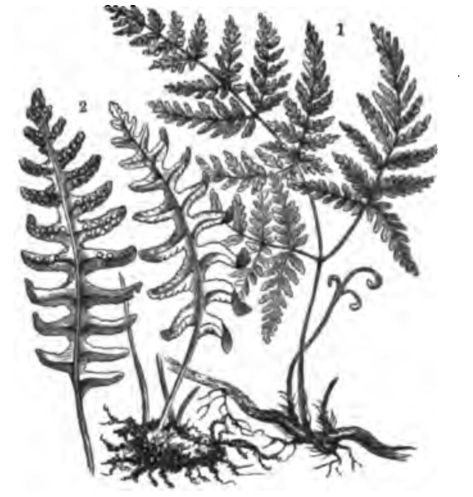
See CORAL, and the articles on the several Polynesian islands or groups of islands; and for the first navigators in Polynesia, see GEOGRAPHY, PACIFIC OCEAN in this work. See also Ellis, *Polynesian Researches* (1829); Reybaud, *La Polynésie* (1843); Sir George Grey, *Polynesian Mythology* (1855); De Quatrefages, *Les Polynésiens et leurs Migrations* (1866); Pritchard, *Polynesian Reminiscences* (1866) Angus, *Polynesia, or the Islands of the Pacific, &c.* (1867); Waitz-Gerland, *Anthropologie der Naturvölker*, vol. vi. (1872); Moresby, *New Guinea and Polynesia* (1877); Fornander, *An Account of the Polynesian Race, &c.* (1878–86); Gill, *Historical Sketches of Savage Life in Polynesia* (1880); Lesson, *Les Polynésiens, &c.* (1880–87); Keane, *Inter-Oceanic Races and Languages* (1880); *Novara* and *Challenger* Reports; Papers in Jour. Anthro. Inst., and Bulletins de la Soc. d'Anthropologie; Guillemard, *Life of Magellan* (1890); R. H. Codrington, *The Melanesians* (1891).

Polyp, a name usually applied to an animal like the fresh-water Hydra or like the Sea-anemone, having a tubular body and a wreath of many tentacles around the mouth. The name is equally applicable to an isolated individual or to a member (zooid or 'person') of a colony. Thus, the individuals which make up a zoophyte or a coral colony are called polyps, and the term is seldom used except in reference to Cœlenterate animals. But the history of the word has been strange. In Greek and Latin works on natural history the term *polypous* or *polypus* is usually applied to the octopus (*poulpe*), or some other cuttle-fish, though sometimes to the many-footed wood-louse, Oniscus. Réaumur and Jussieu were the first to apply the word to zoophytes and the like; Lamarck used it more loosely, but gradually it has been narrowed to the signification above noted. See ANEMONE, CŒLENTERATA, CORAL, HYDRA, HYDROZOA, &c.; and POLYPUS, for the surgical use of the term.

Polyphemus, in the Homeric mythology, the son of Poseidon and the nymph Thoosa, the most celebrated of the fabulous Cyclopes (q.v.), who inhabited the island of Sicily. He was of immense size, and had only one eye. When Ulysses landed on that island he entered the cave of Polyphemus with twelve companions, of which number this tremendous cannibal ate six. The others stood expecting the same fate, but their cunning leader made Polyphemus drunk, then burned out his single eye with a burning pole, and so escaped, leaving the blinded monster to grope about in the darkness.

Polyphonic (Gr. *polys*, 'many,' and *phōnē*, 'voice'). When a musical composition consists of two or more parts, each of which has an independent melody of its own, it is said to be polyphonic, in opposition to a homophonic composition, consisting of a principal part with a leading idea, and accessory parts employed to strengthen it. Each part of a polyphonic composition aims at melodic perfection, and, while supporting the other, has an equal share in the entire effect. A Fugue (q.v.) is the most perfect example of polyphonic composition.

Polypodium (the Greek name, as old as Theophrastus, was *polypodion*, from *polys*, 'many,' and *podion*, 'a little foot'—indicating the foot-like appendage of the rhizome, not the leaf), a genus of Ferns, with spore-cases on the back of the frond, distinct, ring-shaped, in roundish *sori*, destitute of *indusium*. It is the largest genus of the Filices, comprising over 450 species; and amongst them are plants of different modes of growth, of different venation, and from almost all climates. Several species, differing very considerably in appearance, are natives of Britain, where no fern is more common than *P. vulgare*. It grows on rocks, trees, dry banks, &c., and has fronds 2 to 18 inches long, deeply pinnatifid, with large sori. *P. dryopteris*, with delicate ternate bipinnate fronds, is a fine ornament of many dry stony places in Scotland. *P. calaguala*, a native of Peru, is said to possess important medicinal properties—solvent, deobstruent, sudorific, &c.



Polypodium:
1, *Polypodium dryopteris*; 2, *P. vulgare*.

Polyporus. See Amadou, and Dry Rot.

Polyp'terus, a genus of Ganoid fishes, of which only one species (*P. bichir*) is known. It lives in the Nile and western rivers of tropical Africa. It may attain a length of 4 feet, and is esteemed as food. Very characteristic is a series of dorsal spines, with attached finlets, which extend almost the entire length of the back. Of its life very little is known. The only nearly allied living form is *Calamoichthys calabaricus* from Old Calabar.

Polypus, in Surgery, is an ancient term employed to signify any sort of pedunculated tumour attached to the surface of a mucous membrane, to which it was supposed to adhere like a many-footed animal, as its name indicates. The most common seats of polypus are the nostrils and the uterus; but these tumours are also found in the rectum, the larynx, and the external auditory passage of the ear. The only satisfactory mode of treatment consists in their removal, which must be effected in various ways, according to their position, as by the forceps, écraseur, ligature, &c.

Polytechnique, or Polytechnic School (Gr. *polys*, 'many,' *technê*, 'art'), is an institute in which the technical sciences that rest in great part upon a mathematical basis, such as engineering, architecture, &c., are taught. The first school of the kind was established in Paris (1794) by the National Convention, under the name of School of Public Works. No students were admitted but those who intended to enter the public service, especially the corps of civil and military engineers and the artillery. The Polytechnic School, as it was called from 1795, has been repeatedly reorganised as the different political parties have succeeded to power. At the present time it is the institute in which France trains her artillery and engineer officers, her naval engineers, her directors of roads and bridges, and of mines, her telegraph officers, in short, all her officials who require to know something of the higher branches of technical science. Germany too has her polytechnics. Those that came into being during the first half of the 19th century were in great part training-schools for the higher branches of the industrial arts; but since Zurich established (1856) a polytechnic modelled on the plan of the German universities, most of the German polytechnics have followed suit. Of these establishments, thus increased in scope (now called also *Technische Hochschulen*), Germany has nine or ten, and Austria-Hungary half a dozen; though Germany has also several other colleges that might fairly claim the name of *Polytechnikum* in the old sense. The nine technical colleges of Berlin, Hanover, Aix-la-Chapelle, Munich, Dresden, Stuttgart, Carlsruhe, Darmstadt, and Brunswick have some 550 teachers and 6000 pupils—the chief departments of instruction being architecture, civil engineering, machine-making, shipbuilding, chemistry, and metallurgy. In America the oldest institutions of the kind are the Rensselaer Polytechnic Institute, at Troy, New York, and the Franklin Institute, at Philadelphia, both founded in 1824. There are now nearly a hundred technical schools in the United States, more than half of them endowed with a national land-grant. See Technical Education; also Art; and Pinet, *Histoire de l'École Polytechnique* (1886).

Polytheism. See Religion.

Polytrichum, a genus of Mosses (q.v.).

Polyzoa, or Bryozoa, a class of small animals which, with one exception, form colonies, and are almost always fixed. Most familiar are the sea-mats or horn-wracks (Flustra), cast-up pieces of which are abundant on the beach. On these will be seen the hundreds of separate chambers in which the minute individuals live. Each individual has a sac-like or cup-shaped body, traversed by a food-canal bent like a U, crowned around the mouth by a wreath of tentacles, controlled by a single nerve-centre. The cuticle which surrounds the body is usually horn-like, not unfrequently calcareous (Cellepora, Lepralia, &c.), and sometimes gelatinous (Alcyonidium, Lophopus). The individuals of a colony are not always all alike; thus, some of them are occasionally modified into strange birds'-beak-like or whip-like structures. All Polyzoa multiply by budding, and thus the colonies increase. The individuals in the older parts of the colony usually degenerate or die. Fresh-water forms reproduce by peculiar winter-buds or statoblasts, which are liberated on the death of the parent, are floated away by currents, and after a winter's quiescence develop in spring. But all Polyzoa also reproduce sexually; the sexes may be separate or united; the larvæ developed from the eggs are free-swimming. The Polyzoa used to be ranked with zoophytes (among the Hydrozoa), but the individual animals are much more complex and are independent of one another. Often they are called molluscoid, because of apparent affinities with lamp-shells or Brachiopods, which used to be regarded as allied to molluscs. Most modern zoologists rank them as a distinct but heterogeneous class in the great assemblage of 'worms' or 'Vermes.' Representative genera are Cristatella, Lophopus, Plumatella—in fresh water; Flustra, Membranipora, Alcyonidium, Cellepora—marine; Pedicellina and Loxosoma—two marine genera, simpler than the others, the latter non-colonial. Rhabdopleura, a remarkable genus sometimes included in this class, shows at least hints of vertebrate affinities.

See Allman, *British Fresh-water Polyzoa* (Lond. 1886); Busk, *Challenger* Report, X. (1884); Hincks, *British Marine Polyzoa* (Lond. 1880); E. Ray Lankester, article 'Polyzoa' in *Ency. Brit.*

Pomaceæ, or Pomeæ, according to some botanists, a natural order of plants, but more generally regarded as a sub-order of Rosaceæ (q.v.). The plants of this order are all trees or shrubs, abundant in Europe, and chiefly belong to the temperate and colder regions of the northern hemisphere; they are rare in very warm climates, and are not found at all in the southern hemisphere. They have the botanical characters described in the article Rosaceæ (q.v.), and in addition are distinguished by having the tube of the calyx more or less globose, the ovary fleshy and juicy; lined with a thin disc, its carpels adhering more or less to the sides of the calyx and to each other; the fruit a *Pome* (q.v.), 1- to 5-celled, in a few instances spuriously 10-celled; the ovules in pairs, collateral. Many of the species are prized for the beauty and fragrance of their flowers, some produce valuable timber; but the order is chiefly remarkable as producing a number of the very finest fruits of temperate climates. See Apple, Pear, Quince, Medlar, Loquat, Hawthorn, Cratægus, Amelanchier, Rowan Tree, Service.—There are about 200 known species.

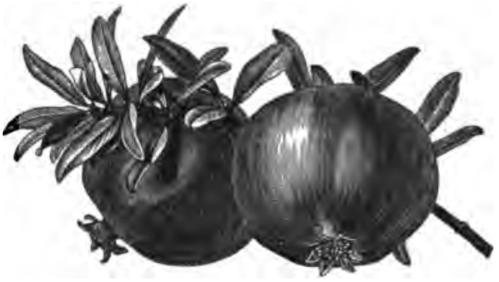
Pomade, or Pomatum, is a preparation of fine inodorous fat, such as lard or suet, used instead of liquid oil for the hair. It may be perfumed with various essences.

Pombal, Sebastian Joseph de Carvalho e Mello, Marquis of, the greatest of Portuguese statesmen, was born 13th May 1699, at the castle of Soure, near Coimbra. In 1739 he was appointed ambassador in London, and six years later was sent to Vienna in a similar capacity. Just before Joseph I. ascended the throne of Portugal (1750), Pombal was appointed secretary for foreign affairs. Among his first acts was to re-attach to the crown a number of domains that had been unjustly alienated. When the great earthquake happened at Lisbon in 1755 Pombal displayed great calmness and fertile resource, so that next year the king made him prime-minister. He crushed a revolt instigated by the great nobles and the Jesuits, and in 1759 banished the latter from the kingdom. Then he abolished slavery in Portugal, set himself to establish good elementary schools, and published a new code of laws. Besides this, he effected the reorganisation of the army, the introduction of fresh colonists into the Portuguese settlements, the establishment of an East India Company, and another for Brazil. The tyranny of the Inquisition was broken. Agriculture, commerce, and the finances were all improved. In 1758 he had been made Count of Oeyras, and in 1770 he was created Marquis of Pombal. On the accession of Joseph's daughter, Maria I. (in 1777), who was under the clerical influence, Pombal was deprived of his offices and banished from court, while many of his institutions were abolished. He died at his castle of Pombal, 8th May 1782. The peasantry always spoke of him as 'The Great Marquis.'

See Life by G. Moore (1819); John Smith, *Memoirs of Pombal* (2 vols. 1843); Carnota, *Marquis Pombal* (Eng. trans. 1871); and Carayon, *Prisons du Marquis de Pombal*—his diary (Paris, 1865).

Pome (Lat. *pomum*, 'apple'), the form of Fruit (q.v.) produced by the Pomaceæ (q.v.)—a fleshy, indehiscent, syncarpous fruit, with calyx attached.

Pomegranate (*Punica granatum*), a fruit much cultivated in warm countries, and apparently a native of the warmer temperate parts of Asia, perhaps also of the north of Africa. It has been cultivated in Asia from the most ancient times, and is frequently mentioned in the Old Testament. It has long been naturalised in the south of Europe. In a wild state the plant is a thorny bush, in cultivation it is a low tree, with twiggy branches, flowers at the extremities of the branches, the calyx red, the petals scarlet. It is generally referred to the natural order Myrtaceæ. The calyx is leathery, tubular, 5- to 7-cleft; there are 5 to 7 crumpled petals; the fruit (technically called *balausta*) is as large as a medium-sized orange, having a thick leathery rind of a fine golden yellow, with a rosy tinge on the sunny side, not bursting when ripe; the cells filled with numerous seeds, each of which is surrounded with pulp, and separately enclosed in a thin membrane; the upper and lower series of carpels being differently attached. Thus the pomegranate appears to be formed of a great number of reddish berries packed together and compressed into irregular angular forms. The pulp is sweet, sometimes subacid, and of a pleasant delicate flavour, very cooling, and particularly grateful in warm climates. It is often used for the preparation of cooling drinks. A kind of pomegranate without seeds is cultivated and much prized in India and Persia. Pomegranates have long been imported in small quantities into Britain from Portugal and the north of Africa, but have never become an article of general demand and commercial importance like oranges. There is an ornamental variety of the pomegranate with double flowers. The rind of the fruit is very astringent, and a decoction is used as a gargle in relaxed sore throat, and as a medicine in diarrhœa, dysentery, &c. Deriving its astringency from tannin, it is used to tan leather. The finest Morocco leather is said to be tanned with it, and small quantities are imported into Britain from the north of Africa for the preparation of the finest kinds of leather, under the name of *Pomegranate Bark*. The bark of the roots is used as an anthelmintic, and is often successfully administered in cases of tapeworm. It contains a peculiar principle called *punicin*, having the appearance of an oleo-resin, an acrid taste, and affecting the nostrils like Veratria (q.v.). Its value was known to the ancients, and it has long been in use in India. The pomegranate tree is occasionally cultivated in hothouses or greenhouses in Britain. It bears the winters of the latitude of London in the open air, and is very ornamental, but the fruit is worthless. In some parts of the south of Europe it is used as a hedge-plant. In northern Mexico it grows to great perfection, and in some of the southern states of the American Union; even as far north as New York it will, if protected in winter, bear fruit, and in some seasons ripen it.


Pomegranate (*Punica granatum*).

Pomerania (Ger. *Pommern*), a province of Prussia, bounded N. by the Baltic, E. by West Prussia, S. by Brandenburg, and W. by Mecklenburg. Area, 11,620 sq. m. It is one of the lowest and flattest regions in Germany, and has few hills of even moderate height, but numerous lakes and ponds. The river Oder divides Hither Pomerania (next Mecklenburg) from Farther Pomerania. The shores of the latter are lined with sand-dunes. The islands of Wollin and Usedom form the northern side of the Stettiner Haff (Lagoon); and farther to the north-west lies the island of Rügen. Pomerania is essentially an agricultural province, more than 55 per cent. of the total area being in tillage, whilst meadows cover another 19½ per cent., and forests nearly 20 per cent. Rye and potatoes are the principal products; in a secondary degree come wheat, barley, oats, flax, beet-root, tobacco, hops, and fruit. More than 55 per cent. of the soil is owned by the nobility, as in Mecklenburg (q.v.). Commerce flourishes in the coast towns, Stettin and Stralsund being the most important. Apart from shipbuilding, machine-works, and the manufacture of sugar, chemicals, bricks, &c., which are carried on principally in the coast towns, the only industries are paper, tobacco, glass, and wooden wares. The fisheries are valuable. Much poultry is reared, especially geese, in Farther Pomerania. Greifswald in this province is the seat of a university; Stettin is the capital. Pomerania sends fourteen members to the imperial diet, and twenty-six to the Prussian Lower House. Pop. (1890) 1,520,889. See PRUSSIA.

Pomerania formed a part of the territory of the ancient Vandals. When they moved south in the 5th century, it was occupied by Slavic tribes, one of whom was called Pomerani; hence the name of the region. From about 1100 it had its own line of princely rulers, and about 1124 it adopted Christianity in consequence of the preaching of Bishop Otto of Bamberg. The native princes assumed the title of duke in 1170 and joined the German empire, being put under the suzerainty of Brandenburg. The duchy was overrun by the Imperialists in the Thirty Years' War, and Wallenstein besieged Stralsund; they were followed by the Swedes, who established themselves permanently in Hither Pomerania and in several towns of Farther Pomerania. In 1637 the last duke of the native dynasty died, whereupon Brandenburg claimed the duchy; the Swedes, however, stuck to what they held until 1720, and certain districts in Hither Pomerania were not given up to Prussia until 1815. See Histories by Kantzow (1835), Sell (3 vols. 1819–20), Fock (6 vols. 1861–72), and Klempin (3 vols. 1868–88).

Pomeroy, capital of Meigs county, Ohio, between the Ohio River and a range of precipitous hills, 133 miles by rail SE. of Columbus. The mining of coal and the manufacture of salt are the chief industries. It also contains foundries, a woollen-factory, &c. Pop. (1880) 5560; (1890) 4726.

Pomfret. See PONTEFRACT.

Pomona, the Roman divinity of the fruit (*pomum*) of trees. She was beloved by several of the rustic divinities, as Sylvanus, Picus, and Vertumnus. Propertius tells us that the last, after vainly trying to approach her under various forms, at last succeeded by assuming the figure of an old woman. In this guise he recounted to her the lamentable histories of women who had despised love, and, having touched her heart to pity, suddenly transformed himself into a blooming youth. Varro tells us that at Rome the worship of Pomona was under the care of a special priest, the *flamen Pomonalis*. In works of art she was generally represented with fruits in her lap, or in a basket, with a garland of fruits in her hair, and a pruning-knife in her right hand.

Pomona, or MAINLAND. See ORKNEY.

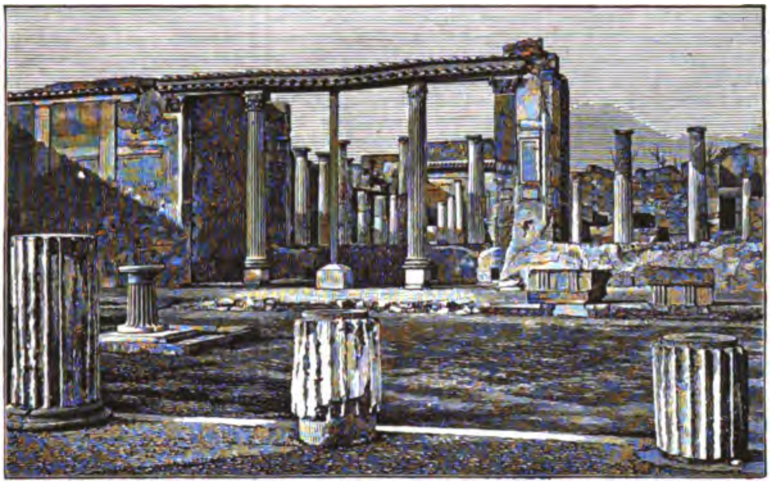
Pompadour, JEANNE ANTOINETTE POISSON, MARQUISE DE, the most famous among the mistresses of Louis XV., was born in Paris, 29th December 1721. She was baptised as the child of François Poisson and his wife Madeleine de la Motte, but it was suspected that her father was Le Normant de Tournehem, a wealthy *fermier-général*, who provided for her education. She grew up a woman of remarkable grace and beauty, devoted to music and painting, and charming every one by her vivacity and wit. But her mind was early depraved by her mother, who constantly dinned into her ears that she was 'un morceau de roi,' and habituated her to see in the rôle of king's favourite the ideal of feminine ambition. In 1741 she was married to her protector's nephew, Le Normant d'Étioles, and soon became a queen of fashion in the financial world of Paris. But neither this nor a devoted husband's love could satisfy her heart, and, as it was impossible to hope for an introduction at court, for two years she sought to attract the eye of the king by waylaying him when he went out hunting. At length in February 1745 she attained her object at a ball given by the city on the occasion of the dauphin's nuptials, and ere long she was installed at Versailles, and ennobled by the title of Marquise de Pompadour. Her husband, to whom she had already borne a daughter, was removed from Paris, but later had his loss recouped with lucrative offices; her brother was afterwards made Marquis de Marigny. Ere long she assumed the entire control of public affairs, the king being merely an indolent *fainéant* who assisted at the spectacle of his reign without even taking an interest in it. For twenty years the mistress swayed the whole policy of the state, and lavished its treasures on the gratification of her artistic tastes, and in carrying out her own ambitious schemes. She reversed the traditional policy of France because Frederick the Great lampooned her, and the proud Maria Theresa addressed her in a letter under the royal style as *Ma cousine*. She filled all public offices with her nominees, corresponded with the generals in the field, and made her own creatures ministers of France, the Abbé de Bernis and the Duc de Choiseul. Her policy was disastrous, her wars unfortunate; still the ministry of Choiseul was the only fairly creditable portion of the reign, which owed to her twenty years of relative dignity. She was a lavish patroness of the arts, and heaped her bounty upon poets and painters, yet did not escape showers of lampoons—the famous *Poissardes*, for a suspected share in which many a wit went to the Bastille. She loved china, fine buildings, books, and sumptuous bindings, and it is said printed with her own hands a fine edition of the *Rodogune* of Corneille. Indeed, she was an artist in everything—'elle était des nôtres,' as Voltaire said truly when he heard of her death. The king remained faithful to her from habit rather than affection, and from the rôle of mistress she passed into that of *amie nécessaire*, and retained her difficult position to the end, by relieving him of all business, by diverting him with private theatricals in her famous 'théâtre des petits cabinets,' where she acted charmingly, and at last even by countenancing his infamous debaucheries and providing him with mistresses too insignificant to be rivals. She herself said with the pathos of truth, 'ma vie est un combat,' and at last her nerves gave way under the strain, and after a languor of twenty days she died, 15th April 1764. She met the inevitable with that queenly dignity that marked everything she did. Her breath fled on the wings of a playful sally—'Stay, Monsieur Curé,' she said to the priest who was leaving her room, 'wait a little; we shall go out together.'

Madame de Pompadour was the last mistress of the king worthy of the name; the descent from her reign of grace and decorum to the boisterous vulgarities of Dubarry was profound. She was 'froide comme une macreuse,' says Madame du Hausset, her femme-de-chambre, in her silly but interesting memoirs, and there can be no doubt that throughout life ambition was the one passion of her heart. She secured her reign till her last hour—no sooner had she closed her eyes than she was forgotten.

The *Mémoires* (Liége, 1766) attributed to her are of no value. See the studies by Capefigue (1858) and Campardon (1867); E. and J. de Goncourt, *Les Maîtresses de*

Louis XV. (vol. ii. 1860); Beaujoint's *Secret Memoirs of La Marquise de Pompadour* (1885); but especially her *Correspondance*, with her father and brother, edited by Malassis (1878), and with the Comte de Clermont, edited by Bonhomme (1880).

Pompeii, a seaport at the mouth of the Sarnus, on the Neapolitan Riviera, founded about 600 B.C. by the Oscans, and, after them, occupied by the Tyrrheno-Pelasgians, and by the Samnites, till these, about 80 B.C., were dispossessed by the Romans. From that time down to its destruction, 79 A.D., it became (with Herculaneum) a sort of Rome-super-Mare, frequented by the aristocracy, if not by Caligula and Nero, in whose honour it erected triumphal arches. Fed from the capital with every luxury and distinction, it included temples in which the inhabitants were encouraged to make costly sacrifices with all their adjuncts of festivity and banqueting; indeed, its public monuments, out of all proportion to its size, were in number and magnificence such as we can now but dimly estimate. On February 5, 63 A.D., by an earthquake in the vicinity, these buildings were all but levelled with the ground, and some years elapsed ere the fugitive citizens recovered confidence enough to re-occupy and rebuild what was once Pompeii. Reconstruction was carried out with a haste and disregard of architectural law contrasting strongly with the earlier work—the Forum especially exhibiting the inferiority of its Roman to its Greek builders. Tawdriness replaced simplicity of decoration—the columns, capitals, and cornices being ornamented with reliefs in stucco picked out with parti-coloured designs, while private houses, fantastically restored and adorned, infringed every artistic or æsthetic canon to favour the grotesque style of the Decadence. Revolutionised as it was for the worse, the city, however, retained a good deal of Greek character and colouring, and had relapsed into more than its former gaiety and licentiousness, when on the 23d August (or, more probably, on the 23d November) 79, with a return of the shocks of earthquake, Vesuvius was seen to throw up a column of black smoke expanding like some umbrella-pine of the neighbourhood, till it assumed the proportions of a great swarthy cloud, dense with ashes, pumice, and red-hot stones, settling down on the doomed cities with a force increased by the rain-torrents that intermittently fell. Amid the impenetrable gloom that veiled land and sea, the panic of the citizens was aggravated by repeated shocks of earthquake, and for three days the flight continued till Pompeii was abandoned by all who could effect their escape. By the fourth day the sun had partially reappeared, as if shining through a fog, and the more courageous of the citizens began to return for such of their property as they could disinter. Much was doubtless recovered or possibly stolen; but the desolation and distress were such that the reigning emperor Titus organised relief on an imperial scale, and even undertook the clearing and rebuilding of the city. This attempt was soon abandoned, and Pompeii remained a heap of hardened mud and ashes, gradually overgrown with grass—the wall of the great theatre and the outline of the amphitheatre alone marking its site—till 1592, when the architect Fontana, in cutting an aqueduct, came on some ancient buildings. These were long believed to mark the old Stabiæ; and only in 1748, under the Bourbon Charles III., were they recognised as part of Pompeii. Unsystematic, unscientific excavations proceeded fitfully till 1860, when the Italian kingdom took in hand the unearthing of the city. This was carried out with admirable ingenuity, care, and success—all treasure-trove being vigilantly preserved, and an archæological record kept by the official excavators Fiorelli and Ruggiero, till now Pompeii possesses a distinction unknown to it in the zenith of its imperial favour, and attracts the pilgrim from every clime for the object-lessons it is unique in affording as to the public and private life of antiquity.



House of the Small Fountain, Pompeii.

We cannot give more than the merest indication of the outline and distribution of Pompeii as now exposed. In form an irregular ellipse, extending from east to west, in circumference about 2843 yards, it had eight gates to which archæology has given names mostly conjectural. It had outgrown its walls, however, particularly towards the sea, and developed considerable suburbs. Its most important part—not quite one-half, including Forum, adjacent temples and public buildings, two theatres with colonnades, amphitheatre, and many private houses—has already been exhumed, and five main streets made out and (provisionally) named. It has been divided, by official arrangement, into nine *regiones* (quarters), seven of them wholly or partially excavated, and each is subdivided into *insulæ* (blocks), bounded by four streets and provided each with a number, as are also the streets of each quarter. A *trottoir* borders the streets, which are straight and narrow—the broader 24 feet wide, the narrower 14 feet only—and admirably paved with polygonal blocks of lava. High stepping-stones, placed mostly at the corners, lead across from one trottoir to another, and these retain the impressions of horses' hoofs, while in the causeway between the wagons have left deep ruts. The street corners are provided with fountains, ornamented usually with the head of a god or a mask. Notices painted in red letters, and referring to municipal elections for which some particular candidate is recommended, occur frequently on the street walls, while trade-signs are few and far between. An occasional ‘phallus,’ to avert the evil eye, projects from over a doorway, and, much more common, one or two large snakes, emblems of the Lares, are to be seen. The stuccoed walls, to judge from the *Graffiti* (q.v.) or roughly-scratched drawings on them, were as tempting to the Pompeian *gamin* as to our own. House-construction consists mainly of concrete (rubble held together by cement) or brick, and sometimes of stone blocks, especially at the corners. Two-storied, sometimes three-storied houses are numerous, though the upper floors, built of wood, have been consumed by the eruption. Shops usually occupied the ground floors of dwelling-houses, on their street aspect, let out to merchants or dealers as at the present day, but not connected with the back part of the house. They could be separated from the street by large wooden doors, while inside they had tables covered with marble, in which earthen vessels for wine or oil were inserted. The shopkeeper had sometimes a second room at the back, when he did not live on an upper floor or in another part of the town. Retail traffic must have been considerable at Pompeii, to judge from the number of those shops along the streets, which, when not so flanked, presented bare walls, occasionally enlivened with a painting. Only a personal visit can convey an idea of the indoor life of the Pompeians, with whom the absence of glass, the fewness of the openings in the street aspect of the house-wall, and the protection of these with iron gratings are among the points noted by the most casual visitor. Models of the interior of an entire house in its original form are given in the fuller guide-books to Pompeii—the feature that most strikes the northerner being the smallness of the rooms, particularly the dormitories—quite intelligible, however, when he realises that the Pompeians led an open-air life, and performed their toilets at the bath, public or private. As rebuilt after 63, Pompeii shows little marble, the columns being of tufa or brick cemented by mortar. A coating of stucco was laid over wall or column, and presented an ample field for ornamental painting. This must have given to Pompeii its bright, gay colouring, which, with its reds, blues, and yellows, on column and capital, on wall and partition, harmonise so well with the glowing sunlight of the south. On the centre of the interior walls is generally seen a painting unconnected with the others—often of a nymph, or a genius, when not distinctly erotic in theme—typifying faithfully the voluptuous sensual life of this pleasure-haunt of paganism.

Thanks to photographs, to the excellent plans in the best guidebooks, and to models, the reader, as the next best thing to a personal visit, can make a tour of the excavated portion of Pompeii, and, from the minute and trustworthy descriptions of the temples, basilicas, public buildings, and private houses, form a vivid realisation of the city in its most frequented and animated quarters. Perhaps the most complete substitute for such a visit is E. Neville Rolfe's *Pompeii, Past and Present*, illustrated by photographs of the ruins as they are, with sketches of their original elevations (Lond. 1884). The student who wishes to enter fully into the whole subject should read Mazois, *Les Ruines de Pompeii* (4 vols. Paris, 1812–38); Nissen, *Pompeian. Studien zur Städtekunde des Alterthums* (Leip. 1877); Mau, *Geschichte der dekorativen Wandmalerei in Pompeii* (Berl. 1882); Overbeck-Mau, *Pompeii* (Leip. 1884); K. Lange, *Haus und Halle* (Leip. 1885); while Professor Fiorelli's great work, *Gli Scavi di Pompei dal 1861 al 1872*, is a mine of information, supplied at first hand by the official excavator, and besides other matter contains an account of the ingenious method by which, pouring in liquid plaster of Paris into the hollows occupied by the skeletons of the victims of the eruption, and allowing it to harden, he obtained a ‘perfect cast, consisting of the bones of the deceased Roman citizen, clad no longer in flesh, but in plaster of Paris, which had assumed the exact shape, not only of his face and body, but of every fold of his clothes.’ A compendium of this thesaurus was published in 1879.

Pompelmoose, or POMELO, names of French and Italian origin for a variety of Shaddock (q.v.).

Pompey. Cneius Pompeius Magnus, the rival of Cæsar, was born in 106 B.C., and at seventeen fought along with his father in the Social or Italian war on the side of Sulla against the faction of Marius and Cinna. When Sulla returned from Greece to Italy to oppose Marius (84) Pompey hastened into Picenum, and there raised an army of three legions, with which he drove the soldiers of Marius out of the district, and then joined Sulla. For his prudence, valour, and good fortune throughout the war he was sent to destroy the remains of the Marian faction in Africa and Sicily. On his triumphant return to Rome he was honoured with the name of Magnus, or the Great. His triumph was an unprecedented distinction for one who had not yet held any public office and was merely an *eques*. His next exploits were the reduction of the followers of Lepidus, whom he drove out of Italy, and the extinction of the Marian party in Spain under the brave Sertorius (76–71). Pompey suffered some severe defeats from Sertorius, and, indeed, put an end to the war only after his antagonist's assassination. Returning to Italy, he fell in with the remnants of the army of Spartacus, and thus closed the Servile war. He was now the idol of the people, and, though legally ineligible for the consulship, was elected for the year 70, the senate relieving him of his disabilities rather than provoke him to extremities. Hitherto Pompey had belonged to the aristocratic party, but of late years he had been looked upon with suspicion by some of the leading men, and he now publicly espoused the people's cause. He carried a law restoring the tribunician power to the people; and aided largely in introducing the *Lex Aurelia*, by which the *judices* should for the future be taken from the *senate*, the *equites*, and the *tribuni aerarii*, instead of from the senate alone. In 67–66 Pompey cleared the Mediterranean of the pirates who infested it; and during the next four years (65–62) conquered Mithridates, king of Pontus, Tigranes, king of Armenia, and Antiochus, king of Syria. At the same time he subdued the Jews and captured Jerusalem. On his return to Italy he disbanded his army, and entered Rome in triumph for the third time in 61. But now his star began to wane. Henceforward we find him distrusted by the aristocracy, and second to Cæsar in popular favour. After his return he was anxious that his acts in Asia should be ratified by the senate, and certain lands apportioned among his veterans. But the senate declined to accede to his wish, and he therefore formed a close intimacy with Cæsar, and the pair, together with the plutocrat Crassus, formed that coalition which is commonly called ‘the First Triumvirate,’ and which for a time frustrated all the efforts of the aristocratic party. This small oligarchy carried all before them: Pompey's acts in Asia were ratified, and his promises to his troops fulfilled; Cæsar's designs were all gained, and his agrarian law, distributing land in Campania among the poorer citizens, was passed. Cæsar's daughter, Julia, was given in marriage to Pompey, and private relationship was thus made to bind tighter the tie of political interest. In the year following Cæsar repaired to Gaul, and there for nine years carried on a career of conquest that covered him with glory, while Pompey was idly wasting his time and his energies at Rome. But Pompey could not bear a rival. Jealousies arose betwixt the two; Julia died in 54, and thus father-in-law and son-in-law were sundered by a yet wider gulf, which no bridge could span. Pompey now returned to the aristocratic party, whose great desire was to check Cæsar's views, and strip him of his command. Cæsar was ordered to lay down his office and return to Rome, which he consented to do, provided Pompey, who had an army near Rome, would do the same. The senate insisted on an unconditional resignation, and ordered him to disband his army by a certain day, otherwise he would be declared a public enemy. To this resolution two of the tribunes in vain objected; they therefore left the city and cast themselves on Cæsar for protection. It was on this memorable occasion that he crossed the Rubicon, and thus defied the senate and its armies, which were under Pompey's command. The events of the civil war which followed have already been recorded in the life of Cæsar. It remains only to mention that, after being finally defeated at Pharsalia in 48, Pompey escaped to Egypt, where, according to the order of the king's ministers, he was treacherously murdered by a former centurion of his own, as he was landing from the boat. His head was cut off, and afterwards presented to Cæsar on his arrival in Egypt. But Cæsar was too magnanimous to delight in such a sight, and the murderer of Pompey was by his orders put to death. The body lay on the beach for some time, but was at length buried by a freedman, Philippus, who had accompanied his master to the shore.

Pompey's younger son, Sextus, by his third wife, endeavoured after his father's death to prolong the struggle with Cæsar. He secured a large fleet, manned largely by slaves and political exiles, and, occupying Sicily, ravaged the coasts of Italy. But in 36 B.C. he was defeated at sea by Agrippa, and next year was slain at Mitylene.

Pompey's Pillar, a celebrated column standing in the neighbourhood of Alexandria, on an eminence about 1800 feet south of the walls. It is a monolith of red granite, and of the Corinthian order, and stands upon a pedestal. Its total height is 98 feet 9 inches; shaft, 73 feet; 29 feet 8 inches in circumference. On the summit is a circular depression for the base of a statue. The name popularly applied to it is an erroneous appellation given by old travellers; the Greek inscription on the base shows that it was erected by Publius, prefect of Egypt, in honour of the Emperor Diocletian, 'the invincible;' and it is supposed to record the conquest of Alexandria by Diocletian, 296 A.D.

Ponani, a seaport town of British India, in the district of Malabar, 30 miles S. of Calicut. Pop. 12,241, mostly Mohammedans.

Ponapé. See CAROLINE ISLANDS.

Ponce de Leon, FRAY LUIS, a celebrated Spanish poet, was born in 1527, probably at Granada. He studied at Salamanca, entered the order of St Augustine, and became professor of Theology there in 1561. His translation and interpretation of the Song of Solomon brought him five years' imprisonment from the tribunal of the Inquisition at Valladolid. Released at length and reinstated in his chair, he quietly resumed his lectures with the words: 'As we observed in our last discourse.' In 1580 he published a satisfactorily orthodox Latin commentary on the Song of Solomon, later his *De los Nombros de Christo* (1583–85) and *La Perfecta Casada* (1583), full of imagery, eloquence, and enthusiasm, and both in prose. Shortly before his death, which occurred in August 1591, he had been appointed general of his order. His poetical remains were first published by Quevedo at Madrid in 1631, under the title *Obras Proprias y Traduciones.* The latter consist of translations from Virgil's *Eclogues* and the *Georgics,* the *Odes* of Horace, and the Psalms. His original poems are few, but they are among the masterpieces of Spanish lyrical poetry.

There are German monographs by Wilkens (1866) and Reusch (1873); also a Spanish Life by Tejede (1863).

Ponce de Leon, JUAN, the discoverer of Florida, was born at San Servas, in Spain, in 1460, was a court page, served against the Moors, and in 1502 sailed with Ovando to Hispaniola, and became governor of the eastern part of the island. In 1510 he obtained the government of Porto Rico, and had conquered the whole island by 1512, when he was deprived of his post. He then, broken in health, set out on a quest for the fountain of perpetual youth, and on 27th March 1512 found Florida, landing a little to the north of where St Augustine now stands. He secured the appointment of adelantado of the country, and, after staying on his way back to drive the Caribs out of Porto Rico, he returned in 1521 to conquer his new subjects; in this, however, he failed, and lost nearly all his followers. He retired to Cuba, and died there in July from the wound of a poisoned arrow. His remains and a monument are in San Juan de Porto Rico.

Poncho, an important article of male attire in Chili, the Argentine Republic, and some other parts of South America (see GAUCHOS). It consists of a piece of woollen or alpaca cloth, 5 to 7 feet long, 3 to 4 feet broad, having in the middle a slit through which the wearer passes his head, so that the poncho rests upon the shoulders and hangs down before and behind.

Pond. See WATER-SUPPLY.

Pond, JOHN, astronomer-royal, was born in London in 1767, studied at Cambridge, and succeeded Maskelyne as astronomer-royal in 1811. His name is identified with numerous improvements in the methods and instruments of observation; he translated Laplace's *Système,* and published a star catalogue and many valuable papers. He died 7th September 1836.

Pondicherry, the chief of the French settlements in India, situated on the Coromandel Coast, 53 miles S. by W. of Madras City, is divided into two parts by a canal, White (European) town being next the sea. It has handsome streets, a government house, a college, a lighthouse, and a cotton-mill employing 1500 hands, besides native dyeing establishments. Pop. 41,858. It exports chiefly oil-seeds. The French colony of Pondicherry has an area of 115 sq. m. and a pop. of 140,945. The governor of Pondicherry is governor-general of the French possessions in India. The French first settled here in 1674. The Dutch took the town in 1693, but restored it to the French in 1697. In 1748 Admiral Boscawen besieged Pondicherry for two months, but was compelled to raise the siege. Eyre Coote, however, took it in 1761, yet it was restored to the French in 1763 with reduced territory. It was once more taken by the English under Sir Hector Monro in 1778, and once more given back in 1783. In 1793 the English again repossessed themselves of it, but it was a third time restored to the French in 1816.

Pondoland, a district of Kaffraria, on the Natal frontier, South Africa, 65 miles long by 30 wide, was annexed to Cape Colony in 1884 and 1887, except East Pondoland, which (with a pop. of 200,000) was annexed in 1894.

Pond-weed. See AQUATIC PLANTS.

Pongwe. See PUNGWE.

Poniatowski, a princely family of Poland. STANISLAS (1677–1762) joined Charles XII. of Sweden in supporting Stanislas Leszczynski, and was the chief instrument in saving the Swedish king at Pultowa. He held his administrative offices under Augustus II. and Augustus III.—His son STANISLAS AUGUSTUS (1732–98) was the last king of Poland (q.v.).—JOSEPH ANTONY, son of Andrew, brother of king Stanislas Augustus, was commander of the Polish legion in the army of Napoleon. He was born at Warsaw, 7th May 1762, and trained in the Austrian army. In 1789 the Polish Assembly appointed him commander-in-chief of the army of the south, with which he gained brilliant victories over the Russian invaders (1792); but the convention of Targowice (see POLAND) put an end to the contest in 1793. On the outbreak of the following year he joined the army as a volunteer, but Kosciusko put him in command of the division charged to defend Warsaw on the north. On its fall he withdrew to Vienna. In 1806 the Prussians evacuated Warsaw before the invasion of the French; and when the duchy of Warsaw was constituted (1807) Poniatowski was appointed minister of war and commander-in-chief for the duchy. In 1809, in the course of the war between Austria and France, he invaded Galicia, after having previously retired before stronger forces. Three years later he joined, with a large body of Poles, the French army in its invasion of Russia, and rendered distinguished service at Smolensk and Borodino, but more especially in the great battle of Leipzig (1813), when he valiantly held his ground on the right wing of the French battle-array. Napoleon rewarded him by making him marshal of France. After the battle he was left to cover the retreat of the French army, and, whilst attempting to swim his horse over the river Elster to join the main body of his troops, he perished in its waters, 19th October 1813. His body was recovered, taken to Warsaw, and in 1816 removed to Cracow, and placed beside the ashes of Sobieski and Kosciusko. See (German) Biography by Boguslawski (Cracow, 1831).

Pont, TIMOTHY, Scottish geographer, was the son of Robert Pont (c. 1527–1606), a celebrated Edinburgh minister. The dates are unknown of Timothy's birth and death, but he graduated at St Andrews in 1584, was minister of Dunnet in Caithness (1601–8), and in 1609 subscribed for 2000 acres of forfeited lands in Ulster. 'He was,' says Bishop Nicholson, 'by nature and education a complete mathematician, and the first projector of a Scotch atlas. To that great purpose he personally surveyed all the several counties and isles of the kingdom; took draughts of 'em upon the spot, and added such cursory observations on the monuments of antiquity and other curiosities as were proper for the furnishing out of future descriptions. He was unhappily surpris'd by death;' but his collections were rescued from destruction and oblivion by Sir John Scott of Scotstarvet, and his maps at last appeared in Blaeu's magnificent *Theatrum Orbis Terrarum* (vol. v. Amst. 1654). See Dobie's *Cunninghame Topographised by Timothy Pont* (1876).

Pontac, an old name for a kind of red Bordeaux wine, from a family owning large vineyards.

Pont-à-Mousson, a town of France (dept. Meurthe-et-Moselle), on the Moselle, 18 miles SSE. of Metz, with a 13th-c. Gothic church. Pop. 11,261.

Pontarlier, a French town (dept. Doubs), 35 miles SE. of Besançon, on the main Jura route from Switzerland to France. Pop. 6709.

Pontchartrain, LAKE, in Louisiana, about 5 miles N. of New Orleans, is 40 miles long and 25 wide, and communicates with the Gulf of Mexico. The drainage of New Orleans (q.v.) is carried into the lake through canals.

Pontecorvo, a city of the Italian province of Caserta, on the river Garigliano, 37 miles NW. of Capua, with 5172 inhabitants. It has an old cathedral and a castle. It was long attached to the States of the Church. Napoleon I. gave the title of Prince of Pontecorvo to Marshal Bernadotte, afterwards king of Sweden.

Ponte Delgada, the largest town of the Azores (q.v.), on the south coast of São Miguel. Pop. 17,940.

Pontefract, or POMFRET, a pleasant market-town in the West Riding of Yorkshire, on an eminence near the influx of the Calder to the Aire, 13 miles SE. of Leeds, 8 E. by N. of Wakefield, and 14 NNW. of Doncaster. It stands on the line of a Roman road, but seems to have arisen round its Norman castle, which, founded about 1076 by Ilbert de Lacy, was the scene of the execution or murder of the Earl of Lancaster (1322), Richard II. (1400), and Earl Rivers (1483), was taken in the Pilgrimage of Grace (1536), and during the Great Rebellion sustained four sieges, being finally dismantled in 1649, after its capture by Lambert. There are two old churches, a town-hall (rebuilt 1796), a market-hall (1860), a grammar-school of Edward VI. (1549), and large market-gardens and nurseries, the growing of liquorice for the lozenges called 'Pomfret cakes' being a specialty as old as about 1562. At Ackworth, 3 miles south, is a large Quaker school (1778). Pontefract, called *Taddenesscylf* in pre-Conquest times, seems to have received its present name between 1086 and 1135. Why is uncertain, but there is a very full discussion of this difficult question in *Notes and Queries* for 1886–87. The borough, which was chartered by Richard III., lost one of its two members in 1885. Pop. of parliamentary borough (1851), 11,515; (1881) 14,767; (1891) 16,407, of whom 9702 were within the municipal boundary.

See works by Paulden (1702), Tetlow (1769), and Boothroyd (1807).

Pontevedra, a cathedral town of Spain, in Galicia, at the head of a bay, 30 miles S. of Santiago. Cloth and hats are manufactured, and there are sardine-fisheries. Pop. 19,857.—The *province* has an area of 1695 sq. m. and a pop. (1887) of 443,385.

Pontiac, capital of Oakland county, Michigan, on Clinton River, surrounded by many small and beautiful lakes, 26 miles by rail NNW. of Detroit. It contains a state reform school and a large asylum for the insane, which cost nearly $500,000, and has flour and planing mills, foundries, and brickyards. Pop. (1880) 4509; (1890) 6200.

Pontiac, chief of the Ottawa Indians, in 1746 defended Detroit for the French, and was said to have led his warriors at Braddock's defeat in 1755. After the French had surrendered Canada, his hatred of the English prompted him to organise a conspiracy among the Indian tribes with a view to the extermination of 'those dogs dressed in red.' The 7th of May 1763 was appointed for the attack, which in eight cases was successful, and the garrisons were massacred; but at Detroit, where Pontiac led in person, the commander was forewarned, and a five months' siege ensued. Peace was made in 1766. Pontiac himself was murdered in 1769 by a Kaskaskia Indian, at Cahokia, Illinois, opposite St Louis. See Parkman, *The Conspiracy of Pontiac* (1851); and a *Diary of the Siege of Detroit*, ed. by F. B. Hough (1860).

Pontianak, capital of the western division of Dutch Borneo, near the mouth of the river Kapuas, on the west side of the island. It has some fortifications, and a lively trade. Pop. 5000.

Pontifex, the title borne by the members of one of the two great colleges among the ancient Romans, instituted for the purpose of preserving and cultivating religious knowledge; the other was the college of Augurs. The name seems obviously to be derived from *pons*, 'bridge,' and the root of *facio*, 'I make;' but in what way the pontifices were connected with bridge-making is obscure. It is natural to suggest that it was in some way through the sacred bridge across the Tiber, the *pons sublicius*. It is customary to speak of the college of pontiffs as a 'priesthood;' it was not, however, strictly speaking, such—that is to say, the members were not charged with the worship of any particular divinity, nor did they conduct sacrifices. Their duties embraced the regulation of all the religious rites and ceremonies of a state—how the gods should be worshipped, how burials should be conducted, how the manes of the dead should be appeased. To them was entrusted the care of the calendar, the proclamation of festival days, &c. They also saw that every religious and every judicial act took place on the right day. 'As they had thus,' says Mommsen, 'an especial supervision of all religious observances, it was to them in case of need (as on occasion of marriage, testament, or *arrogatio*) that the preliminary question was addressed, whether the matter proposed did not, in any respect, offend against divine law.' In matters of religion they were the supreme authorities; from their decisions there was no appeal, and they themselves were responsible neither to the senate nor the people; further, they had power to inflict punishment on such priests as dared to disobey their injunctions and deviate into schismatical courses. The words of Festus are: *rerum quæ ad sacra et religiones pertinent*, JUDICES ET VINDICES. Their president was termed *pontifex maximus*.

The pontiffs, according to Roman tradition, were instituted by Numa, but as they appear in all the Latin communities they are regarded by Mommsen as a thoroughly national Italian institution, and probably found a place in the earliest religious organisation of the Latin race. Their number was originally four, or, including the *pontifex maximus*, five, all of whom were taken from the patricians. In 300 B.C. the Ogulnian Law raised the number to nine, four of whom were to be plebeians. The first plebeian, however, who attained the dignity of *pontifex maximus* was Tib. Coruncanius, 254 B.C. Sulla, in 81 B.C., again increased the number to fifteen, and Julius Cæsar to sixteen. During the empire the functions of *pontifex maximus* were generally discharged by the emperors themselves; and the name survived even the establishment of Christianity, occurring in inscriptions of Valentinian, Valens, and Gratianus; but at length the emperors dropped it, when it was assumed by the Christian bishops of Rome, and now this title forms one of the designations of the pope.

Pontifical, one of the service-books of the Church of Rome, in which are contained the several services, whether in the administration of sacraments or the performance of public worship, in which the bishop or a priest delegated by the bishop officiates. There were many such collections for the various national churches; but that which is now in universal use throughout the Western Church is the *Pontificale Romanum*, or Roman Pontifical, first printed in 1485, revised under Clement VIII. in 1596, and repeatedly republished since that time. The Pontifical contains the services for ordinations, for religious professions and receptions of monks and nuns, consecrations, benedictions, as well as of the solemn administration by a bishop of those sacraments which are ordinarily administered by priests. Besides the prayers to be recited, the Pontifical also lays down the ceremonial to be observed.

Pontigny, a village of the French department of Yonne, 18 miles SE. of Auxerre, with a famous Cistercian monastery, dating from the 12th century. Three English archbishops retired hither—Becket in 1164, Cardinal Langton in 1207, and St Edmund of Canterbury in 1240, the last being buried here. The monastery was devastated by the Huguenots in 1567, and finally destroyed at the Revolution; but the church (mainly 1150–70) is the most perfect Cistercian church in existence. To the shrine of St Edmund (18th century) in this church came in 1874 a pilgrimage of English Roman Catholics.

Pontine Marshes (Lat. *Pometinæ Paludes*), a low-lying district, the southern part of the Campagna of Rome, extending south-east from Velletri to the sea at Terracina, 26 miles long by 17 broad. The district is separated from the sea by sand-dunes, and is traversed by the Appian Way. Herds of cattle, horses, and buffaloes feed on its pasture. Many attempts have been made to drain these marshes, from that of Appius Claudius (312 B.C.) to the proposals of Captain von Donat (1887), amongst the promoters of these drainage schemes being Augustus, Trajan, and the popes Boniface VIII., Martin V., Sixtus V., and Pius VI.

Pontoon (Fr. *ponton;* Lat. *pons*, 'a bridge'), the name given to buoyant vessels used in military operations for supporting a temporary bridge. Marlborough used clumsy wooden pontoons. Napoleon and Wellington had them lighter of tin and copper. They were flat-bottomed, rectangular boats, open at the top. Tin cylinders were then used for some time, but light open boats are now carried by the pontoon troops of the Royal Engineers for large bridges capable of carrying artillery, and Berthon's collapsible boats are sometimes used for small infantry bridges. See BRIDGE, Vol. II. p. 447; and for pontoons in connection with floating-docks, see DOCK, Vol. IV. p. 32.

Pontoppidan, ERIK, Danish writer, born at Aarhus on 24th August 1698, was appointed professor of Theology at Copenhagen in 1738 and bishop of Bergen in Norway in 1747; there he died on 20th December 1764. His writings are principally historical and theological; amongst them must be mentioned *Annales Ecclesiæ Danicæ Diplomaticæ* (4 vols. 1741–52), written in German, and still of use as a book of reference; *Det Danske Atlas* (1781), an unfinished historical and topographical account of Denmark; *Glossarium Norvagicum* (1749), a work on Norwegian dialect words; *Explanations to Luther's Catechism*, used as a text-book down to the present day; *Marmora Danica* (2 vols. 1739–41), a collection of Danish inscriptions; and *Norges Naturlige Historie* (2 vols. 1752–54.; Eng. trans. *Natural History of Norway*, 1755), containing accounts of the Kraken, the sea-serpent, and other marvels.

Pontresina, a tourist centre in the Swiss canton of Grisons, stands in the Upper Engadine, on the road connecting with the Bernina Pass, and is much frequented by Alpine climbers. Pop. 383.

Pontus, the name given by the ancient Greeks to a country in the north-east of Asia Minor, bordering on the Pontus Euxinus (whence its name), and extending from the river Halys in the west to the frontiers of Colchis and Armenia in the east. Its southern limits were the ranges of Anti-Taurus and Paryadres, so that it corresponded pretty nearly to the modern pashaliks of Trebizond and Sivas. The name seems to have come into use after the time of Alexander the Great. Previous to that Pontus was governed by a satrap for the empire of Persia. One of these satraps, Ariobarzanes, early in the 4th century B.C., laid the foundations of an independent sovereignty. He was succeeded by a line of princes mostly called Mithridates, the greatest of whom was Mithridates VI. (q.v.), one of the most formidable enemies that Rome ever encountered in the east. On the overthrow of this potentate by Pompey (65 B.C.), Pontus was annexed to Bithynia. Subsequently, a Greek named Polemon was installed (36 B.C.) monarch of part of Pontus; but in the reign of Nero this too became (63 A.D.) a Roman province, and was called *Pontus Polemoniacus*. The principal towns of ancient Pontus were Amisus, Sinope, Cotyora, Cerasus, and Trapezus on the coast, and Amasia (the capital), Comana, and Cabira (Neocæsareia) inland.

Pontypool, a market-town of Monmouthshire, on the Afon Llwydd, 9 miles N. by W. of Newport. Its 17th-century japanned wares have long been a thing of the past, and iron and tinplate works, brewing, and coal-mining now furnish employment. Pop. (1851) 3708; (1881) 5244; (1891) 5842.

Pontypridd, a town of Glamorgan, 12 miles NW. of Cardiff by rail, at the junction of the Rhondda and the Taff. It has a famous bridge (see BRIDGE), iron and coal mines, iron and brass foundries, and chemical and other manufactures—to which is due its rapid growth from a mere village at the beginning of the 19th century. Pop. (1881) 12,317; (1891) 19,971.

Pony. See HORSE.

Pood. See PUD.

Poodle. The origin of this breed of dog dates from the beginning of the 17th century or earlier, as many pictures of that time contain portraits of poodles. The breed was unknown in Britain until the beginning of the 19th century. The poodle is one of the few breeds of dogs which has not been properly appreciated and cultivated in Britain. From his great intelligence and cleverness in learning tricks, he was generally adopted as a circus or 'trick-dog;' but this fact, instead of making for his credit, has caused the poodle to be treated with contempt. On the Continent, however, the large variety of poodle has been universally used as the humbler sportsman's companion, as he combines the properties of a land as well as a water dog.

Black Corded Poodle.
(From a Photograph by Gambier Bolton, F.Z.S.)

The poodle varies considerably in his appearance, and attempts have been made to divide the breed into several sections, such as the large and small variety, or the corded-coated and fleecy-coated variety, as also into black Russian and white German poodles; but none of these divisions are very clearly defined. The large black Russian poodle is much the most handsome and agile specimen of the race, and may be easily trained to retrieve. The small white poodle is only fit for a house dog, but is extremely clever and apt. For some unknown reason the poodle has always been clipped in a peculiar manner: with the exception of a few tufts, his body and hindquarters are entirely bare, while the coat on his shoulders sometimes grows to an enormous length. On the Continent the poodle is left with his natural coat during the winter, a much more humane plan than the English habit of keeping him shaved in all seasons.

Pool, a game played on a billiard-table. Any number may play. Each is provided with a coloured ball, taken at random from a *pool-basket*. The first in order (white) is spotted on the *billiard spot*. The next (red) plays from hand on the white. Red is called white's *player*. The next (yellow) is red's player, and so on, in the order indicated by the *marking-board*. The owner of each ball has three *lives*. If the player holes the ball he plays on, or any other ball, after having first hit the ball he plays on, the owner of the ball holed loses a life, and has to pay to the player a sum previously agreed on. The player plays again, from where he stopped, on the nearest ball; and so on until he fails, when the next player goes on, or until there are no other balls on the table, when the striker's ball is spotted. After the stroke from hand the player, unless spotted, always plays from where he is on the table; when he is holed he plays his next stroke from hand. If the player holes his own ball or gives a miss he loses a life, and plays his next stroke from hand. When the owner of a ball has lost all his lives he is *dead*, and plays no more that pool. The first dead may *star*—i.e. may come in again with the smallest number of lives on the board. In the end one or two of the players, who have not lost all their lives, remain in. They continue to play until they have an equal number of lives, when they *divide* the pool (a sum contributed by each player, generally equal to the value of three lives, the star paying an extra pool). If one of the two who remain in has more lives than the other, and kills his adversary, he takes the *whole pool*. The above describes briefly what is called *following pool*. The principal varieties are *selling pool*, where the player may play on any ball he likes; and *black pool*, where an extra ball is spotted on the centre spot and has to be played on under certain conditions, about which there are no fixed rules. When the black is holed at black pool each of those in has to pay a life; if missed or run in off the player has to pay a life all round. There is no pool, and no one has any specified number of lives, the game continuing for a given time (generally half an hour). *Snooker pool* is played in the same way as *snooker* (see PYRAMIDS), the players following each other as at pool, and the order of play being determined as at pool.

Poole, a seaport of Dorsetshire, 5 miles W. of Bournemouth and 30 E. of Dorchester. It stands on the north side of Poole Harbour (7 by 4½ miles), an irregular inlet, formed by the projection of the 'isle' of Purbeck, almost dry at low-water, and having four tides a day. On Brownsea or Branksea Island, just within the narrow entrance to the harbour, is a castle dating from the time of Henry VIII. Poole itself has an old town-hall (1572), a guildhall (1761), a town-house (1822), considerable shipping, some yacht-building, and a large trade in potter's and pipe clay. The men of Poole were great fighters in days of old by land and sea, as buccaneers, smugglers, and Cromwellian soldiery. There was 'Arripay,' or Harry Page, who about

1400 kept the seas against France and Spain; and there was William Thompson, who, with a man and a boy, captured a French privateer in 1695. Till 1867 the borough returned two members, and then till 1885 one. Pop. (1851) 9255; (1881) 12,310; (1891) 15,405. See works by Hutchins (1788), Sydenham (1839), and Brannon (3d ed. 1859).

Poole, John, playwright, born in 1792, died in February 1879 at Kentish Town, London, wrote the immortal *Paul Pry*, first produced at the Haymarket in 1825, and several other farces and comedies, such as *Turning the Tables*, *Deaf as a Post*, *'Twould Puzzle a Conjuror*, *The Wife's Stratagem*, &c. Besides these theatrical pieces he wrote also the satirical *Little Pedlington* (1839), *The Comic Sketch Book* (1859), *Comic Miscellany* (1845), *Christmas Festivities* (1845), and other books of a light, humorous kind.

Poole (or Pool; Latinised *Polus*), Matthew, divine, was born at York about 1624, educated at Emmanuel College, Cambridge, and held from 1648 till the passing of the Act of Uniformity (1662) the rectory of St Michael le Querne in London. He retired to Holland and died at Amsterdam in 1679. His principal work was his *Synopsis Criticorum Biblicorum* (5 vols. fol. 1669–76), in which the opinions of 150 biblical critics were summarised. In his *English Annotations on the Holy Bible* he had only reached Isaiah lviii., but the work was completed by his friends (2 vols. fol. 1685). Effective contributions to the Romish controversy were *The Nullity of the Romish Faith* (1666) and *Dialogues between a Popish Priest and an English Protestant* (1667).

Poole, William Frederick, the compiler of the 'Index,' was born at Salem, Massachusetts, 24th December 1821, and graduated at Yale in 1849. While there he was librarian of a literary society, and prepared an index (pp. 154) of periodical literature, of which a 2d ed. (pp. 521) was published in 1853, and a 3d (pp. 1469), with the assistance of the American and British Library Associations, in 1882. A supplement (pp. 496), by Poole and W. J. Fletcher, of Amherst, was issued in 1888; and a similar one was promised for every five years. From 1856 to 1869 he was librarian of the Boston Athenæum; afterwards he was employed in organising libraries (as at Waterbury and Cincinnati). From 1873 he had charge of the Public Library, and from 1888 of the Newberry Library at Chicago; and at Chicago he died in March 1894.

Poona, or Puna, a town of British India, 119 miles by rail SE. of Bombay, is the military capital of the Deccan and the seat of the government of the presidency during the last half of the year. The city is embosomed in gardens, but its streets are mostly narrow or crooked, and the houses poor. The ruins of the peshwa's palace, burned in 1827, still remain. Under the peshwas the city was the capital of the Mahratta princes and power; it was occupied and annexed by the British in 1818. Here have been built the Deccan College and the College of Science, the latter for training civil engineers, a normal school and normal college, a high school, and other educational establishments. The Europeans live chiefly at the cantonments, north-west of the city. The natives manufacture cottons and silks, gold and silver jewellery, ivory and grass ornaments, and clay figures. Pop. (1851) 73,209; (1872) 90,436; (1881) 99,622, to which must be added 30,129 in the cantonment, making a total of 129,751; (1891) 160,460.—The *district* has an ara of 5348 sq. m. and a pop. of 900,621.

Poon-wood is the timber of the Poon trees of India and Burma (*Calophyllum inophyllum* and *C. angustifolium*). It is very commonly used in the East Indies, particularly in shipbuilding, for planks and spars. See Tacamahaca.

Poor Clares. See Clare (St).

Poor-laws. Charity, like Christianity, had its origin, or earliest development, in the East. Among the primitive nations of the world almsgiving was inculcated as a religious observance, and is prescribed as such in their sacred records. Among the European nations of antiquity we find a provision for the poor adopted as a matter of state policy. In early times Athens could boast of having no citizen in want; 'nor did any disgrace the nation by begging.' But war at length brought poverty in its train, and the Athenian people decreed the maintenance of those who were mutilated in battle, and, at a later period, of the children of those who fell. Plutarch mentions Pisistratus as the originator of the first decree, though others derive it from Solon. By the latter decree the state provided for the orphans of its soldiers up to their eighteenth year, and then sent them into the world with a new suit of armour. The bounty given to the disabled is mentioned by Lysias, Harpocration, Aristotle, Isocrates, and others; it is variously stated at one, two, and three oboli a day, and it seems to have been increased with the increased cost of subsistence. There were also societies for the relief of distress among the democratic states of Greece, called *eranoi*—a sort of friendly societies, in which the members relieved were expected to pay back the money advanced to them when they had raised themselves to better circumstances. But it must be remembered that these so-called democratic states were in reality slave-holding aristocracies.

Among the Romans the Agrarian Law of Licinius Stolo (367 B.C.) was framed in order to prevent the extremes of riches and poverty in the state. It limited the extent of property in public land to be held by each citizen, and directed that all such land above the allotted portion should be taken away from the holders, and given to those who had none. The distribution of grain at reduced prices, which at length became gratuitous, was introduced by Caius Gracchus, and lasted till the fall of the Roman empire. Augustus in vain tried to suppress it. In his time 200,000 citizens were thus fed. Cicero makes mention of this provision as in great favour with the Roman people, because it furnished them with an abundant subsistence without labour; other Roman writers describe its results as disastrous both to agriculture and to manners, creating a nation of mendicants, and causing the land to fall out of cultivation.

In the middle ages the great body of the labouring classes were in a state of serfdom, and looked to their feudal lords for maintenance. The obligation to provide for their slaves, or serfs, seems to have been fully recognised, so that many, encountering in a state of freedom the miseries of want, went back to bondage as a refuge from destitution. The villeins in Saxon England were attached to the soil, and received from their lord a portion of land for the support of themselves and their families. But the Church of Rome constituted herself the great receiver and dispenser of alms. The rich monasteries and abbeys distributed doles to the poor, as is still done at the mosques under the Mohammedan system.

In most states of continental Europe the church remains to a larger or smaller extent the public almoner, the state only stepping in to supplement the offerings of the church and voluntary charity when they become deficient. The disseverance from the church is hardly anywhere so complete as in England. The laws of different countries vary as to the degree of want entitling a pauper to relief, the extent to which the right to relief is matter of positive right, the conditions which give rise to a claim of relief, the incidence of taxation, and the obligation on relatives to aliment.

It is only in Prussia, Denmark, and Sweden that there is any legislative declaration of the right to relief; and only in Britain and Denmark is any special tax imposed for this purpose. On the continent of Europe, generally speaking, the administration of relief falls on the parish or commune, but the responsibility of supervision undertaken by central departments varies greatly; no workhouse test is applied; and the statistics are not reliable. In northern Europe there has been a more decisive severance of poor-law functions from the church. In Denmark the old law was altered in 1867–68 to one of elective unions in rural districts, the burgomaster and town-council becoming the poor-law authority in each considerable town. The overseers are amateurs, and medical aid is universal. In Sweden the law formerly rested on the Church Ordinance of 1571, but the statutes of 1871 (translated by Nassau Jocelyn and criticised by Lammers) have made great changes, the relief of the able-bodied being prohibited, a direct liability being placed on the larger employers of labour, and a system of poll-taxation introduced. In Norway (where the system of out-quartering still subsists) the poor-law of 1845 was altered in 1863 in the direction of greater strictness, relief being restricted in theory to orphans and persons of unsound mind, and a maximum assessment fixed. Among other sources of income there is an excise duty on beer. In north Germany the old law of 1577 was gradually enlarged—e.g. by the Convention of Gotha and Agreement of Eisenach, dealing with the matter of settlement. In 1867 a law of free settlement was passed, and in 1870 by a general law the period of two years was fixed for pauper domicile. In Prussia this is further developed by a statute of 1871, which connects the *Bezirksregierung*, or local government, with the parish poor-law authority. The peculiar system of Leipzig (founded on that of Hamburg) is carried on by an *Armendirectorium*, amateurs of good social position, who make very strict inquiries by means of a *Fragebogen*, or question-paper.

In the Hanse towns there was introduced in 1788 a system of voluntary contributions aided by fixed subsidies from the government. This at length resulted in government supplying all deficiencies, which in the last few years have been 80 per cent. of the cost of the general poor relief. At the treaty of Versailles (1870) Bavaria preferred to remain under her own law of 1816, amended in 1869. In Belgium, known as the classic land of pauperism, there is no poor-rate, but large parochial endowments exist. As in France, there are *hospices civiles* for indoor relief, and *bureaux de bienfaisance* for outdoor relief. The law may be enforced on communes by the Deputation Permanente of each province. One-third of the Belgian proletariat are inscribed on the poor-lists (see Laurent, *Le Paupérisme et les Associations de Prévoyance*). In Russia the poor-law has been modified by the communal system of land-tenure and the large amount of unoccupied crown-land. Down to 1864 the landowner was bound to feed the serf, and there were also provincial charitable societies receiving state aid. The administration of the poor-law, however, was in that year handed over to the new *Zemstvos*, or local representative assemblies, who tax real property for this purpose. There is in St Petersburg a Grand Philanthropic Society with numerous branches; and many of the provincial offices of charity were endowed in the time of Catharine II. with the property of the monasteries. In Italy there is a remarkable absence of compulsory provision, except for lunatics and foundlings, but the charitable foundations amount to more than thirty millions sterling. The law of 1862, however, requires each charitable corporation to submit to the supervision of the representative provincial assembly. In Rome the *Commissione de Carita* has many peculiar features. Holland has no law of settlement.

In Austria each commune is charged with the relief of its poor. All who have legal domicile, or who, being unable to prove their domicile, are resident in the commune, are entitled to relief out of the general assessment. There is no special rate, and the administration is strictly municipal. In many provinces private charity is associated with public assistance, administered by the priest, a few chosen inhabitants, who are called 'Fathers of the Poor,' and an officer accountable to the commune. This system is called the 'Pfarrarmen Institute,' and their funds are principally derived from private sources; but they receive a third part of the property of ecclesiastics who die intestate, and certain fines, &c. The 'einlager system,' or boarding-out system, obtains to a large extent as regards both old and young paupers.

In France the law of 1798 distinctly negatived the right to relief. The present system rests mainly on the legislation of 1850–51, amended in 1872. The law of 1867 secured the intervention of the prefect. The relief of the poor is not compulsory, in as far as its distributors may, after making inquiry, refuse relief, except in the case of foundlings and lunatics. The minister of the Interior has a general superintendence of the machinery of relief, as well as the immediate administration of many large hospitals and refuges. The departmental funds are called upon for compulsory relief, but the commune is the main source of public assistance. It encourages and stimulates voluntary charities, and receives gifts for the benefit of the poor. The administration of the hospitals, and of the relief given at the homes of the poor (*secours à domicile*) is under the separate management of unpaid commissions, who co-operate with the communal authorities. The *dépôt de mendicité* is a penal establishment for the repression of vagrancy, and like the *crèche* is departmental. The work of the public dispensary is largely done by sisters of charity at a small salary and with unsatisfactory results, as at Boulogne.

In Holland pauper colonies have been supported by government for the last sixty years. Vagrants, after a short imprisonment, are sent to one of these, under a rigorous system of discipline. Paupers of good character are sent to maintain themselves and their families by agricultural labour in free colonies. The working of the system is pronounced costly and unsatisfactory. A description of the chief voluntary experiments in dealing with the poor in Europe will be found in *The Charities of Europe*, by John de Liefde (1865).

The annals of the poor in England are neither short nor simple. Severe enactments for the repression of vagabondage and mendicity date from a very early period. In ancient Saxon times the householder was bound to provide for the labourer, and men who had no master were, by the Folkmote, assigned to some householder; but when freedom began to prevail this state of things naturally came to an end. No master was bound to provide for the freeman, and when he failed to provide for himself, by honest labour, he generally took to vagrant begging, often to violence. The statute of Winchester (13th Ed. I., 1285) shows the poor utterly uncared for, and the roads infested by vagrant robbers. Up to the reign of Richard II. the sole idea of English rulers was to treat pauperism as a crime, and repress it by punishment, and by the most unjust and absurd restrictions on the freedom of labour. The 23d Ed. III. forbids giving alms to vagrants, on pain of imprisonment; then also the laws of settlement had their origin in the attempt to chain the free labourer to the land. The 12th Richard II. (1388), chap. 7, is the first statute that makes provision for the impotent poor. The statutes of Henry VII. endeavour to carry out, by the severest measures, the system of repression. The 27th Henry VIII., chap. 25 (1536), introduced the principle of compulsory assistance. Each parish was ordered to receive and provide for the impotent, and set the able-bodied to work. Alms were to be collected into a general fund, and indiscriminate almsgiving was forbidden, on pain of forfeiture of ten times the value given. The sturdy beggar was to be whipped when first caught, next to have his ears cropped, and for a third offence to suffer death as a felon and enemy to the commonwealth. In 1547 the following penalties were substituted—viz. branding, on first conviction, with a V on the shoulder, and being adjudged a slave for two years, to be claimed by any one, fed on bread and water, and caused to work by beating, &c. Running away from this tender treatment was punishable with S branded on the face, and slavery for life to the town or parish, on the roads of which the incorrigible vagrant was to work in chains. A little urging was now found necessary to obtain funds for the maintenance of the poor. The collectors were gently to ask every man and woman at church what they would give; but if one could not be persuaded the bishop was to send for the recusant, and use 'charitable ways and means.' At length the 5th Elizabeth, chap. 3 (1563), provided that he who obstinately refused to give should be handed over to the justices, who were empowered to tax him at their discretion, and send him to jail for default. Ten years later the power of compulsory assessment is given to the justices, and abiding-places are ordered to be provided for the aged and infirm. These statutes culminated in the 43d Elizabeth, chap. 2 (1601), which has formed the basis of the poor-law system of England up to the present time. It taxed every inhabitant of every parish for the relief of the poor. It directed the justices in every county to appoint three or four substantial householders in each parish to be overseers of the poor, along with the churchwardens. It ordered the relief of the impotent, and the apprenticing of children, and the providing of work for the able by means of 'a convenient stock of flax, hemp, wool, thread, iron, and other necessary ware and stuff.'

The great Act of Elizabeth came but slowly into operation. Up to the reign of Charles I. there were many parishes in which no rate was assessed, and which turned away their poor; but the great evils had been remedied, and there is little legislation on the subject for the next hundred years. The 3d William and Mary, chap. 2 (1691), provides that the persons to be relieved be registered and examined by the vestry, because evils had arisen out of the unlimited power of the churchwardens and overseers giving relief 'for their own private ends,' by which the charge on the parish was greatly increased, contrary to the true intent of the statute of Elizabeth. This act also gave power to the justices to order relief in cases of emergency, a provision which afterwards became a fruitful source of difficulty. The evils henceforth complained of were that many had thrown themselves on the rates who ought to have been supporting themselves independently of such aid; that pauper labour was found interfering with and displacing industrial labour; that the overseers were acting with unchecked dishonesty; and justices, with unrestrained liberality, ordering the money of the industrious and prudent to be spent upon the idle and improvident. Efforts were made to remedy these abuses throughout the reigns of the first three Georges, by making the justices act with the overseers, by rendering the overseers accountable to the parishioners by means of returns and the power of inspection, and by the offer of the workhouse to all applicants for relief. This last provision, made in the reign of George I. (1723), substituted what is called indoor relief for the allowance made to the poor at their own homes, and introduced the workhouse system. The workhouse established on Locke's suggestion by Carey at Bristol was one of the earliest. All who refused to be lodged in the house were to be struck off the poor's-roll and refused relief. A great increase in the number of workhouses took place; guardians were appointed to guard the pauper children from neglect and improper conduct, and other attempts to improve their administration made. Workhouse Unions were also introduced by Gilbert's Act, 1782, and a succession of acts passed for the protection of parish apprentices. Towards the close of the 18th century a great relaxation took place in the treatment of the poor. The famous Speenhamland Act of 1793 meant the establishment by justices of a minimum rate of wages. The 36th Geo. III., chap. 10 and 23 (1796), increased the amount, and extended the application for relief. It repealed the workhouse test, and allowed relief to be given in aid of wages. Henceforth outdoor relief became the rule under a variety of systems, which practically turned the poor-laws into a mode of paying wages. In 1801 the amount of the rates was reckoned at £4,000,000. In 1820 it had risen to £7,330,254, the justices being now the 'rating' as well as the 'relieving' authority.

In 1817 a commission of the House of Commons stated their opinion, that, unless checked, the assessment would swallow up the profits of the land. Though the two Vestry Acts, which resulted from the commission appointed in 1817, seem to have done something to remedy the evils complained of, a new commission to inquire into the operation of the poor-laws was found necessary, and appointed in February 1832. The evidence brought before this commission, with which the names of Bishop Blomfield, Sturges-Bowme, Edwin Chadwick, and Nassau Senior are always connected, revealed a disastrous state of things. The independence, integrity, industry, and domestic virtue of the lower classes were in some places nearly extinct. The great source of the evil was shown to be the relief afforded to the able-bodied in aid of wages. This aid at first reduced the expenditure in wages, and found favour with farmers and magistrates, who framed scales of relief in accordance with the wants of the people. Five modes of outdoor relief were found in operation: (1) Relief without labour; (2) allowance given, in aid of wages, according to the number of the labourer's family; (3) the Roundsman system, the labourers being let out by the parish, among the employers round; (4) parish work, generally on the roads; (5) the labour-rate, the ratepayers preferring to divide among them the pauper labour, and to pay for it, however valueless, instead of raising a rate. Diminished industry ate away the very root of capital. Farmers turned off their men, or refused to employ them at fair wages, thereby causing a surplus of unemployed labour; they then took them back from the parish at reduced wages, paid out of the rates. From parish after parish came the reply to the queries of the commissioners: 'All our able-bodied labourers receive allowance.' No poor man in such parishes could save; if it was known that he had a fund of savings 'he would be refused work till the savings were gone,' and he had come down to the pauper level. In many places pauperism swallowed up three-fourths of the rent. Nor was the maladministration confined to the rural districts; it extended all over the country, and into the manufacturing towns, where outdoor relief was a source of constant imposture. The administration of indoor relief was also full of abuses, from want of classification, discipline, and employment. Better food and lodging were provided for idle paupers than working-people could procure—better, even, than could be afforded by many of the ratepayers.

In 1834 the commissioners reported that they found the administration 'opposed to the letter and spirit of the law, and destructive of the welfare of the community.' The commissioners laid down the principle that the condition of the pauper ought to be below the lowest condition of the independent labourer, because every penny bestowed in rendering his condition more eligible is a bounty on indolence and vice, and recommended (1) the cessation of outdoor relief; (2) a central authority to control the administration; (3) unions for the better management of workhouses, and the classification of their inmates; and (4) a complete and clear system of accounts. The bill embodying these recommendations was brought in, March 17, 1834, passed its second reading in the House of Commons with only twenty dissenting votes, and became law on the 14th August as the 4th and 5th Will. IV. chap. 76. This act was not a change of law, but of administration. The orders of the new board restricted overseers, on the formation of a union, to the collection of rates; appointed paid relieving-officers to dispense relief under the directions of the unpaid Boards of Guardians; required the gradual withdrawal of outdoor relief; and enforced classification and discipline in the workhouses. A rapid formation of unions took place under the new board. In the first eight months 112 were formed including 2066 parishes. The pauperised districts experienced a great and immediate relief, numbers of paupers going off when they found that relief involved adequate work or the strictly-disciplined workhouse; wages rose, and the expenditure was reduced on an average 20 per cent. At the accession of George I. in 1714 the poor-rates amounted, as nearly as can be estimated, to £950,000, equal to 3s. 3¾d. per head on the population of 5,750,000. At the accession of George III. in 1760 the population had increased to 7,000,000, the poor-rates to £1,250,000—an average of 3s. 6¾d. ; while in 1834 the population, estimated from the last census, was 14,372,000, and the money expended in relief £6,317,255—equal to 8s. 9½d. per head. In three years the operation of the Amendment Act had reduced the expenditure one-third—viz. to £4,044,741. In 1848 the commissioners were exchanged for a public board, which became one of the government departments, with a president, in whom was vested the power of the commissioners, and who held office as one of the ministers of the crown. Finally, in 1871, the Poor-law Board was abolished, and its powers transferred (with various other powers) to a new body, the Local Government Board (q.v.), which accordingly became the central authority for England and Wales in regard to poor-law administration. The commissioners were unable to withdraw outdoor relief, which continues to be in England the most important item. With the aged, the sick, and orphans the guardians deal at their discretion; but stringent rules for the relief of the able-bodied are in operation under the board, whose orders have the force of laws. In the rural districts guardians are prohibited from giving relief to the able-bodied out of the house, unless under a supplemental order in emergency. For other places the general rule forbids relief to be given in aid of wages, and requires work to be supplied. Exceptions are made by the board on the application of the unions when necessity arises. The expenditure is strictly guarded and examined by public auditors. A district medical officer, of whom one or more are appointed for each union, attends to all cases of sickness among the poor.

The fundamental rule adopted as to the relief of the poor was that each parish in England and Wales is bound to maintain its own poor. Overseers are required to be appointed in each parish every year; and these, along with the churchwardens, who are *ex officio* overseers, have the duty of providing the requisite funds. This is done by means of a poor-rate, which the churchwardens and overseers may levy on all the occupiers of land in the parish, after such rate has been confirmed by the justices. The rate specifies a certain sum in the pound which is to be levied, and the annual value of the various lands is then specified. The rate is thus a local tax on the occupier of the land, and not on the owner, unless he himself is also occupier. Owing to the mischiefs arising from the officials of each parish distributing the funds at their discretion, without uniformity of plan, authority was given to combine various parishes into one poor-law union, and a central controlling power was created in 1834 in the shape of the Poor-law Board, now the Local Government Board. When a union is formed the control of the expenditure is chiefly vested in the guardians of this union, who are elected by each parish, and who supervise the management of the union workhouse. They order the overseers of each parish to raise their due proportion of funds by a contribution order issued to such overseers, who are thereon bound to levy the amount by including it in the next poor-rate. The guardians are bound to contract for the provisions, clothing, fuel, &c. supplied to the workhouse, by means of sealed tenders, unless the quantity is less than a stated amount. The guardians profess only to relieve destitution already existing, and not to enable persons to keep off impending destitution. Hence they only supply the bare necessaries of life. They cannot, for example, advance or lend money to set up a poor person in trade.

Minute regulations are contained in the consolidated poor-law orders of the Board as to the classification of paupers in the workhouse, mode of admission, diet, discipline, and outdoor relief. It is provided that every able-bodied person requiring relief from any parish shall be relieved wholly in the workhouse, together with his wife and family, if any, and if not otherwise employed. But the relief may be given out of doors in cases of sudden and urgent necessity, of sickness, accident, and a few other cases. In general relief is confined to persons actually residing in some place within the union, except in case of casual destitution, or sickness and accident. Whenever outdoor relief is given to an able-bodied person half of it is to be in the form of articles of food or fuel. Relief is given only weekly where the pauper is not required to be received into the workhouse. No relief is to be given to able-bodied persons while they are employed for wages or hire by any person; and every able-bodied male person, if relieved out of the workhouse, shall be set to work by the guardians, and kept so employed while he continues to receive such relief. Wherever a person applies for parochial relief, if he or she has a father or grandfather, mother or grandmother, or child, who is able to maintain such pauper, the parish officers can obtain an order from justices to compel such relative to contribute a sum towards such maintenance. In some cases the guardians or overseers may employ the poor in public works; but this is seldom done except on occasions like the Lancashire distress. The law as to the settlement of the poor is somewhat intricate, and gives rise to much litigation. There are various grounds on which this settlement is acquired. Thus, every person has, *primâ facie*, a settlement in the parish where he was born, until some other is proved; and there are so many other qualifications that it is seldom a birth-settlement is resorted to. By marriage a woman immediately acquires the settlement of her husband, if he has one, whether the husband be an Englishman or a foreigner. If the husband has no settlement, then the wife is thrown back on her maiden settlement. If any person shall be bound an apprentice by indenture, and reside forty days under such apprenticeship, or has resided three years in a parish, or shall rent a tenement in a parish, and actually occupy the same, and be rated to the poor for one whole year, the rent being not less than £10, and paid by the person so actually occupying the tenement, or shall acquire an estate in land, however small in value, and reside forty days in the parish, or shall buy an estate, and the consideration amount to £30 at least, he shall by any of these methods acquire a settlement. Unless a pauper has acquired a settlement in the parish or union where he receives relief, he is liable to be removed compulsorily to the parish where he last acquired a settlement. Paupers who have resided for one whole year in the parish or union in which they became destitute cannot, however, be removed. The general expense of maintaining the poor is paid out of the common fund, and not by each parish in the union. When a pauper is sought to be removed it is necessary to take him before two justices of the peace for examination; and, on proper evidence of his settlement, the justices will make the order of removal, which is an authority to the overseers to take or send the pauper to the overseers of the parish of settlement. If, however, the pauper is too ill at the time to admit of removal without danger, the justices may suspend the order of removal till he is recovered. Whenever a pauper is to be removed the removing union is bound to give notice to the union of settlement; and it is on these occasions that so many obstinate and costly litigations take place as to which is the union of settlement. The union also may appeal to the court of quarter sessions against the removal order; and the quarter sessions may state a case for the opinion of the Court of Queen's Bench, if any nice point of law should arise, as frequently happens. This evil of litigation was greatly diminished by the Union Chargeability Act of 1865.

Scotland and Ireland have been legislated for separately. Their poor-laws are similar to the English in principle and practice; both are administered by a Central Board, which supervises the local bodies charged with relief, and in both the rate is levied on the annual value of real property. In Scotland the usual early legislation was passed against sturdy beggars and vagabonds. A system of assessment by the owners in each landward (i.e. non-urban) parish was set up in 1579 and 1663, and the general policy of the poor-laws was stated in proclamations by the Privy-council in the end of the 17th century. Until the 19th century, however, the poor in most parishes were supported out of the voluntary collections at the parish church, administered by the heritors and kirk-session. In spite of the opposition of Dr Chalmers, the present system in Scotland was instituted by the 8th and 9th Vict. chap. 83 (1845). The relief is administered by a parochial board, appointed by the ratepayers, the burgh magistrates, and the kirk-session. They appoint inspectors of the poor, who act as relieving-officers. The Scots law differs from the English and Irish in allowing no relief to able-bodied adults. Claimants must be aged, infirm, or disabled. Outdoor relief is the rule. Ireland had no poor-laws until the year 1838, when they were introduced by the 1st and 2d Vict. chap. 56. Each union has a workhouse managed by a Board of Guardians, elected by the ratepayers. Every destitute person has an absolute right to relief, which is administered almost entirely in the workhouse.

In Scotland, under the Poor-law Amendment Act, 1843, a central board (called the Board of Supervision) was established, which controls the parochial board of each parish in a manner similar to the Local Government Board in England, though with less extended powers. For example, although parochial boards may combine to build workhouses, there are no unions, properly so called, in Scotland. A settlement can be acquired in Scotland by residence of five years. Children follow the settlement of their parents, and wives that of their husbands; and if no other settlement be proved, then the settlement of birth is liable. In Scotland the poor-rate, except in a few cases where the local usage established in 1845 is followed, is universally imposed equally upon owners and occupiers according to the annual value of the houses, works, farms, mines, &c., by which is meant the net annual value, after allowing for repairs, insurance, and other expenses, and not the gross annual value appearing in the valuation-roll. Each parochial board, however, may exercise, with the approval of the Board of Supervision, an important power of classifying subjects according to the use to which they are put, and giving appropriate deductions from annual value. The tendency of this system is to approach an assessment imposed upon probable income, the older assessment in Scotland having frequently been laid on means and substance. In 1891 the general question of personal income, whether locally secured or not, being made to contribute to local taxation was being much discussed. Neither in England nor in Scotland has any attempt been made as yet to connect the representative County Councils with the poor-law administration, which remains with the Board of Guardians and Parochial Board in these countries respectively. The future relations between the latter bodies and the proposed District or Parish Council in England and the existing District Committee in Scotland may probably involve changes in poor-law administration in the direction of enlarging the area of assessment while retaining a localised agency for inspection. There is a general agreement in Scotland that at all events the larger towns should become responsible for their own poor without the intervention of a parochial authority; also that the area of the poor-law parish should be enlarged, though perhaps not to so great an extent as the English Union.

In Ireland a Poor-law Act was also passed, in 1838, and numerous amending statutes have followed, the code of laws being substantially founded on the English acts. There are special acts of parliament regulating the conditions on which paupers are removable between England, Scotland, and Ireland respectively.

In recent times a new policy has been devised, and in the German empire carried into practical effect, of providing against the evils which the poor-law is intended to alleviate. This policy is generally known as that of compulsory insurance. The German law of 13th June 1883 on sickness insurance was followed by that of 6th July 1884 on accident insurance, and that of 22d June 1889 on insurance against permanent disability and old age. Compulsory contributions are collected, to which the workman, the employer, and the state are all parties. The disability pension is given after five years' payment, the old age pension after thirty years' payment and after the age of sixty. Where the wages are below 350 marks the contribution is 14 pfennige per week. The disability pension starts from a minimum of 60 marks, to which the state adds 50 marks, the balance depending on the number of weekly contributions made. The old age pension is only 106·40 marks, or about £5, 10s. for the lowest class of salary. The grave difficulties of this scheme (which came into operation on 1st January 1891) are sufficiently obvious: (1) the workman has to keep a card-register all through life; (2) the employer has to submit to inspection, and to contribute a fixed sum for all wages under a certain figure; (3) the annual charge to the state is expected to exceed £4,000,000 sterling.

A comparison of the statistics of poor-law administration for England and Wales in 1872 and 1889 is interesting and encouraging. In 1872, the population (1871) of England and Wales being 22,712,266, there were 977,200 paupers, of whom 150,930 were able-bodied adults. The total cost of poor relief was £8,007,403, while the rateable value of property assessed was £107,398,242. In 1889, the population (1891) being 29,001,018, the corresponding figures were: paupers, 817,190, of whom 104,817 were able-bodied adults; cost, £8,232,472; property assessed, £139,636,307. The burden had diminished from 1s. 5½d. to 1s. 1½d. per £1 (see VAGRANTS).

In Scotland in 1890, the population (1891) being 4,033,103, the paupers were 92,324; the expenditure, including buildings, was £874,389, contributed to the extent of 76·8 by assessment, and grants in aid 17·6, being at the rate of 4s. 4d. per head of population, and 1s. 6d. lower than in England. The cost of the lunatic poor rapidly increases. In Ireland, the population in 1891 being 4,706,162, the average daily number, in 1890, of paupers in the workhouses was 43,536, and on outdoor relief 62,286, together 105,822. In 1889 the total expenditure on poor relief was £853,912. It would be misleading to draw inferences from these figures with respect to the condition of the respective countries, as the practical details of poor relief vary greatly.

In America the system is on the whole similar to the British. Every man is entitled by law to relief from the town of his settlement, the rate being assessed on whole towns, and not on parishes. The states have their own poor-laws, but paupers are removable from one state to another. Thus, in Massachusetts the unit of poor-law administration is the town or city, comprising in each case the surrounding rural district; while in New York the unit, generally speaking, is the county. These areas bear the burden of the settled poor; the unsettled poor (including Indians) are a charge upon the state. In New York one year's residence is sufficient to constitute a settlement. The policy in Massachusetts has been to encourage outdoor relief as being more economical, and for this reason to facilitate settlement. Any American becoming a pauper loses his state rights. The acts concerning Workhouses and Paupers in the Revised Code of Massachusetts may be taken to represent generally the state of the law throughout the Union. The former provides 'that any town may erect or provide a workhouse for the employment and support of all poor and indigent persons that are maintained by, or receive alms from, the town; all persons who, being able to work, and not having means to maintain themselves, refuse or neglect to work; all persons who live a dissolute vagrant life, and exercise no ordinary calling or lawful business; and all such persons as spend their time and property in public-houses, to the neglect of their proper business, or by otherwise misspending what they earn, to the impoverishment of themselves and their families, *are likely to become chargeable to the town or the commonwealth.*' The idle and the vagrant may be committed to the workhouse, and kept to labour, as in a house of correction. There are provisions for enforcing the claims of kindred and for the immediate relief of strangers. The administration is in the hands of overseers, but the counties elect superintendents, holding office for three years, who are again responsible to a Board of Supervisors. The New York State Board of Charities contracts with the counties for the housing in almshouses of certain classes of the state poor. The State Boards have large general powers of supervising the whole charitable, reformatory, and correctional system of the commonwealth, and report annually to the legislature on such questions. These boards are mainly nominated by the governor. Their functions and the results achieved are described in Mr Sanborn's Report to the Massachusetts Centennial Commission, 1st February 1876, and in the Report by Mr Henley to the Local Government Board in June 1877 (Parliamentary Papers, vol. xxxvii.), on the Poor-laws of certain of the United States, and on the combination there of private charity with official relief. The Massachusetts state workhouse and almshouse are at Bridgewater and Tewksbury respectively; the most important establishment in New York state is on Blackwell's Island. Generally the American system is marked by a high degree of classification, variety of work, special educational methods, and liberal treatment in the matter of diet. In the city of Boston, under special statutes, the authority of overseers is largely superseded by a 'Board of Directors for Public Institutions.' The former practice of levying a small poll-tax on poor immigrants was decided by the case of Henderson *v.* Wickham (1876) to be illegal. With reference to the efforts made by voluntary associations to assist and develop the working of the poor-law in America, Mr Henley reports that this cannot properly be done except under a well-considered regulation having the force of law, and a paid staff of officers acting under the orders of representative and responsible administrators, controlled by independent auditors.

There is no poor-law in the Australian colonies, but benevolent asylums for the infirm and destitute have become general, and hospitals are numerous in all the rising towns.

See Sir F. M. Eden, *The State of the Poor* (1797); Böckh's *Public Economy of Athens*, translated by Sir G. C. Lewis (2d ed. 1842); Sir George Nicholls, *History of the Poor-laws* (1854–56); Emmingham, *Das Armenwesen und die Armengesetzgebung in den europäischen Staaten* (Berl. 1870); *Poor Relief in different parts of Europe*, revised by E. B. Eastwick (1873); Fowle, *The Poor-law* (1882; new ed. 1890); Glen, *The Poor-law Statutes* (1873–79), and *General Orders of the Poor-law Commissioners* (10th ed. 1887); Archbold, *The Poor-law* (new ed. 1886); for Scotland, the *Digests* of Smith (1880) and Reid (1880); Mills, *Poverty of the State* (1887); Jessopp, *Arcady* (1887); Aschrott, *The English Poor-law System, Past and Present* (trans. 1888); Cowen, *The Poor-laws of the State of New York* (Albany, 1887); works on the poor-law of France by Reitzenstein (Leip. 1881), of Germany by Münsterberg (1887), and of Austria by Mischler (1890); Lentz, *Des Institutions de Bienfaisance et de Prévoyance en Belgique* (Brussels, 1860); *Edinburgh Review*, 149; *Quarterly Review*, 106; First and Sixth Reports of the Poor-law Commission (1834 and 1839), Annual Reports of Poor-law and Local Government Boards for England and Ireland, and Board of Supervision for Scotland; Reports on Poor-laws in Foreign Countries communicated to Local Government Board by the Foreign Office, with introduction by Andrew Doyle, Parliamentary Papers, 1875, vol. lxv.; also the articles on CHARITY, INSANITY, INSURANCE, MENDICANCY, VAGRANTS, WORKHOUSE.

Poor's-roll, in the practice of the law of Scotland, means the list of poor persons who are litigants, but unable to pay the expenses of litigation, and therefore are allowed to sue *in formâ pauperis.* This privilege is only granted on production of a certificate by the minister of the parish and two elders, setting forth his circumstances to their own knowledge and his general poverty. Notice is given of this to the adverse party, who is allowed time to inquire and oppose the application. Where the applicant is not in Scotland he may make a declaration of poverty before a magistrate—e.g. in Ireland. When the court is satisfied of the poverty the next thing is for the court to remit the matter to the reporters appointed by the Faculty of Advocates, who report whether there is a *probabilis causa*—i.e. a plausible cause of action. If this report is made it is considered conclusive, and the party is put on the poor's-roll. This warrant remains in force for two years, and during that time the pauper is exempt from all fees of court, and has the gratuitous services of counsel and agents, whose names appear on a list made by the Faculty of Advocates and other legal bodies. This provision for enabling paupers to carry on litigation is unknown in England or Ireland; for though a party may also be allowed there to sue *in formâ pauperis,* no provision is made by the court for giving him the gratuitous services of counsel and attorney. There is also a list of poor's counsel in the High Court of Justiciary. By an old custom a panel charged with murder may claim the gratuitous services of the Dean of Faculty. See IN FORMÂ PAUPERIS.

Popayan, capital of the department of Cauca in Colombia, stands in a fertile plain, 5700 feet above sea-level, near the river Cauca. It is a bishop's see, although its cathedral is now in ruins; and it has a university and normal school, and manufactures woollens. Founded in 1537, it rose to considerable importance; but the civil wars and an earthquake in 1827 have done much to reduce it. It is still of some consequence for the trade with Peru. Pop. 9000.

Pope, a fish of the Perch family. See RUFFE.

Pope (Gr. *pappas,* Lat. *papa,* 'father;' at first used of all bishops, from the 5th century gradually appropriated in the West to the Bishop of Rome, though still used of priests of the Greek Church), the Bishop of Rome, and supreme pontiff of the Roman Catholic Church. In this article an historic sketch will be given of the papacy as an institution. While the empire remained pagan the history of the bishops of Rome is obscure. Tradition confirmed by the faith of the church represents St Peter as the first Bishop of Rome. His immediate successors must have been recognised by Christians as the heads of Christ's church in the imperial city. Rome, the mistress of the world, was regarded by all men with reverence; all men came thither. So among Christians its bishop held a position of special dignity, and his judgment in ecclesiastical controversies was regarded as weighty. The heresy of Novatian, irregularly ordained Bishop of Rome during the lifetime of Cornelius (251), illustrated the importance of ecclesiastical unity, and so in the end tended to exalt the Bishop of Rome as the visible head of the church.

Under Constantine the empire became Christian, and Rome ceased to be the sole imperial city. The first of these changes vastly increased the dignity of its bishop; the second separated Latin from Eastern Christendom; the heresies of the speculative East found no acceptance in the West; the Bishop of Rome became the champion of orthodoxy, and was recognised by the Council of Sardica (347) as having appellate jurisdiction. Before the end of the 4th century Siricius, in publishing his decretal on clerical celibacy, assumed that the law of the Roman Church was binding everywhere. A great increase in power may be dated from the reign of Innocent I. (402–417), who claimed, as the successor of St Peter, superiority over western Christendom. The weakness of the western empire, the sack of Rome by the Visigoths, and the reverence which they paid to all things Christian, combined to make Innocent the most powerful person in the Christian city which rose upon the ashes of pagan Rome. Leo I. (440–461) maintained the claim of his see to the patriarchate of the West, while in Rome and Italy his fearlessness and prudence during the invasions of the Huns and Vandals gave him commanding influence. In 476 the empire of the west came to an end; the sole emperor of the Romans reigned at Constantinople. As long as he left Italy alone the papal power was the stronger for his absence. Amid the political disintegration of the West the church remained a stable bond of union; its centre was Rome, and the head of Rome was the pope, who became more and more regarded as the leader and defender of the people. Though Theodoric the Ostrogoth, while master of Italy, abstained from interference with the bishops of Rome until shortly before his death, some trouble arose from disputed elections. The election anciently lay with the clergy and people of the city, but as the interference of the laity led to violence, Symmachus decreed (498) that thenceforward the election should be decided by the votes of the Roman clergy. The reconquest of Italy by the generals of Justinian impaired the papal power, for he treated the pope like a rebellious servant. As the imperial power waned in Italy before the invasion of the Lombards, the pope again became pre-eminent. Neglected by her emperor, Rome found a protector in Gregory the Great (590–604), who was forced by the sufferings of the people to deal with the Lombards as a temporal prince. Yet his work was chiefly spiritual. Under him the right to the patriarchate of the West was firmly established; his holiness, his writings, and his reforms were universally admired; he exercised ecclesiastical discipline over the bishops of other lands, and he resented the indignity put upon his see by the assumption of the title 'Universal Bishop' by the Patriarch of Constantinople. Under him the Arian invaders of Italy, the Lombards, were converted to Catholicism; so, too, were the Arian Visigoths of Spain; while the heathen English first received the gospel from missionaries whom he sent out. Gregory completed the work of Innocent and Leo, and was the greatest of the three founders of the papacy of the middle ages.

During the 7th century the popes were much troubled by the eastern emperors, who were still lords of Rome and some parts of Italy. The emperors caused elections to the papacy to be submitted to themselves for confirmation, tried to force the popes to concur in their heresy concerning the will of Christ, and treated them as mere officers of their state. Martin I. (649–654), a strenuous opponent of the Monothelite heresy, was seized, carried off to Constantinople, and, after suffering ill-usage, died in exile. Even when the emperors again became orthodox they still humiliated the popes. Meanwhile the papal power was growing in western lands: the English turned from Columban usages, and professed obedience to Rome (664); the Burgundians and Frieslanders received the gospel; and early in the 8th century Boniface won over a large part of Germany to the faith, acting on a commission from Gregory II. (715–731). In Gregory's time the Emperor Leo III. forbade the worship and even the use of images throughout his empire, whence he and his successors who adopted the same policy are called Iconoclasts (image-breakers). Gregory refused to obey his decree, and was upheld by the Italians and the West generally. The imperial governor in Italy, called the exarch, sought to compel the pope to obey his master, and the Italians rose in the pope's defence. The Lombards took advantage of the confusion to conquer the exarchate. They threatened the lands of the church; no help was to be had from the emperor; Italy was virtually severed from the empire. In his distress, Gregory III. (731–741) appealed for help to the Catholic Franks. Twice Pepin brought an army of Franks to the pope's relief, and routed the Lombards; he won back from them all that had belonged to the exarchate in Northern Italy, and bestowed it on the Roman see (754). This was the beginning of the temporal power of the popes. In return Pepin accepted from the pope the title of Patrician of the Romans, an acknowledgment of his rights in Rome, and of his duty as the defender of the church. He had already received the papal sanction for the deposition of the Frankish king and his own coronation; the pope's action in this matter formed a precedent not forgotten by his successors. Pepin's son, Charles (Charlemagne), again routed the Lombards, and renewed his father's donation. At another visit he declared Leo III. (795–816) guiltless of certain crimes with which he was charged, and on Christmas Day, 800, Leo crowned him emperor. It was contrary to the feelings of the age that the church should lack an imperial protector; the breach with the eastern empire was complete, and the imperial throne at Constantinople was held to be occupied unlawfully. While Leo had allowed his cause to be judged by a temporal prince, and had accepted him as master of Rome and emperor, he had assumed as God's vicar the right to bestow the imperial crown, which carried with it the lordship of the world.

During the struggles that preceded the break-up of the Frankish empire the popes generally favoured the princes of the West (or Gaulish) Franks, rather than of the East (or German) Franks. The rise of separate nations threw political power into the hands of the great churchmen of the new states. The pontificate of Nicolas I. (858–867) was marked by the successful assertion of the authority of Rome in correcting the vices of princes, and compelling the submission of the most powerful prelates of the West, such as the Archbishop of Ravenna, certain German bishops who upheld their king in his evil ways, and even Hincmar of Rheims. His chief weapon against the bishops was a series of early decretals, now known to have been forgeries not emanating from Rome. The lofty policy of Nicolas was pursued, though with less success, by Hadrian II. (867–872). Meanwhile a dispute begun in the time of Nicolas was leading the Greek Church towards schism. During the papacy of John VIII. (872–882) the Saracens established themselves in Southern Italy and threatened Rome, and the courageous pope sought help on all sides against them and his Christian enemies. The anarchy in Italy which followed the extinction of the Carolingian empire had the worst effects on the papacy. Things were darkest in the first half of the 10th century. Competitors for power treated the popes as their tools, and elections to the papacy were decided either by the nobles of Rome, or the mob, or any foreign power which chanced to be master of the city. No reverence was paid to the papal office, and several of those raised to it were men of fierce and unholy lives. Pressed by enemies, John XII. sent for help to Otto the Great, king of Germany, and, by crowning him emperor in 962, revived the empire; he acknowledged Otto as his sovereign, and the Romans swore to elect no pope without the emperor's consent. Though Otto, his son, and his grandson did something towards restoring to the papacy its proper dignity, the attempt to regenerate it failed; and, after the death of Otto III., it was again degraded by falling under the control of the counts of Tusculum.

The emperor Henry III. regenerated the papacy by releasing it from the control of the Roman nobles, and conferring it on German churchmen of high character. One of these, Leo IX. (1049–55), commanded the respect of Christendom by his revival of ecclesiastical discipline. He was taken prisoner when attempting to check the Norman invaders of Italy, but the Normans reverenced their captive, and after his death acknowledged the pope as the feudal lord of their conquests, Sicily and Southern Italy. Under the guidance of Hildebrand (see GREGORY VII.) the papacy advanced rapidly in power and repute. By a decree of Nicolas II. (1059–61) in 1059 the right of election was vested in the cardinals. After a severe struggle clerical celibacy was enforced, and the clergy thus separated from worldly ties became devoted to the interests of their order and its earthly head. Simony was strictly repressed. A further advance was made when Gregory VII. (1073–86) forbade churchmen to receive investiture of their benefices from lay hands. This touched the sovereignty of lay princes. He was opposed by the Emperor Henry IV. (q.v.). The principle at stake was the church's independence of the lay power, its dependence on its own visible head, and its consequent salvation from feudal bonds and abuses. Gregory asserted the highest claims, and deposed the emperor, who made a humiliating submission at Canossa in 1077. Pope and emperor each found support, the pope in the discontent of the Germans and in the Normans. War broke out, an antipope and rivals to the emperor were set up. The struggle lasted beyond the lives of Gregory and Henry IV., and was decided in 1122 by the Concordat of Worms, which, though a compromise, was a substantial victory for the papacy. During the struggle the Crusades brought a vast increase of power to the pope, for they made him the head of Christendom in arms and the director of its forces. Though disturbed for a few years by a schism, the result of Roman faction, the reign of Innocent II. (1130–43) was a time of greatness. The religious orders had from the first rise of western monasticism been strong upholders of the papacy, and each order as it was founded laid its new-born zeal at the disposal of Rome. Innocent gained much from the support of St Bernard, backed by all the strength of the Cistercian order. Under Hadrian IV. (1154–59), a native of St Albans, named Nicolas Brakespear, the only Englishman who has been raised to the papal chair, the papacy entered on a struggle with the Emperor Frederick I., who was determined fully to enforce his imperial rights. In theory pope and emperor supplied each the complement of the other's power, the one being God's vicegerent in spiritual, the other in worldly things; but the limits dividing their spheres of action were undefinable, and when both were strong they were almost forced into hostility. Among the definite causes of dispute was the sovereignty of the pope over certain parts of Italy which had been bequeathed to the papacy by the Countess Matilda of Tuscany (died 1115). The popes were upheld by a league of the Lombard cities, which carried on a long war with the emperor; he was defeated, and in 1177 submitted to Alexander III.

The papal authority reached its greatest height under Innocent III. (1198–1216), who ruled as the head of a vast spiritual empire, founded on the reverence of mankind for righteousness. He was master in Italy. His strife with two emperors ended in the success of his ward, Frederick II., inheritor of the Sicilian throne, whom he crowned emperor. By excommunication he forced the king of France to put away his paramour; he deposed John of England, and compelled him to become his vassal. The kings of many nations submitted to his rebukes. The Latin conquest of Constantinople brought the East for a while under the papal obedience, and a crusading army began to extirpate the heretics of Languedoc. More important than all was the foundation of the orders of St Dominic and St Francis, which gave the pope well-organised and generally devoted forces in every land. Innocent was the first pope that exercised full dominion over the States of the Church. Their position as temporal sovereigns brought his successors into collision with Frederick II., who, already king of Sicily and Naples, wished to gain Central Italy. Had he done so he would have made the papacy dependent on himself. Gregory IX. (1227-41) and Innocent IV. (1243-54) resisted him by every means, spiritual and temporal, at their disposal. The Italian cities of the Guelfic or papal party were their strongest allies. Innocent declared the emperor deposed, and found allies against him in Germany. The papal resources were strained; money was extorted from foreign countries, especially from England, and the papacy lost in repute by its demands. The struggle was continued against Frederick's house until it was extinguished. All danger of subjection to the empire was past; but the papacy owed its final success to Charles of Anjou, who was invested with the kingship of Sicily and Naples. This gave France an interest in Italy, and led to the subjection of the papacy to the French king. The imperial power having fallen, Boniface VIII. (1294-1303) sought to take the emperor's place as head of Europe. His aims were secular and his temper violent. National monarchies were being built up in England and France by strong kings. The claims of Boniface were subversive of their domestic policy; they refused to admit them, and he quarrelled with both kings. The Italian partisans of Philip IV. of France seized him; he was brutally treated, and died soon afterwards.

Philip procured the election of a Frenchman, Clement V. (1305-16), who resided at Avignon in Provence, afterwards sold to the papacy. There the papal court remained for about seventy years, a period called the 'Babylonish Captivity,' during which the popes were much under the influence of their powerful neighbour of France. A long struggle with the Emperor Louis IV., in which the popes were successful, injured the reputation of the papacy. During its course men began to criticise the character and claims of the papacy. It was attacked on ecclesiastical grounds by the 'Spiritual Franciscans,' and by scholars like Ockham, and on political by the imperial legists. The court at Avignon was luxurious and venal. Little revenue came from the States of the Church, which fell into disorder during the pope's absence, and large sums were raised from national churches and by corrupt means. Fearing to lose all authority in Italy, Gregory XI. returned to Rome in 1378, but died there immediately afterwards. Urban VI. was elected, but the French cardinals, supported by the king of France and the Angevin queen of Naples, rebelled, and elected Clement VII. During the schism which ensued the obedience of Europe was divided between rival popes. In order to heal the schism the cardinals revived the long disused authority of a general council. The Council of Pisa (1409) failed of its object. The reformation as well as the reunion of the church was largely desired. In England Wyclif urged apostolic poverty as the only cure for abuses. His teaching was of little practical importance, save that it helped forward the revolt of Bohemia, where the Slavs regarded the Latin liturgy as a badge of German superiority. Many orthodox churchmen desired to see the abuses of the papal court reformed and the churches of the several countries preserved from undue papal interference. By the Council of Constance the schism was closed, and Martin V. (1417-31) was elected pope; the council proved unequal to deal with reform. Martin's wise administration raised the papacy from its low estate; he regained its possessions, and made its power widely felt. The Bohemian war made another council inevitable; it met at Basel in 1432, it attacked Eugenius IV. (1431-47), raised up an antipope, and ended in contempt. Meanwhile the Greeks, hoping for help against the Turks, submitted to the holy see. In another respect the papacy was specially affected by the troubles of the Greeks. It readily adopted the learning and culture brought by the Greeks to Italy. The genius of Nicolas V. (1447-55) conceived a new ideal. The 15th century was an age of splendour; its magnificence was conspicuous in the lives not merely of princes, but even of nobles, merchants, and bankers. As the papacy outstripped all earthly powers in greatness, so in the mind of the pontiff was Rome its seat to impose on the imagination of all the world by an exterior grandeur which should outshine that of the city of any earthly potentate. But his was no vulgar ideal of mere magnificence; Rome to him was to be the protectress of the arts, the home of learning, the central point of culture in the Christian world; and all this was but to typify and render sensible the supremacy of religion.

Under Pius II. (1458-63) the pope again appeared as the natural head of the forces of Christendom united in arms against the infidel. Pius died when actually setting out on a crusade, and his plans failed, but they gave the papacy renewed importance in the eyes of Europe. His successors, inheriting generally the views of Nicolas V. in regard to Rome as the material expression of papal greatness, did not inherit the loftiness of his spirit. Whilst pursuing the idea of surrounding the papal dignity with pre-eminent splendour, some, like Paul II. (1464-71), betrayed a sympathy for the pagan renaissance which is unmistakable, and which cannot fail to have diminished the veneration due to the head of the church. Other popes, like Alexander VI. (1492-1503) or Julius II. (1503-13), were bent on founding in the Italian states princedoms either for their relatives or for the papal chair. This is specially true of Alexander (Borgia), whose earlier life had been immoral, and who as pope caused scandal by his undisguised love of worldly pleasures; whilst his son Cæsar, an able, unscrupulous man, made matters worse by his crimes.

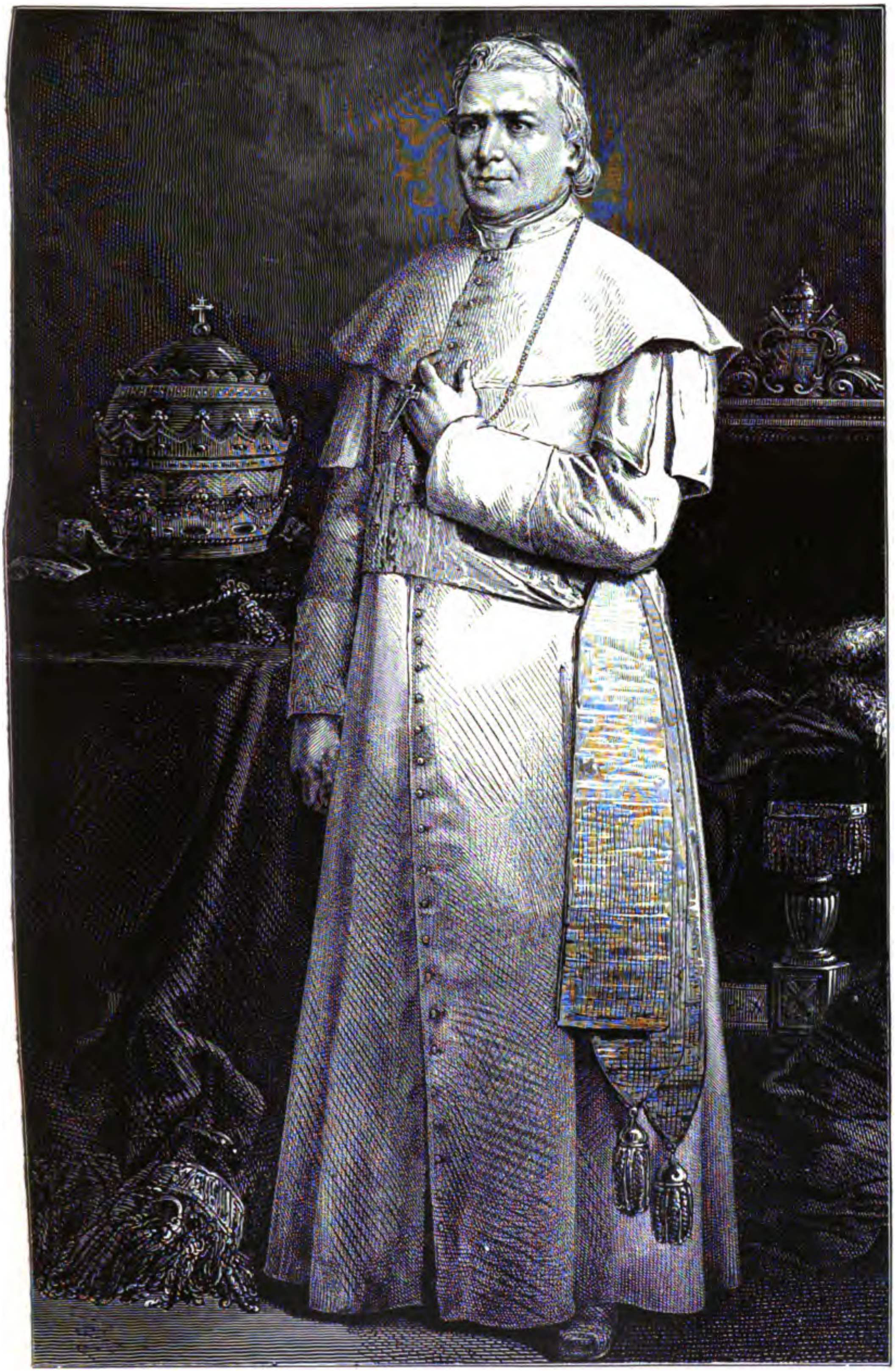
Meantime the idea of reform had not slept—witness the activity of such a man as Cardinal Nicolas of Cusa; but efforts like his were inspired by individual minds of a specially lofty turn, and at most had the countenance of supreme authority; however widespread, they were local and were not that general 'reformation in head and members' which had been so loudly and so earnestly called for. The inevitable day of reckoning came, but in a guise which none expected. In place of reform the Protestant Reformation effected a ruthless breach with the past, and instead of the enforcement ot the law of the church that law itself was repudiated. Events now convinced, but too late, the most unwilling minds that what priests and bishops, regulars and seculars, theologians and zealous laymen had pressed for had been indeed the need of the time. Rome itself furnished a lamentable illustration of the ruin that had come upon the church. Clement VII. (1523–34), though he had his own political aims, was as a man not unworthy of his office, and by character the least able to bear the brunt of the storm; yet it was he who witnessed Rome ruthlessly sacked (1527), and that by the troops of Charles V., who during the first half of the 16th century was the mainstay of the Catholic cause, and by his dignity as then emperor-elect the recognised protector of the Roman Church. The impression made by this event on all religious minds is well expressed in the measured but weighty words of Cardinal Sadoleto. 'If those,' he writes, 'had done their duty on whom the obligation chiefly rested (I speak not of the pontiff whose virtues, mildness, and uprightness are known not as great merely but as admirable), the priesthood would still be venerated as of old, and not now exposed to injury and contempt. I say what I feel, and God and man are my witnesses, that this best of pontiffs desired to cure these corrupt morals; but the thing needed the knife, not a salve, and his nature and kindly spirit shrank from strong measures.'

From this point the history of the papacy to the close of the 18th century falls naturally into three divisions. From 1530 to the early years of the 17th century there takes place a reconstitution of the papacy on the basis of Catholic reform; next follows a century of normal activity on the new basis thus formed; thirdly, a century of decline in influence, the term of which is marked by the conclave in Venice which resulted in the election of Pope Pius VII.

(1) No time was lost in setting about the work which now all recognised as the imperative need. The papacy was not prominent in the work of reform; but the countenance given by Rome to men like Contarini, Pole, and Ghiberti is sufficient evidence that the popes themselves did not intend to be behindhand. The pontificate of Paul III. (1534–50) witnessed two events of considerable importance to the future of the church—the institution of the Jesuits, and the commencement of the Council of Trent. In 1534 Ignatius of Loyola pronounced his vows in the presence of the pope, and thus laid the foundations of a society of men specially devoted to the service of the holy see, with which its fortunes have subsequently been intimately associated. The ideal conceived by Ignatius was that of an order governed by 'a general whom all should be bound to obey under vow, who should be perpetual, possessed of absolute authority, subject entirely to the pope, but not liable to be restrained by any chapters of the order.' Paul III., on September 27, 1540, by the bull *Regimen militantis*, gave the papal approval to the 'form of life' designed by the founder. The Council of Trent, whatever be the import of its dogmatic definitions, is essentially a council of disciplinary reform; but in this place it requires notice as being a council of which, though held at a distance from Rome, the control and effective action really vested in the pope. After long negotiations the council convoked by Paul III. met at Trent in December 1545. As early as 1542 the papal legates had reached that city; but the war between France and Germany which then broke out made the further delay inevitable. It is worth remarking, as showing the influence already possessed by the newly-founded Society of Jesus, that two of its members came to the council as papal theologians. On April 28, 1552, the sittings of the fathers were suspended for two years. On November 29, 1560, the then pope, Pius IV., convoked it for the following Easter. The decree of reformation of morals and government, consisting of eighteen chapters, was adopted in the 23d session. It contained a number of important provisions on the residence of bishops and parish priests, upon the qualifications for the priesthood, and for the erection of seminaries for clerical training. In the 25th session was passed a series of regulations for the regular clergy and nuns. The decrees of the council were formally confirmed by Pius IV. in 1564. By its declarations on dogmatic theology the council gave prominence to the differences existing between Catholics and non-Catholics, and thus more sharply divided Christendom into the spiritual subjects and the enemies of the papacy. The cause of Catholic reform dominated the policy of Paul IV. (1555–59), and from his time the constitution of the Roman see in its modern aspect progressed practically without a check. In this period, too, falls the establishment of administrative bodies called 'sacred congregations,' which henceforth are the recognised and usual organs for the exercise of papal power in the government of the church. Lesser objects were not neglected. If modern Rome has been for so long the city in Europe which has attracted and deserved to attract the curiosity and admiration of all men, this is largely due to the continuation during this period of the works begun under the inspiration of Nicolas V. It is often forgotten that St Peter's itself was not completed till 1626.

(2) By the beginning of the 17th century the papacy as an institution had reconstituted itself in accordance with the circumstances induced by the Protestant Reformation. Its history in this second period shows no such stirring events as had marked the preceding age. But for its future the transfer of the weight of political power from the House of Austria to that of France was of decisive importance. The full consequences of the change were not, of course, perceived immediately, but it is certain it was recognised in Rome as momentous, and was not viewed with satisfaction.

(3) The conclave which assembled in Rome in the year 1700 determined the history of the papacy in the third period. Among the cardinals the one who enjoyed the most respect was the Dominican Cardinal Orsini, the head of a body of cardinals whose views are sufficiently indicated by the name given to them—the *Zelanti*. He was a man of illustrious family, dominated by a sense of duty in all things great and small, of slender intellectual capacity indeed, but endowed with a rare gift of discerning merit and capacity in others; free from petty jealousy, he knew how to gather round him men of ability, and how to use them when he had them. But the change in the balance of power effected during the 17th century determined the election of Cardinal Albani, to whom was given the whole weight of the influence of France. As Clement XI. (1700–21) he was in the most important acts of his reign inspired by Louis XIV. To outward appearance, in the first half of the 18th century, the position of the papacy in its relations with princes and peoples remained as it had been before. To some extent also it is certain that Benedict XIV. (1740–58), by a charm of character which impressed even one so keenly alive to the weak side of humanity as Walpole, staved off the evil day. But before his death the signs of disintegration were unmistakable. Throughout Europe luxury and an accompanying dissoluteness of manners had increased to shamelessness, whilst the school of infidelity in France was now fully organised and confident of victory. The full effect, moreover, of the displacement of the imperial House of Austria as the political prop of the church in favour of France now made itself manifest, and the Jansenist troubles of the 17th century bore bitter fruit. The whole church of France had become involved in the quarrel. On



PIUS IX.

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the one side the bishops nominated by the king insisted, as in duty bound, upon the acceptation of the bull *Unigenitus* issued by Clement XI. in 1713, whilst on the other a large body of the clergy and a not less large body of the laity resisted a bull involving assent to a lengthy series of abstract theological propositions. Of the violence of these theological quarrels it is now almost impossible to form an idea, and more than one cool observer believed schism in France to be imminent. Thus, whilst the papacy needed every aid to stem the rising tide of infidelity, it found those on whose help it should have been able to depend involved in internecine conflict. The second half of the 18th century was for the papacy a slow agony, the successive stages of which do not call for notice here. By the suppression of the Jesuits the papacy not merely deprived itself of an able body of strenuous defenders, but cast by the very act dismay among the ranks of many devoted to the church. Moreover, the manner of the fall of the Society of Jesus was not calculated to lessen the weight of responsibility, or it may be said the odium, attaching to so grave an act. It fell with dignity, and the cruelties inflicted upon many of its members called forth in unlikely quarters sympathy for the victims. It was natural that onlookers should be more impressed by these more recent occurrences than by the long chain of events which had brought the holy see to view the suppression of the Order as inevitable.

Even the faithful House of Austria now fell away, and the Emperor Joseph II. assumed to himself and exercised functions which the popes had ever claimed as pertaining to the supreme ecclesiastical power. The fruitless journey of Pius VI. (1775–99) to confer with Joseph II. at Vienna in 1782 is the outward evidence of the humiliation of the papacy. Before long the Revolution which broke forth in France swept away king and priest and all established institutions in church and state, involving Catholic Europe in disorder. An outbreak in Rome, fomented by the agents of the French ambassador, forced the pope from Rome as a prisoner (1798); and, after his removal from one place of confinement to another, Pius VI. died at Valence on 29th August 1799, Napoleon having, two years before, in anticipation of his death, given orders that no successor should be elected, and that the papacy should be abolished.

A few words must still be given to the present and fourth period of the modern age of the papacy. Through the instrumentality of schismatic Russia the conclave of cardinals met in the monastery of St Giorgio Maggiore at Venice on the 1st of December 1799. The conclave lasted for nearly four months. Just as the conclave of 1700 was decisive as regards the fortunes of the papacy in the 18th century, so was this of 1800 as regards the 19th century. The possible candidates were numerous; the choice finally rested on the Benedictine cardinal, Chiaramonti. Nothing better illustrates the confusion of ecclesiastical ideas in the 18th century, or a chief source of the weakness of the church, induced by universal suspicion, than an accidental expression used by a member of the conclave, Cardinal Langini, in his private diary. Explaining the objections felt by some in the conclave to Chiaramonti, he notes under 12th March 1800, only two days before the election, 'Chiaramonti, as a Benedictine, being suspected of Jansenism.'

No one who reviews the history of the 19th century can doubt that events have justified the choice of the cardinals. After enduring shocks which to human eyes seemed to threaten its very existence, the papacy has become once more a factor of the greatest potency in the civilised world. That this is so is largely the result of the personal character of Chiaramonti, the new pope, who as Pius VII. (1800–23) combined a conciliatory temper with an unconquerable inflexibility when vital principles were involved. The history of his relations with Napoleon I. is sufficient of itself to explain how he, destitute apparently of all human help, won for himself the respect of those who would naturally have been the first to contest his spiritual authority. In the space of his pontificate he was able to restore the papacy to the position which it had held a hundred years before. Under him began that restoration of Catholic life and Catholic aim which has attracted some of the ablest intellects and most statesmanlike minds of the century to the service of the church; and under him and his successors was accumulated a reserve of Catholic strength which is one of the most interesting and remarkable features of the 19th century.

The successors of Pius VII. by the personal purity of their lives contributed greatly to advance this Catholic revival. The reigns of Leo XII. (1823–29), Pius VIII. (1829–30), and Gregory XVI. (1831–46) witnessed an increase of zeal on the part of the Roman Catholic clergy everywhere, and a marked development of the spirit of loyalty to the holy see both in them and in the ranks of the Catholic laity. In France the exertions of Montalembert, Lamennais, and others firmly established a new school, which, whilst professing enlightened liberal doctrines, was founded on the principle that complete and loyal submission to the teachings and direction of Rome was the first duty of every Catholic. In England the passing of the act for Catholic emancipation in 1829 gave liberty, and with it new life, to Roman Catholics.

Pius IX. (1846–78) was chosen to succeed Gregory XVI. He had generally been credited with advanced liberal views, and had exerted himself during the civil disturbances under his predecessor to secure some mitigation of the punishments meted out to the political prisoners. He began his rule with a proclamation of general amnesty for such offenders, and for the first two years he maintained a policy of liberal political reform. At the end of that time he had practically become a prisoner in the hands of the revolutionary party, and on November 24, 1848, he escaped in disguise from Rome to Gaeta. Here he remained till in April 1850 he was brought back to Rome by the French troops. On September 29, 1850, he took the important step, as regards the English Catholics, of establishing a hierarchy of bishops in communion with the Roman see. On December 8, 1854, he issued the bull *Ineffabilis Deus*, by which the doctrine of the Immaculate Conception of the Blessed Virgin Mary was declared to be a dogma of the Christian faith. Ten years later (December 1864) he published the famous encyclical *Quanta cura*, together with the *Syllabus*, or catalogue of errors of the day which called for special condemnation. Romagna, a portion of the pontifical states, was occupied by the Sardinian troops in 1860, and in September of the same year, after a stubborn resistance made by the pope's troops at Ancona, most of the States of the Church were annexed to the kingdom of Victor Emmanuel. From that time till 1870 Pius IX. was maintained in Rome by a French garrison. On the 18th of July of that year (1870) the Vatican Council, which the pope had assembled at Rome, decreed the dogma of Papal Infallibility part of the faith of the church. Upon the outbreak of the war between France and Prussia the French garrison was withdrawn from Rome, and on the news of the defeat of the French the Sardinian troops moved upon Rome. After a slight show of resistance Victor Emmanuel's army entered the city on the 21st September 1870, and from that time the temporal power of the pope has ceased to exist. Pius IX. for the rest of his life remained in the Vatican, refusing to recognise what had been done. The position in which he was thus placed as a virtual prisoner in his palace aroused the sympathy of the Catholic world at large.

Leo XIII. (1878), who was chosen as his successor, has since continued to maintain towards the kingdom of Italy the attitude taken up by Pius IX. Although shut up in the Vatican palace, Pope Leo has possessed himself of an influence which has made itself felt, and has won for himself the respect of European powers. In Germany his wise diplomacy brought about a mitigation of the anti-Catholic 'May Laws.' In a question of disputed rights over the Caroline Islands his arbitration was sought by Germany and Spain, and his award accepted as final. The state of Ireland caused him to despatch thither a special envoy to study on the spot and report to him the nature of the agrarian difficulties which had arisen there, and the attitude of the Catholic clergy towards the grave questions involved in the struggle between the landlords and tenants. As a result of this mission, in May 1888 the pontiff issued a circular to the bishops of Ireland in which he condemned as immoral boycotting and the Plan of Campaign. In June 1891 the pope published an encyclical, addressed to the Catholic bishops, dealing with the principles which should govern the consideration of the questions involved in struggles between capital and labour.

See Anastasius, *Liber Pontificalis sive Vitæ nonnullorum Pontiff. ap. Rer. Ital. SS.* iii.; Baronius (Pagi), *Ann. Eccl.* i.-xlii.; Theiner, *Cont. Baronii Ann.*; Milman's *Latin Christianity*; Bryce's *Holy Roman Empire*; Creighton's *History of the Papacy during the Reformation*; Ranke's *History of the Popes*; Pastor, *Geschichte der Päpste der Renaissance*. With these may also be studied many chronicles and histories, and specially the collection of documents entitled *Regesta Pontiff. Rom.* ed. Jaffe and Pothast; of a new and enlarged edition the 3d vol. was published at Leipzig in 1891. See also the articles BULL, ENCYCLICAL, INFALLIBILITY, ITALY, NORMANDY, REFORMATION, ROMAN CATHOLIC CHURCH; and the separate articles on the chief of the popes, as given in the following list, in which the order and dates of accession are taken from P. B. Gams's *Series Episcoporum*, the names of the antipopes being given in italics.

St Peter	41
Linus	67
Cletus, or Anacletus	79
Clement I.	91
Evaristus	100
Alexander I	109
Sixtus I. (Roman)	119
Telesphorus (Greek)	128
Hyginus (Greek)	138
Pius I. (Italian)	142
Anicetus (Syrian)	157
Soter (Greek)	168
Eleutherus (Greek)	177
Victor I. (African)	190
Zephyrinus	202
Callixtus I. (Roman)	218
Urban I. (Roman)	222
Pontianus (Roman)	230
Antherus (Greek)	235
Fabianus (Roman ?)	236
Cornelius (Roman)	251
Novatianus.	
Lucius I. (Roman)	253
Stephen I. (Roman)	254
Sixtus II. (Roman)	257
Dionysius (Greek)	258
Felix I. (Roman)	269
Eutychianus (Tuscan)	275
Caius (Roman)	283
Marcellinus (Roman)	296
Marcellus I. (Roman)	307
Eusebius (Greek)	309
Melchiades (African)	310
Sylvester I. (Roman)	314
Marcus (Roman)	336
Julius I. (Roman)	337
Liberius (Roman)	352
Felix II.	
Damasus I. (Spaniard)	366
Ursicinus.	
Siricius (Roman)	384
Anastasius I. (Roman)	398
Innocent I. (Italian)	402
Zosimus (Greek)	417
Boniface I. (Roman)	418
Celestinus I. (Roman)	422
Sixtus III. (Roman)	432
Leo I. (Tuscan)	440
Hilarius (Sardinian)	461
Simplicius (Italian)	468
Felix III. (Roman)	483
Gelasius I. (Roman)	492
Anastasius II. (Roman)	496
Symmachus (Sardinian)	498
Hormisdas (Italian)	514
John I. (Tuscan)	523
Felix IV. (Italian)	526
Boniface II. (Roman)	530
John II. (Roman)	532
Agapetus I. (Roman)	535
Sylverius (Italian)	536
Vigilius (Roman)	537
Pelagius I. (Roman)	555
John III. (Roman)	560
Benedict I. (Roman)	574
Pelagius II. (Roman)	578
Gregory I. (Roman)	590
Sabinianus (Tuscan)	604
Boniface III. (Roman)	607
Boniface IV. (Italian)	608
Deusdedit I. (Roman)	615
Boniface V. (Neapolitan)	619
Honorius I. (Italian)	625
Severinus (Roman)	640
John IV. (Dalmatian)	640
Theodorus I. (Greek)	642
Martin I. (Tuscan)	649
Eugenius I. (Roman)	654
Vitalianus (Italian)	657
Deusdedit II. (Roman)	672
Domnus I. (Roman)	676
Agathon (Sicilian)	678
Leo II. (Sicilian)	682
Benedict II. (Roman)	684
John V. (Syrian)	685
Conon (Greek)	686
Sergius I. (Sicilian)	687
John VI. (Greek)	701
John VII. (Greek)	705
Sisinius (Syrian)	708
Constantine (Syrian)	708
Gregory II. (Roman)	715
Gregory III. (Syrian)	731
Zacharias (Greek)	741
Stephen II. (Roman)	752
Stephen III. (Roman)	753
Paul I. (Roman)	757
Constantinus II	767
Stephen IV. (Sicilian)	768
Hadrian I. (Roman)	772
Leo III. (Roman)	795
Stephen V. (Roman)	816
Paschal I. (Roman)	817
Eugenius II. (Roman)	824
Valentinus (Roman)	827
Gregory IV. (Roman)	827
Sergius II. (Roman)	844
Leo IV. (Roman	847
Benedict III. (Roman)	855
Nicolas I. (Roman)	858
Hadrian II. (Roman)	867
John VIII. (Roman)	872
Marinus I.	882
Hadrian III. (Roman)	884
Stephen VI. (Roman)	885
Formosus	891
Sergius.	
Boniface VI. (Roman)	896
Stephen VII. (Roman)	896
Romanus (Tuscan)	897
Theodorus II. (Roman)	897
John IX. (Italian)	898
Benedict IV. (Roman)	900
Leo V	903
Christopher (Roman)	903
Sergius III. (Roman)	904
Anastasius III. (Roman)	911
Lando (Roman)	913
John X. (Roman)	914
Leo VI. (Roman)	928
Stephen VIII. (Roman)	929
John XI. (Tuscan)	931
Leo VII. (Roman)	936
Stephen IX. (Roman)	939
Marinus II.	942
Agapetus II	946
John XII. (Roman)	955
Leo VIII.	963
Benedict V. (Roman)	964
John XIII. (Roman)	965
Benedict VI. (Roman)	973
Benedict VII. (Roman)	974
John XIV	983
Boniface VII. (Roman)	984
John XV. (Roman)	985
Gregory V. (German)	996
Sylvester II. (French)	999
John XVII. (Italian)	1003
John XVIII. (Roman)	1003
Sergius IV. (Roman)	1009
Benedict VIII. (Italian)	1012
John XIX. (Roman)	1024
Benedict IX. (Italian)	1033
Sylvester.	
Gregory VI. (Roman)	1045
Clement II. (Saxon)	1046
Damasus II.	1048
Leo IX. (German)	1049
Victor II. (German)	1055
Stephen X. (Italian)	1057
Benedict X. (Italian)	1058
Nicolas II. (French)	1059
Alexander II. (Italian)	1061
Gregory VII. (Tuscan)	1073
Clement III.	
Victor III. (Italian)	1086
Urban II. (French)	1088
Paschal II. (Tuscan)	1099
Albert.	
Theodoric.	
Gelasius II. (Italian)	1118
Callixtus II. (French)	1119
Honorius II. (Italian)	1124
Innocent II. (Roman)	1130
Anacletus.	
Celestinus II. (Tuscan)	1143
Lucius II. (Italian)	1144
Eugenius III. (Italian)	1145
Anastasius IV. (Roman)	1153
Hadrian IV. (English)	1154
Alexander III. (Italian)	1159
Victor.	
Paschal.	
Callixtus.	
Lucius III. (Italian)	1181
Urban III. (Italian)	1185
Gregory VIII. (Italian)	1187
Clement III. (Roman)	1187
Celestinus III. (Roman)	1191
Innocent III. (Italian)	1198
Honorius III. (Roman)	1216
Gregory IX. (Italian)	1227
Celestinus IV. (Italian)	1241
Innocent IV. (Italian)	1243
Alexander IV. (Italian)	1254
Urban IV. (French)	1261
Clement IV. (French)	1265
Gregory X. (Italian)	1271
Innocent V. (Italian)	1276
Hadrian V. (Italian)	1276
John XXI. (Portuguese)	1276
Nicolas III. (Roman)	1277
Martin IV. (French)	1281
Honorius IV. (Roman)	1285
Nicolas IV. (Italian)	1288
Celestinus V. (Italian)	1294
Boniface VIII. (Italian)	1294
Benedict XI. (Italian)	1303
Clement V. (French)	1305
John XXII. (French)	1316
Nicholas.	
Benedict XII. (French)	1334
Clement VI. (French)	1342
Innocent VI. (French)	1352
Urban V. (French)	1362
Gregory XI. (French)	1370
Urban VI. (Neapolitan)	1378
Clement VII.	
Boniface IX. (Neapolitan)	1389
Benedict XIII.	
Innocent VII. (Italian)	1404
Gregory XII. (Venetian)	1406
Alexander V. (Italian)	1409
John XXIII. (Italian)	1410
Martin V. (Roman)	1417
Eugenius IV. (Venetian)	1431
Felix.	
Nicolas V. (Italian)	1447
Callixtus III. (Spaniard)	1455
Pius II. (Italian)	1458
Paul II. (Venetian)	1464
Sixtus IV. (Italian)	1471
Innocent VIII. (Italian)	1484
Alexander VI. (Spaniard)	1492
Pius III. (Italian)	1503
Julius II. (Italian)	1503
Leo X. (Italian)	1513
Hadrian VI. (Dutch)	1522
Clement VII. (Italian)	1523
Paul III. (Roman)	1534
Julius III. (Roman)	1550
Marcellus II. (Italian)	1555
Paul IV. (Neapolitan)	1565
Pius IV. (Italian	1559
Pius V. (Italian)	1566
Gregory XIII. (Italian)	1572
Sixtus V. (Italian)	1585
Urban VII. (Italian)	1590
Gregory XIV. (Italian)	1590
Innocent IX. (Italian)	1591
Clement VIII. (Italian)	1592
Leo XI. (Italian)	1605
Paul V. (Roman)	1605
Gregory XV. (Italian)	1621
Urban VIII. (Italian)	1623
Innocent X. (Roman)	1644
Alexander VII. (Italian)	1655
Clement IX. (Italian)	1667
Clement X.	1670
Innocent XI.	1676
Alexander VIII. (Venetian	1689
Innocent XII. (Neapolitan)	1691
Clement XI. (Italian)	1700
Innocent XIII. (Roman)	1721
Benedict XIII. (Roman)	1724
Clement XII. (Italian)	1730
Benedict XIV. (Italian)	1740
Clement XIII. (Venetian)	1758
Clement XIV. (Italian)	1769
Pius VI. (Italian)	1775
Pius VII. (Italian)	1800
Leo XII. (Italian)	1823
Pius VIII. (Italian)	1829
Gregory XVI. (Italian)	1831
Pius IX. (Italian)	1846
Leo XIII. (Italian)	1878

Pope, ALEXANDER, the greatest poet of his age, and the most brilliant satirist that England, or perhaps the world, has ever produced, was born in London on the 21st of May 1688. He was of good middle-class parentage, but not, as he afterwards characteristically endeavoured to make out, of aristocratic descent. His grandfather, Alexander Pope the elder—whose pedigree he attempted to derive, though on very inadequate evidence, from the Earls of Doune—was a clergyman of the Church of England. His son, the poet's father, was placed with a merchant at Lisbon, where he became a convert to the Roman Catholic Church. On his return from Lisbon he seems to have followed the trade of a linen-draper in Broad Street, whence, after his marriage with Edith Turner, the poet's mother, he migrated to Lombard Street. Here, on the above-mentioned date—once the subject of much perplexing controversy, but now satisfactorily ascertained—Alexander the younger first saw the light. In his infancy, and indeed up to the age of ten, he does not seem to have been either weakly or deformed. In the opinion of a kinsman, 'it was the perpetual application he fell into in his twelfth year that changed his form and ruined his constitution;' and it is possible that this may have contributed to and aggravated a misfortune which could hardly have been due to any such cause alone. It is at any rate certain that Pope's application to study must have been both early and intense, for deep traces of thought and culture are no less conspicuous than natural precocity of genius even in his most juvenile poems; and he certainly owed little to his teachers. His education, thanks no doubt to the disabilities created by his inherited creed, was unmethodical and imperfect to the last degree. He seems to have passed from one incapable Catholic priest and ill-ordered Catholic seminary to another, until at twelve years of age he was removed, knowing little more apparently than the Latin and Greek rudiments, to Binfield near Wokingham, to which place his father had by that time retired. Yet in this very year he wrote his *Ode on Solitude*, an insignificant but not unpromising performance, and at fourteen, according to his own account, he composed the poem on *Silence*, in imitation of Rochester's *Nothing*, which both in manner and matter is astonishingly mature. It was at the same age that he produced the first of his works which attracted attention, a *Translation of the First Book of the Thebais of Statius*, a poem memorable above its intrinsic merits from the fact that in it the English heroic couplet, though of course falling far short of the technical perfection to which Pope afterwards brought it, is already beginning to take the new mould into which, in his hands, it was destined to be recast. It is during the next two years, that is to say, at the marvellously early age of from sixteen to eighteen, that Pope's career as a recognised English poet may be said to begin. For it was at some time during these years (1704–6) that he wrote his *Pastorals*, which, though not published till 1709, were shown to and highly commended by all the leading critics of the day, and were the means of bringing their young author acquainted with the dramatist Wycherley, then advanced in years, with whom he commenced a singular correspondence, the tenor of which he audaciously misrepresented in later life.

It was to Wycherley, too, that Pope owed his first introduction, which took place a little later, to London life, where the youth's extraordinary talents were quickly recognised, and where he was not long in establishing a friendship with Addison, Steele, Swift, Arbuthnot, and other famous wits and poets of the day. In 1711 he published his *Essay on Criticism*, a poem which, whether written in 1709 or 1707—and it may have been his invincible habit of committing small acts of dishonesty for still smaller gains that suggested the antedating of the composition—was a sufficiently splendid achievement for the age either of nineteen or twenty-one. It at once, or nearly at once—for it hung for a little at first at the booksellers—placed him in the front rank of the men of letters of his time. Critical opinions differed, and down to our own day have continued to differ, as to the degree of merit possessed by this remarkable poem in respect of its matter—some depreciating its critical aphorisms as platitudes, others elevating them into utterances of gnomic wisdom; but its excellences of form are not open to question in any competent judgment. Young as was its author, even on the highest computation of his age, his style had already reached maturity, and his matchless power of expression is here exhibited, if over a less varied subject-matter, yet certainly with a no less unerring mastery than in any of his later works. The year 1713 witnessed the publication of *Windsor Forest* (written, according to Pope's account adopted by Warburton, in 1709), a piece much admired in its day for the accuracy and force in its descriptions of nature; and this was succeeded in the following year by the poem on which Pope's claim to the gift of poetic imagination may perhaps be most securely rested, the *Rape of the Lock*. Necessarily precluded by the deliberate triviality of its subject from appealing to the higher emotions which imaginative poetry of the serious order arouses, this piece displays, in addition to the exquisite charm of its versification, a grace of delicate fancy which at times almost recalls the creator of Puck and Ariel, and the diviner of the dream-whispers of Queen Mab.

We now reach the commencement of what was probably the happiest and most prosperous period of the poet's life. His brilliant success had not yet brought with it much pecuniary profit, but in the year 1713 a project was set on foot by him, and warmly supported by Swift and others of his friends, which was destined not only to add to his fame, but to place his fortunes on a substantial basis for life. This was the translation of the *Iliad*, a work published by subscription, in six volumes, intended to appear yearly; the last two, as a matter of fact, were issued together after six years' intermission in 1720. Most imperfectly representative, as might be expected, of its great original, it is nevertheless a poem so remarkable for its union of force and elegance, and one which moves with an animation so inspiriting and unflagging, that it can be read to-day with no inconsiderable portion of the pleasure which it gave to the contemporaries of the poet. The year of its composition was among the fullest and busiest of Pope's life. In 1716 his father removed from Binfield to a house at Chiswick, where he resided till his death in the following year. Pope was now the foremost of the literary lions of fashionable London, and almost as conspicuous a personage in the drawing-rooms of ministers and magistrates as in the coffee-houses of the wits. At this period, too, his mind, save for an interval of natural grief at the loss of his father, was probably as easy as his circumstances. Political differences, aggravated by well or ill-founded suspicions of the elder writer's jealousy of the younger, had alienated Pope from Addison; but, though he had already begun his almost life-long quarrel with the eccentric John Dennis, it had not yet taken on a character of any very extreme virulence. In 1718 he purchased out of the early profits of the *Iliad* the famous villa and grounds at Twickenham, which he occupied till his death.

A translation of the *Odyssey*, less successful because largely 'farmed out' to inferior hands, was published in 1725 and the following years; and in 1727 appeared the first two volumes of a collection of *Miscellanies*, from the joint authorship of Pope and Swift, a work famous as being the first shot fired in the war between the poet and 'the Dunces.' In March 1728 the third volume appeared, and the furious and scurrilous retorts wrung from the persons ridiculed in it elicited the retaliatory publication of the first three books of the *Dunciad*. This work Pope represented as having been written in reply to their attacks, but it (or a first draft of which) has been ascertained by recent inquiry to have been in existence as early as 1725, and to have been merely withheld until its author had deliberately stung his enemies into a blind and headlong charge. 'Martinus Scriblerus,' in fact, played the part of the lance with which the Spanish picador irritates the bull to frenzy; the *Dunciad* was the blade poised ready to transfix him. In this immortal lampoon—for it is too personal in all senses of the word to deserve the title of satire—Pope has rescued the names of a host of insignificant enemies from oblivion; and it is the highest tribute to the extraordinary artistic power of this poem that it can still be read with a pleasure unimpaired by the absolute obscurity of most of its heroes. The fourth book, added twelve years later, is of a more serious cast and of a more general application, and it contains one at least of the poet's most admired passages. But its incorporation with the earlier poem, with its infelicitous substitution of Cibber for Theobald as the personification of Dullness, is to be regretted. The *Essay on Man*, the first part of which was published in 1733, the *Moral Essays*, and *The Imitations of Horace* conclude the catalogue of Pope's poetic works. The first, a didactic poem, intended to commend to the world the not very profound philosophy which Pope had borrowed from Bolingbroke, is from the point of view of execution a masterpiece of weight and wit. The poet's mastery of terse and epigrammatic expression is here seen at its highest; and it has been declared, no doubt with truth, that the *Essay on Man* contains more lines which have won their way to the rank of universally familiar quotation than any poem of equal length in the language. The *Moral Essays* and the *Imitations* exhibited the same qualities exercised upon a series of selected subjects of, for the most part, a lighter order; and, as in the case of the still more famous *Essay on Man*, it is almost impossible to open a page without coming upon a line or a couplet which has become a household word.

The last few years of Pope's life were marked by no new creative activity, but devoted to the revision of his published works. He suffered during this period from asthma, which in time developed dropsy, a disease which ultimately proved fatal to him. He died on the 30th of May 1744, at the age of fifty-six, leaving behind him a literary fame which, despite the change of taste in poetry, has undergone no eclipse in a century and a half. As a man the figure which he presented to all but a few close friends was always an unamiable one, and modern research into the facts of his life has unfortunately only tended to deepen the impression. It cannot be denied that many of the smaller and meaner vices of humanity were painfully prominent in the character of Pope. His vanity was insatiable, and his vindictiveness came near to be so: he committed acts of treachery to men, brutality to women, and ingratitude to both. He showed an extraordinary and at times an almost ludicrous preference for the crooked to the straight path, and much of his time was occupied in laying elaborate plots for the deception of posterity and his contemporary public, including sometimes his most intimate friends. Yet it is certain that to these last he must have revealed many lovable qualities. He was undoubtedly capable of warm attachment, and his disposition when appealed to by the sight of want or suffering was genuinely benevolent. It should be remembered, too, in excuse for the acrimony of his satire, that physical misfortune and accidents of bringing up had combined to render him morbidly sensitive to the insults of his adversaries, and that his revenge was not more cruel than his sufferings.

The position of Pope in the history of poetry is easier to fix than his rank among English poets; and the historian of literature can in these days assign him a far higher place without fear of challenge than any critical admirer, however ardent, can hope to secure for him in contemporary esteem. For the importance and splendour of Pope's contribution to the development of English *poetic art* are beyond the denial of any one conversant with the facts. It is a truth superior to and independent of the endless and irreconcilable controversy as to the essence and 'true inwardness' of *poetic matter*. The poets of the naturalist revival at the end of the 18th century regarded Pope as the brilliant exponent of a false and artificial theory of poetry who had systematically, though of course unconsciously, led men away from the contemplation of the 'true truth' of things. It has on the other hand been contended with much learning and ingenuity by Mr Courthope that Pope's theory of poetry, if compared with that which it displaced, was a no less distinct and salutary return to nature than that of which Cowper became the pioneer in the later half of the century, and which Wordsworth preached and practised with such notable results towards its close. But even if this contention leaves us unconvinced, we can still find abundant reason for recognising as invaluable the services rendered by Pope to English poetry. He was virtually the inventor and artificer who added a new instrument of music to its majestic orchestra, a new weapon of expression to its noble armoury. Considered from the point of view of its descriptive and emotional capabilities, the heroic couplet as he received it from the hands of Dryden was an instrument of vast compass but of modulations few and rude. By force of exquisite sensibility wedded to untiring study Pope theoretically deduced and practically educed its hidden powers; discovered, formulated, and inimitably applied the rules for 'discoursing' upon it; and handed it on to posterity in a form whose easy mechanical perfection is attested by the fact that its powers are but too much within the reach of the inferior performer. Considered as a weapon of expression, the heroic couplet of Dryden was a mediæval broadsword which only the mighty thews of its master could wield with any effect. In the hands of Pope it became a rapier of perfect flexibility and temper: and he himself discovered, and acquired mastery over, every trick of fence which it was capable of executing. To have accomplished this alone would have sufficed to perpetuate his name; but Pope has lived and will live in English literature, not only as the virtual inventor of a new poetic form, but as an artist without a rival in any age or language in the adaptation of speech to thought. No one who brings a fairly sympathetic mind to the perusal of the *Epistle of Eloisa to Abelard* will deny to Pope a measure of the lyrical gift and no mean power over the softer emotions. But one must admit that to the taste of the present age there occurs a certain coldness and artificiality in his portrayals alike of the face of nature and of the passions of man. He appeals rather to the brain than to the heart. Ideas and not emotions are his province; but to the metric presentment of ideas he imparts a charm of musical utterance unachieved before his time, and a lucidity of illustration, a brilliancy of wit, a command of apt and terse expression, and a combined ease and dignity of manner which have never been equalled since. To have done this is to have well deserved immortality as a man of letters; whether it is also to have established a title to the name of 'poet,' as understood in these days, every man who frames his own definition of poetry must decide for himself.

The editions of Pope have been fairly numerous. The first, by his friend Bishop Warburton, was an answer to Bolingbroke's attack on Pope's memory, and appeared within a few years of his death. Dr Joseph Warton's was virtually a reply to Warburton's; and the controversy on the power of the poet was revived in the 19th century by Bowles and Roscoe, who each published an edition of his works, and in whose polemics Byron took a memorable part. All other editions, however, have been superseded by that of the Rev. Whitwell Elwin and Mr W. J. Courthope, which was founded on a mass of documentary material collected by the late J. W. Croker; the concluding volume, containing Mr Courthope's biography of the author, was published in 1889. The annotations of the poems are rich and valuable, and the Life disposes finally of many questions concerning Pope's character and career which all his earlier biographers had lacked the material and some the critical impartiality to determine.

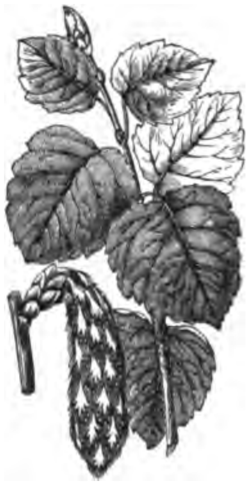
Pope, JOHN, an American general, was born in Louisville, Kentucky, 16th March 1822, graduated at West Point in 1842, and entered the engineers. He served in Florida (1842–44) and in the Mexican war, and was brevetted captain for gallantry. He was afterwards employed in exploring and surveying in the west, until the outbreak of the civil war, when he was appointed brigadier-general of volunteers. In 1861 he drove the guerillas out of Missouri; in 1862 he captured New Madrid in March and was made major-general, commanded the Army of the Mississippi in the operations against Corinth, and was assigned to the command of the Army of Virginia, with the rank of brigadier in the regular army. For fifteen days in August he faced Lee, but was defeated at the second battle of Bull Run, on the 29th and 30th. He then requested to be relieved, and was transferred to Minnesota, where he kept the Indians in check. He held various commands until 1886, when he retired. In 1882 he became major-general. Pope attributed his defeat at Bull Run to the conduct of General Fitz-John Porter, who was tried by court-martial and cashiered; but this verdict occasioned much controversy, in which General Grant ultimately took Porter's side (*American Review*, December 1882), and in 1886 the latter was restored to the army. Pope died September 23, 1892.

Poperinghe, an old commercial town of Belgium, in the province of West Flanders, 4 miles from the French frontier, and 8 miles W. of Ypres by rail. The town has manufactures of lace, linens, and woollen cloths. Pop. 11,065.

Popinjay (Fr. *papegai*, Ital. *papagallo*, Low Gr. *papagas*), a parrot; a figure of a bird put up as a mark for archers to shoot at (*papingo* being another Scottish form for this sense); see KILWINNING. The green woodpecker is also sometimes called popinjay.

Popish Plot, the name given to an imaginary plot on the part of the Roman Catholics in England during the reign of Charles II., the object of which was believed to be a general massacre of the Protestants. See OATES.

Poplar (*Populus*), a genus of trees, forming along with willows the whole of the natural order Salicaceæ or Salicineæ (by some regarded as a sub-order of Amentaceæ), and having diœcious flowers arranged in catkins, both male and female flowers with an oblique cup-shaped perianth. The seeds have silky hairs, as in willows, and are readily wafted about by the wind. The species are numerous, chiefly natives of the temperate and cold regions of the northern hemisphere. They are large trees of rapid growth, with soft wood, and broad, heart-shaped, ovate, triangular, or lozenge-shaped, deciduous leaves, on rather long stalks. Many of them are very beautiful trees. The catkins appear long before the leaves, and proceed from distinct lateral buds. Few of the poplars are of much value for their timber, which is generally white, soft, and light; but from their rapid growth they are useful as yielding firewood, where the scarcity of other fuel renders it necessary to plant trees for this purpose, and they are often planted as ornamental trees, producing an immediate effect of embellishment in a bare situation more readily than almost any other kind of tree. Besides the species known by the name Aspen (q.v.), or Tremulous Poplar, the following seem the most worthy of notice. The White Poplar, or Abele (*P. alba*), a native of the southern parts of Europe, and reckoned among British trees, but probably not indigenous in Britain, is a tree of 80 feet or upwards, with a fine spreading head, and roundish, heart-shaped, lobed, and toothed leaves, which are smooth, shining, and dark-green above, downy and silvery-white beneath. The wood is used by cabinet-makers, turners, and toy-makers. It is little liable to swell or shrink, and this fact adapts it for various purposes. The tree loves low situations and clay soils. This tree has of late years suffered in Britain from some unknown cause, like the potato, dying where it previously flourished; whilst other poplars, the most nearly allied, continue to flourish in the same localities. The Gray Poplar (*P. canescens*) is very similar to the white poplar, but of more vigorous growth, a large spreading tree, the leaves similar to those of the white poplar, but not so dark green above or so white beneath. It is not of so rapid growth as the white poplar; and its wood is harder and better, makes good flooring, and is preferable to pine-deal for the neighbourhood of fireplaces, being less apt to take fire; it is also used for coarse doors, carts, barrows, &c., and, not being liable to warp, is esteemed by woodcarvers. The tree generally begins to rot in the heart when forty or fifty years old. Like most of the other poplars, it fills the ground around it with suckers. Like the white poplar, it is a very doubtful native of Britain, and belongs to the centre and south of Europe. The Black Poplar (*P. nigra*), a native of most parts of Europe, and perhaps of England, is a tree 50 to 80 feet high, with an ample spreading head, viscous leaf-buds, and deltoid or unequally quadrangular, perfectly smooth leaves. The wood is used for the same purposes as that of the white and gray poplars. The 'cotton' from the seeds has been used in France and Germany for making cloth hats and paper, but these uses of it were not found profitable. The Lombardy Poplar (*P. fastigiata* or *dilatata*) is a mere variety of the black poplar, with erect instead of spreading branches. It

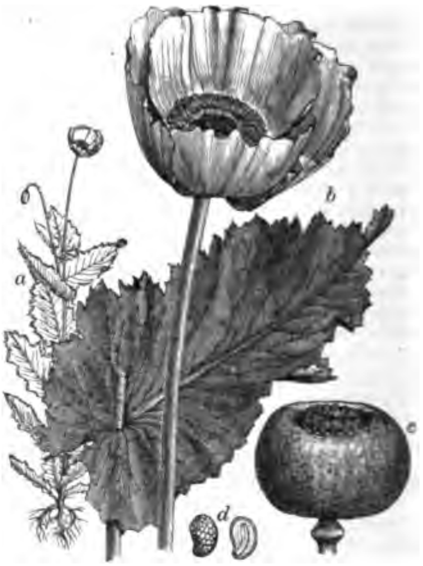

Branch and Male Catkin of *Populus alba canescens*.

appears to have been introduced into Europe from the East. It is very common in the Punjab and in Persia, and now also in Lombardy and other parts of Italy. It attains a height of 100, or even 150 feet, and is remarkable for its erect form, contracted head, and very rapid growth. It is often planted as an ornamental tree, although not so generally as in the end of the 18th century, when it was thought preferable for ornamental purposes to every other tree. It is common in the streets and squares of towns in Britain, and is particularly adapted to situations where a long horizontal line of any kind fatigues the eye, or where it is seen starting up from a mass of lower wood or shrubbery. The wood is almost of no value. It is generally propagated by layers. The species commonly known as Black Italian Poplar (*P. monilifera* or *acladesca*), although it is really a native not of Italy, but of North America, and is sometimes more correctly called Canadian Poplar, the female catkins of which resemble a string of pearls, is frequently planted both as an ornamental tree and for the sake of its timber, which is useful for flooring, &c. The leaves are deltoid. It is of very rapid growth, and attains a height of 100 to 120 feet. The Balsam Poplar, or Tacamahac (*P. balsamifera*), a very common ornamental tree in Britain, is a native both of North America and of Siberia, and has ovate-oblong leaves, which in spring are of a delicate yellow tint, and have an agreeable fragrance. The leaf-buds are viscid. The resinous exudation of the buds (Tacamahac, q.v.) is said to be diuretic and anti-spasmodic; and an ointment made from the buds is used for tumours, wounds, and burns. The resinous exudation of the buds of other species, as the black poplar, possesses similar properties. The Cottonwood (*P. canadensis*) of North America, particularly abundant on the upper parts of the Mississippi and Missouri, is valued as a timber-tree, and has been pretty extensively planted in Britain; as has also the Ontario Poplar (*P. candicans*), a species with the same balsamic character as *P. balsamifera*, and chiefly distinguished from it by its larger leaves. In size of leaf no other species equals *P. heterophylla*, a native of the southern states of North America, the leaves of which are often 6 inches long. See Aspen.

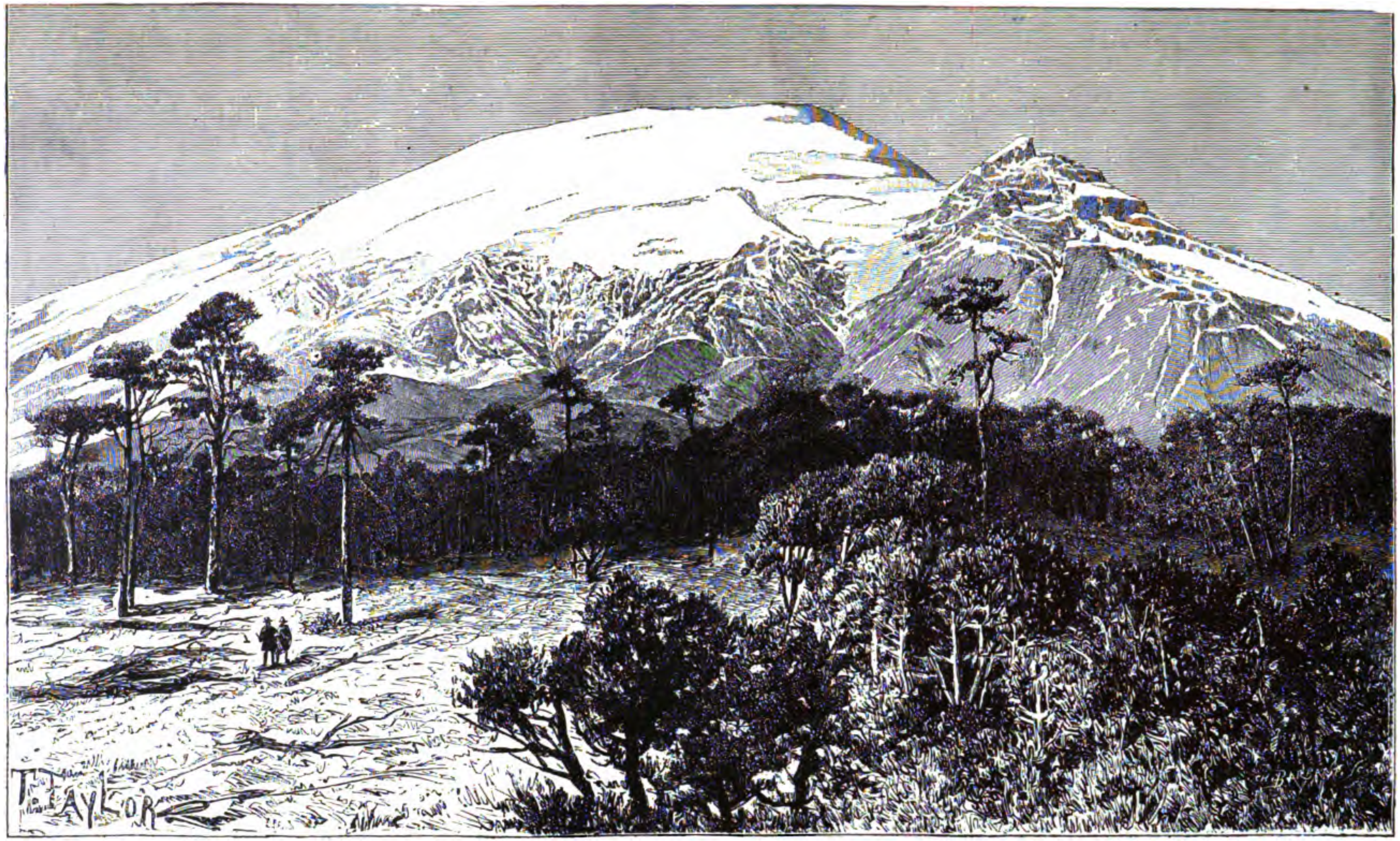
Poplin (Fr. *papeline;* possibly from the town of Poperinghe, of which an old spelling is Poppeling), a fabric which has been long made in France, from which country the manufacture was introduced into England and Ireland in the 17th century by Protestant refugees. Poplin consists of a warp of silk and a weft of worsted, and the latter being thicker than the former produces a corded appearance. The worsted yarn gives substance to the fabric, and a soft silky face is produced by the way in which it is woven. Poplins may be either plain or figured. The Irish poplins are nearly all made in Dublin; the industry has been subject to great fluctuations, notwithstanding the efforts to foster it. Figured poplins, which were much used about 1870 for curtains and covering furniture, are at the present time, in Great Britain at least, employed for these purposes only to a limited extent.

Popocatepetl ('smoking mountain'), a volcano about 40 miles SE. of the city of Mexico. It rises in the form of a cone to a height of 17,784 feet above the sea-level. No eruption has been recorded since 1540; it still smokes, however. It is often scaled, and in and around its crater (5165 feet in diameter, and nearly 1000 deep) a good deal of sulphur is obtained.

Poppy (*Papaver*), a genus of plants of the natural order Papaveraceæ, having a calyx of two (or rarely three) sepals, which very soon fall off; a corolla of four (rarely six) petals; numerous stamens seated on a receptacle; the stigma crowning the ovary, without a style, and in the form of 4 to 20 rays; the capsule opening by pores under the persistent stigma, imperfectly divided into cells by partitions as numerous as the rays of the stigma, but which do not reach the centre, and the seeds extremely numerous. There are numerous species of poppy, mostly natives of Europe and Asia, some of them found even in very northern regions, but most of them in the warmer temperate parts. They are herbaceous plants, annual, biennial, or perennial, mostly sprinkled with bristly hairs. They have a white milky juice; a disagreeable narcotic smell, particularly when bruised; pinnatifid or bipinnatifid leaves, more rarely jagged or toothed leaves; and large showy flowers, which readily become double by cultivation. The capsules are curious from the manner in which they fling out their seeds when the plant is shaken by the wind; each capsule being somewhat like a round or oval pepper-box, with holes, however, not in the top, where rain might get in by them, but under the projecting rim. By far the most important species is that known as the Opium Poppy (*P. somniferum*), also called the White Poppy and the Oil Poppy (see Opium). But the same species is important on account of the bland fixed oil of the seeds, and is much cultivated as an oil-plant. *Poppy-oil* is as sweet as olive-oil, and is used for similar purposes. It is imported into Britain in considerable quantities from India. The poppy is also extensively cultivated for it in France, Belgium, and Germany. The use and manufacture of this oil were for a long time, during the 18th century, strictly prohibited in France, from a mistaken notion that it must partake of the narcotic properties of the milky juice of the plant. The seed, however, contains no opium or any narcotic principle, and was well known to the ancients as a pleasant article of food, fit to be eaten by itself or with bread; some German cakes have poppy-seed plentifully sprinkled on the top. The oil expressed from it is perfectly wholesome, and is much used in



Opium Poppy (*Papaver somniferum*):
a, whole plant; *b*, flower and leaf; *c*, ripe capsule; *d*, seed and section of do. enlarged. (Bentley and Trimen.)



PEAK OF POPOCATEPETL.

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France and elsewhere as an article of food. It is believed that one-half of the oil used for cooking and otherwise for alimentary purposes in France is of this kind. The seeds yield about 40 per cent. of oil, and the oil-cake is useful for manure or for feeding cattle. The oil is sometimes used by painters and by soap-boilers; but it is not good for burning. In the cultivation of the poppy for oil the seed is often sown in autumn, where the severity of winter-frosts is not to be feared; in more northern parts it is sown in spring, and sometimes the seed is scattered on the top of the snow with which the ground is covered. Being very small it needs little or no harrowing. Early sowing is favourable to the size of the plant and the abundance of produce. Hoeing and thinning are advantageous. An open but rich soil is best for the poppy; and a sheltered situation is necessary, as in exposed situations much of the seed is scattered by the wind. The poppy does not exhaust the land so much as colza, rape, and some other oil-plants. Harvesting ought to begin when one-fourth of the capsules of each plant are open. It is accomplished by pulling the plants in such a manner as not to shake the seed out of the capsules, and tying them in sheafs, which are placed together in an erect or slightly sloping position, till the ripening of the capsules is completed, when the seed is taken out by shaking the capsules into a tub or on a cloth, great care being used to prevent any earth from the roots from getting mixed with them. Some farmers in Flanders sow poppies in alternate rows with carrots. The variety of poppy chiefly cultivated as an oil-plant has flowers of a dull reddish colour, large oblong capsules, and brownish seeds; but the white-flowered variety, with globular capsules and white seeds, is also used. The Oriental Poppy (*P. orientale*), a native of Armenia and the Caucasus, a perennial species, is often planted in gardens on account of its very large, fiery-red flowers. Its unripe capsules have an acrid, almost burning taste, but are eaten by the Turks, and opium is extracted from them. Several species are British, all of them local, rare in some places, and troublesome weeds in cornfields in other places apparently quite similar in climate. Among them is the Corn Poppy or Common Red Poppy (*P. rhoeas*), with bright-red flowers, and deeply pinnatifid leaves. The petals are mucilaginous and slightly bitter; they have a slight narcotic smell; and a syrup made of them is sometimes used as an anodyne in catarrhs and children's complaints; but they are more valued for the rich red colour which they yield. A variety with double flowers is cultivated in flower-gardens, under the name of *Carnation Poppy*. Among the ancients the poppy was sacred to Ceres.

Poppy-head. See PEWS.

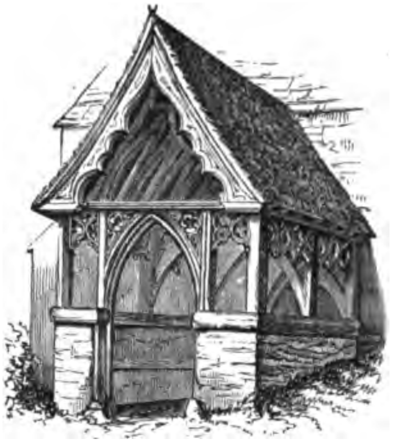
Population. Information as to the population of the various communities of the world will be found in the paragraphs dealing with the subject in the articles in this work on the various kingdoms and countries, ancient and modern, and on the several provinces of those countries, and on the towns and cities of the world; at EUROPE, ASIA, AMERICA, will be found tables of the population of the several countries in those great divisions of the world, so far as ascertainable. The population of the world (estimated by Behm and Wagner in 1882 at 1434 millions) will be dealt with at WORLD. The so-called 'population question' is discussed at MALTHUS; and other articles that deal more or less directly with population, its enumeration and fluctuations, are CENSUS, REGISTRATION (of Births, Deaths, and Marriages), and VITAL STATISTICS. For mortality tables, see INSURANCE. And questions that emerge in connection with the increase and density of population will be found treated at CORN LAWS, CROFTERS, EMIGRATION, FREE TRADE, INFANTICIDE, LAND LAWS, POLITICAL ECONOMY, POOR-LAWS, SOCIALISM, &c. And see works by Farr (q.v.), Quetelet (q.v.), Behm (q.v.), Bodio, Block.

Porbeagle, sometimes called 'Beaumaris Shark' (*Lamna cornubica*), is a shark found on the British coasts, in the Atlantic, Mediterranean, on the American coast, and in Japanese waters. Its usual length is 4 feet, but it sometimes attains a length of 10 feet, and is sometimes caught in mackerel and salmon nets, and even on haddock lines. It lives on cuttle-fish, pilchards, herrings, hake, and smaller cartilaginous fishes. In Mediterranean countries it is eaten as human food.

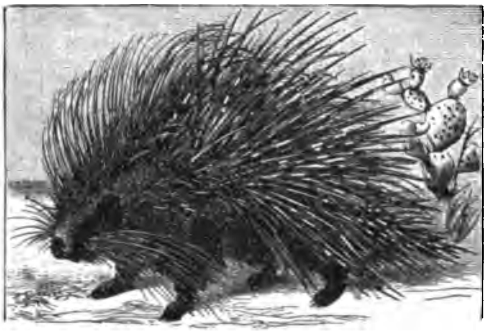
Porcelain. See POTTERY.

Porcellanite, a very hard, impure, jaspideous rock, frequently met with in the immediate vicinity of intrusive eruptive masses. In most cases porcellanite is simply a highly baked and altered argillaceous rock—shales being frequently converted into porcellanite along their line of junction with an igneous rock.

Porch, a building forming an enclosure or protection for a doorway. In mediæval and Elizabethan architecture the porch was very common in domestic architecture. In churches it was almost universal in England, most often on the south side of the nave, of stone or flint-work (in East Anglia), but sometimes also of wood. In France many splendid porches or portals remain; they are amongst the most beautiful specimens of mediæval art. See also GALILEE.


Porch of Aldham, Essex (1350).

Porcupine, a name given to all the members of a family of Rodentia—the Hystricidæ. This family contains a number of well-defined genera, which include a good many species. The Common Porcupine (*Hystrix cristata*) is found in southern Europe, as well as in Asia and Africa, and is one of the largest of rodents; it has a heavy aspect and a grunting voice, whence the name Porcupine (from the French *porc*, 'a hog,' and *épin*, 'a spine'). The porcupines of the New World are sometimes included in a separate family; they comprise two well-marked forms—the Urson (*Erethizon dorsatus*) of North America and the Prehensile-tailed Tree Porcupines (Cercobates) of South America. The most marked peculiarity of the porcupine is of course the presence of the quills, which are simply thickened hairs; gradations between ordinary hairs and the thickest and longest spines exist to prove this statement. Occasionally the spines end in a peculiar cup-shaped extremity. The armature of spines is of the greatest value to the porcupine, though their use is entirely for defensive purposes. It is hardly necessary to deny the popular belief that the animal can shoot out its quills like so many arrows; the notion has arisen from the fact that when the animal erects its spines, the loose ones occasionally fall out. The Echidna (q.v.) is called Porcupine Ant-eater; and the Globe-fish (q.v.) is known as Porcupine Fish.



Common Porcupine (*Hystrix cristata*).

Pordage. See PHILADELPHIANS.

Porifera. See SPONGES.

Porism, according to the definition of Robert Simson, is a proposition in which it is proposed to demonstrate that some one thing or more things are given, to which, as also to each of innumerable other things, not indeed given, but having the same relation to those which are given, it is to be shown that there belongs some common affection described in the proposition. Playfair defined a porism to be a proposition affirming the possibility of finding such conditions as will render a certain problem capable of innumerable solutions. Owing to the loss of Euclid's three books on porisms, and the obscurity of the account given by Pappus of their contents, there has been much discussion among geometers as to the nature of a porism. The two most important books on the subject are Simson's *De Porismatibus* in his *Opera Reliqua* (1776), and Chasles's *Les trois livres de Porismes d'Euclide* (1860). Chasles is of opinion that the porisms were closely allied to the modern theories of anharmonic ratio, homographic division, and involution.

Pork. See PIG for the animal from which pork is procured; DIET and FOOD for the properties of pork as an article of food; and TRICHINOSIS for one of the gravest of the diseases affecting the pig. The great headquarters of the trade in pork is the United States. This is partly indicated by the figures given at CHICAGO and HAM; but it will be shown more clearly by the following figures. In 1890 the total number of pigs in the United Kingdom was 2,773,609; in the United States it was in the same year 51,602,780, with a value of $243,418,336. While Britain imports pigs and pig-products (hams, bacon, pork, and lard) to a large extent (mainly from America), the United States exports on a vast scale. In the fiscal year 1889–90 the exports were as follows: hogs, 91,148; bacon, 531,899,677 lb.; hams, 76,591,279 lb.; fresh pork, 279,463 lb.; pickled pork, 79,788,868 lb.; lard, 471,083,598 lb. The value of these pig-products in that one year 1889–90 was over $67,070,000.

Porosity. By this term we express the experimental fact that no kind of matter completely fills the space it occupies. On the atomic theory it is obvious that this must be the case if the atoms of matter are spherical, or, indeed, if they have any form save one or two special ones, such as cubes or rhombic dodecahedrons. The Florentine Academicians, in their attempts to compress water, proved the porosity of silver by flattening a sphere of that metal, filled with water and soldered. The water escaped through the silver, and stood in fine drops on its surface. The porosity of liquids is easily shown by mixing alcohol and water. The bulk of the mixture is considerably less than the sum of the bulks of the components.

Porous Jars. See REFRIGERATION.

Porphyrite, one of the crystalline igneous rocks. It consists principally of plagioclase. The ground-mass of the rock is composed of microlites and minute rod-like crystals of plagioclase, interspersed amongst which may occur crystalline granules of hornblende, augite, rhombic pyroxene, mica, ilmenite, magnetite, &c. Sometimes traces of a glassy or devitrified base can be detected. Throughout this ground-mass are scattered porphyritically larger crystals of plagioclase, accompanied by one or more of the following minerals: hornblende, augite, rhombic pyroxene, mica, &c. The rock shows all varieties of colour, and ranges in texture from vitreous and cryptocrystalline up to coarsely crystalline. It is often vesicular and amygdaloidal. It occurs abundantly in Scotland (where it forms many of the hill-ranges of the Lowlands), both in the form of lava-flows and intrusive sheets, dykes, and masses. Porphyrite is so closely allied to Andesite (q.v.) that it may be considered as merely an altered variety of that rock.

Porphyrogenitus (Gr., 'born in the purple'), a title given to the Byzantine emperor Constantine VII. (912–959).

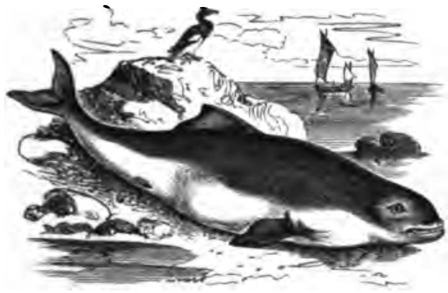
Porphyry (Gr., 'purple'), a term originally confined to an Egyptian rock used in sculpture and known as *porfido rosso antico*. It occurs as a dyke or vein some 65 to 85 feet thick in the granite of Jebel Dokhan (formerly called *Mons Porphyrites*) in Egypt, between Siout and the Red Sea. It is composed of a felspathic base, in which are disseminated crystals of oligoclase felspar, with some plates of dark hornblende, and grains of an iron oxide. The beautiful pink or red colour of the porphyritic felspar and the fine-grained base is due to the diffusion of the red variety of epidote, called Withamite or Piedmontite. The term porphyry is not now used to denote any particular rock, but is applied by architects and others to any igneous rock which, like the porfido rosso antico, has a homogeneous, compact base or fine-grained ground-mass, through which are scattered distinct crystals of one or more minerals. By geologists the term porphyry is seldom used without some descriptive word bracketed with it, as quartz-porphyry, orthoclase-porphyry, augite-porphyry, &c.

Porphyry, one of the greatest Neoplatonist philosophers, was born at Tyre, or at Batanea, in the year 233 A.D. His original name was Malchus (Heb. *Melech*, 'king'); and *Porphyrius* ('one clad in purple') is but a kind of playful synonym for this royal name. He is said by Socrates the historian and by St Augustine to have been originally a Christian; but this seems improbable, although it is certain that in his youth he was a hearer of Origen, or at least held some intercourse with him at Cæsarea in Palestine. What is more certain is that he passed at a later time to Athens, where he studied rhetoric under Longinus, the well-known author of the treatise *On the Sublime*. It was at Rome, however, whither he repaired about 263, that he found the master who permanently moulded his life. Here he became the most trusted of the disciples of the Neoplatonist

Plotinus. After a few years in Rome he went to Sicily, where, if St Jerome's account is to be relied on, he wrote his once celebrated treatise in fifteen books against the Christians, now known only from the replies—themselves lost—which it elicited from Methodius of Tyre, Eusebius of Cæsarea, and Apollinaris of Laodicea. His book itself was burned by order of the emperors Theodosius II. and Valentinian in 448. He then returned to Rome, and taught there, where he is said to have died, probably about 303. His own most famous pupil was Iamblicus. For a view of Porphyry's position in the history of the Neoplatonic school, see NEOPLATONISM. He was a very voluminous writer, and, though no very profound thinker, a learned, capable, earnest, and high-minded man. His philosophy keeps close to life and practical duties, its object the salvation of the soul, to be effected by the extinction of impure desires through strict asceticism together with knowledge of God. He was a determined opponent of Christianity, and in his trenchant criticism exposed many of its supposed errors and imperfections.

Of his writings the chief are the Lives of Plotinus and Pythagoras; *Sententiæ; De Abstinentia;* and the *Epistola ad Marcellam*, addressed to his wife. There is a complete list in Fabricius' *Bibliotheca Græca*, v., ed. Harless. See the works on the Alexandrian school by Vacherot and Jules Simon, and Zeller's *Philos. der Griechen*, vol. ii.; also the monograph by Bouillet (Paris, 1864).

Porpoise (*Phocæna*), a genus of Cetacea in the family Delphinidæ. The species are like dolphins, but have shorter snouts. The Common Porpoise (*P. communis*) is the most familiar Cetacean on the British coasts, especially to the west of Ireland and Scotland. It is found also on all the coasts of Europe from the Mediterranean northwards, on the coasts of North America, and in the Arctic regions. It is one of the smallest of the Cetacea, its average length not exceeding four feet, although individuals may measure six feet in length. The body is spindle-shaped, its greatest diameter being near the triangular dorsal fin. The skin is perfectly smooth, and destitute of hair. The upper surface is black with a bluish shimmer, but the under side is grayish white. There are from forty to fifty teeth in each jaw, not conical, as in most of the Cetacea, but compressed. The eye is small; the opening of the ear is very minute, like a hole made with a pin. The crescent-shaped blow-hole, with the horns of the crescent directed forwards, is situated exactly over the eyes.



Porpoise (*Phocæna communis*).

The porpoise is gregarious, and large numbers are often seen together, sometimes swimming in file, when their backs, appearing above the surface of the water, suggest the idea of a great sea-serpent; sometimes gamboling in fine weather, or when a storm is approaching, or even in the midst of a storm. They feed on fish, which the teeth are admirably adapted to catch, and schools of porpoises pursue the vast shoals of herring, mackerel, &c. into bays and estuaries. They sometimes ascend rivers, apparently in pursuit of salmon, as far as the water is brackish, and are not unfrequently caught on such occasions. The skin, the oil, and the flesh are all useful. The skin is nearly an inch thick, but is planed down until it becomes translucent, and is made into excellent leather, which is used for covering carriages and for other purposes. But much 'porpoise' leather is obtained from the Beluga (q.v.), or white whale, whence come also the so-called 'porpoise laces.' Under the skin is a layer of fat, about an inch in depth, which yields oil of the finest quality. The flesh was in former times highly esteemed, and reckoned fit for the table of royalty, perhaps partly because among Roman Catholics it was accounted *fish*. In the time of Queen Elizabeth it was still used by the nobles of England, and was served up with bread-crumbs and vinegar. It is now used only in very northern regions. An entirely black Porpoise (*P. melas*) from Japan has no dorsal fin and only seventy-two teeth in all. The name porpoise is from the old French *porpeis*, from the Latin *porcus*, 'hog,' and *piscis*, 'fish,' corresponding therefore in meaning to the modern French *marsouin*, a corrupt form of the German *meerschwein* ('sea-hog').

Porpora, NICCOLA, musical composer, was born at Naples, on 19th August 1686, trained there in music, and, having produced some successful operas, was appointed master of the conservatorio of San Onofrio (1722). Shortly before that he had established a school for singing, from which came some of the greatest singers the world has known, as Farinelli, Caffarelli, Salimbeni, and Uberti. From 1725 to after 1755 he led an unsettled life, though he stayed some time at Dresden, at Venice, in London (with Farinelli, 1734–36), and in Vienna, composing music, chiefly operas (though none rises above the level of conventional respectability), and teaching singing; at Vienna he taught Haydn. Of his other musical compositions a series of cantatas (twelve published in London in 1735), several sonatas for the violin, and six fugues for the clavichord are written with considerable freshness. He died at Naples in 1766 or 1767, and now is chiefly known through George Sand's *Consuelo*.

Porridge, a highly nutritious kind of food made by boiling oatmeal in water, formerly at least one of the chief elements of diet of the Scotch peasantry. Besides oatmeal, porridge may be made of barley, beans, or the like, and instead of water milk may be used.

Porrigo. See FAVUS, and RINGWORM.

Porsena. See ETRURIA, Vol. IV. p. 446. The story of the defence of the bridge across the Tiber at Rome against Lars Porsena of Clusium in the time of Tarquin has been told in spirited verse by Macaulay in his *Lays of Ancient Rome*.

Porson, RICHARD, perhaps our greatest Greek scholar, was born on Christmas Day 1759, at East Ruston in Norfolk, where his father was parish clerk. The Rev. T. Hewitt, curate of the parish, noticing the boy's omnivorous appetite for books and his marvellous memory, had him educated along with his own sons, and brought him under the notice of a neighbouring squire, Mr Norris, the founder of the Norrisian professorship at Cambridge, who sent him to Eton in August 1774. Here he remained four years, and in 1778 was entered at Trinity College, Cambridge, mainly by the help of the physician Sir George Baker. He was elected a scholar in 1780, next year won the Craven Scholarship, and subsequently the first chancellor's medal. In 1782 he was elected a Fellow of Trinity. He now began to contribute to *Maty's Review*, his first critique being on Schutz's Æschylus, and his finest on Brunck's Aristophanes.

He also opened a correspondence with the veteran scholar David Ruhnken of Leyden. His *Notæ breves ad Toupii Emendationes in Suidam* (1790) first carried his name beyond England as a scholar of the highest rank. In 1787 appeared in the *Gentleman's Magazine* his three sarcastic letters on Hawkins' *Life of Johnson;* and during 1788 and 1789, in the same periodical, his far more famous and trenchant *Letters to Archdeacon Travis, on the Spurious Verse 1 John v. 7* (coll. 1790)—'the most acute and accurate piece of criticism since the days of Bentley,' says Gibbon. Porson naturally incurred great odium on account of the side which he took in this controversy, and it is said that one old Norwich lady, who had him in her will for a legacy of £300, cut it down to £30 when she heard that he had written a book against Christianity. In 1792 his fellowship ceased to be tenable by a layman, whereupon some friends raised a fund to preserve him from want, and about £100 a year was secured. This he accepted on condition that after his death the money should be returned to the donors, but when they refused to take it back it was used to form a foundation for the Porson prize at Cambridge. He was also appointed to the regius professorship of Greek in the university of Cambridge, an office worth £40 a year. In 1795 he edited the plays of Æschylus for the Foulis press at Glasgow, and between 1797 and 1801 four of Euripides, the *Hecuba*, the *Orestes*, the *Phœnissæ*, and the *Medea.* He also collated the Harleian MS. of the *Odyssey* for the Grenville *Homer*. He married in 1796, but his wife died five months later, too soon to cure him of his dilatory and slovenly habits and his thirst for drink. In 1806 he was appointed librarian of the newly-founded London Institution, with a salary of £200, but neglected his duties. He was suddenly struck down with apoplexy in the Strand, 19th September 1808, and died six days later. He was buried in the chapel of Trinity College, Cambridge. Porson possessed a stupendous memory, unwearied industry, great acuteness, fearless honesty, and masculine sense, but was hindered all his life by poverty, ill-health, dilatoriness, and fits of intemperance. With all his powers he achieved but little, and to justify contemporary admiration there remain, besides the works already named, but a few *bon-mots*, some brilliant emendations, the posthumous *Adversaria* (1812), and notes on Aristophanes (1820), the lexicon of Photius (1822), Pausanias (1820), and Suidas (1834). His *Tracts and Criticisms* were collected by Kidd (1815).

See 'Porsoniana' in Rogers' *Table-Talk* (1856), H. R. Luard in *Cambridge Essays* (1857), and the Rev. J. Selby Watson's *Life* (1861). His *Correspondence* was edited by Luard for the Cambridge Antiq. Soc. (1867).

Port. See STEERING; also PORT WINE.

Porta, GIAMBATTISTA DELLA, Neapolitan physicist (1543–1615), wrote numerous works on physiology, gardening, arboriculture, pneumatics, and refraction, besides several comedies; his best-known books being *Magia Naturalis* (1569) and *De Humana Physiognomonia.*—For Baccio della Porta, see BARTOLOMMEO.

Port Adelaide. See ADELAIDE.

Portadown, a market-town of Armagh, Ireland, on the Bann, 6 miles S. of Lough Neagh and 25 miles by rail SW. of Belfast. It is a place of considerable trade in agricultural produce, and manufactures linen, cambric, and sheeting. Pop. (1871) 6735; (1881) 7850; (1891) 8430.

Portage City, capital of Columbia county, Wisconsin, is at the head of navigation on the Wisconsin River, and on the ship-canal which connects it with the Fox River, 177 miles by rail NW. of Chicago. Steamboats ply to Green Bay, Lake Michigan. Portage has grain-elevators and iron-works, and manufactures leather, boots, clothing, &c. Pop. (1880) 4346; (1890) 5143.

Portage la Prairie, the market-town of a rich agricultural district in Manitoba, on the Assiniboine River, 56 miles by rail W. of Winnipeg. It has flour-mills and grain-elevators, a brewery, a biscuit-factory, a paper-mill, &c. Pop. 3600.—In North America *portage* (from Fr. *porter*, 'to carry') means a place where boats or canoes have to be carried past rapids or across between one navigable stream and another.

Portalis, JEAN ÉTIENNE MARIE (1745–1807), jurist, practised law in Paris, was imprisoned and prosecuted during the Revolution, but under Napoleon was the chief author of the famous *Code Civil.* See CODE.

Portal Vein, the vein which conveys to the liver the venous blood from intestines, spleen, and stomach. See LIVER, CIRCULATION, VEINS.

Portarlington, a market-town of Ireland, partly in King's County, partly in Queen's County, on the Barrow, 44 miles by rail SW. of Dublin. It was granted by Charles II. to the Earl of Arlington; and here William III. planted a colony of French and Flemish Protestants. Until 1885 it returned one member to parliament. Pop. 2357.

Port Arthur, the terminus of the eastern division of the Canadian Pacific Railway, on Thunder Bay, an arm of Lake Superior, 993 miles by rail WNW. of Montreal. Pop. 5500. See OWEN SOUND.

Port Arthur, or LUSHUNKO, a naval station and arsenal on the peninsula stretching south into the Gulf of Pe-chi-li, opposite that of Wei-hai-wei, on the Shantung promontory to the south. Together they command the entrance to the gulf. Port Arthur was taken by the Japanese in November 1894, and Wei-hai-wei in January 1895.

Port-au-Prince, the capital of Hayti (q.v.), is situated on the west coast, at the head of a bay of the same name. Pop. 20,000.

Port Breton, a name given to the south-east part of New Ireland (now German), the scene in 1879 of a disastrous experiment in colonising by a company of French Legitimists. The Marquis Du Rays, who floated the company, and his associates were condemned to various terms of imprisonment (1883) for fraud and raising money on false pretences.

Portcullis (Fr. *porte* and *coulisse*, 'a groove'), a strong timber or iron grating, sliding in the jambs of the entrance to a castle, which, when dropped to the ground, defended the gate from assailants. The lower ends of the vertical bars had spikes to stick in the ground, or injure those on whom it was made to fall. A powerful mechanism of windlasses was required to work the portcullis. There might be a succession of portcullises in the same entrance.

Port Darwin, one of the finest harbours in Australia, is situated on the coast of the Northern Territory of South Australia. Its entrance is 2 miles wide, and vessels of any tonnage can float in it with safety. Palmerston, the chief town on its shores, is the land terminus of the overland telegraph, 1973 miles from Adelaide, and of the cable to Java, and the starting-point of a railway (1891) to the gold-fields of the interior, 150 miles distant. The imports average about £290,000 per annum and the exports £105,000.

Port D'Urban. See DURBAN.

Port Durnford, a harbour in the British East African Company's territory, a little more than 1° S. of the equator.

Porte, or SUBLIME PORTE, a name given to the Turkish government. See CONSTANTINOPLE.

Port Elizabeth, a seaport of the British colony of the Cape of Good Hope, stands on the western shore of Algoa Bay, by rail 85 miles SW. of Graham's Town and 350 S. of Kimberley. It is the principal seaport of the east part of Cape Colony, and also of the Orange River Free State. Its public buildings, solid and substantial edifices, are the town-house, the provincial hospital, churches, the Grey Institute, a college, a library (20,000 volumes), a museum, &c. There are two parks and several tree-planted squares. The town was founded in 1820, and the population, which was not much above 4000 in 1855, had grown to 13,049 in 1875, and to 23,266 in 1891. Two piers were constructed to protect the harbour in 1881; and an aqueduct, 28 miles long, has brought good water to the town since 1878. The value of the imports increased from £376,638 in 1855 to an average of £2,940,800 for the three years ending 1889; that of the exports (mainly wool, with ostrich-feathers, Angora goats' hair, and diamonds) from £584,447 in 1855 to an average of £1,820,660 (ending 1889).

Porteous Mob. At Pittenweem in Fife, on the night of 9th January 1736, three smugglers, Andrew Wilson of Kirkcaldy, George Robertson, an Edinburgh innkeeper, and William Hall, robbed the Kirkcaldy excise-collector of over £100. All three were at once arrested, and on 11th March were sentenced to death. In an attempt to break out of the Edinburgh Tolbooth (the 'Heart of Midlothian'), Wilson, 'a squat round man,' stuck fast in a grating, preventing also the escape of Robertson; but the following Sunday, being taken with him to hear the condemned sermon in St Giles' Church, he suddenly seized two of the four soldiers guarding them, and fastened with his teeth upon a third, at the same time crying, 'Run, Geordie, run for your life.' Robertson did get clear off; Wilson on 14th April was hanged in the Grassmarket. There was some disturbance and stone-throwing, when Captain John Porteous, the brutal commander of the City Guard, fired on the crowd, and killed or wounded sixteen or more men and women. For this he himself was tried and sentenced to death (20th July), but on 26th August was respited by Queen Caroline. However, on the night of 7th September an orderly mob burst open the tolbooth, dragged Porteous out, bore him, pleading for mercy, to the Grassmarket, and lynched him—hanged him from a dyer's pole, and slashed at him with Lochaber axes. A drunken footman of Lady Wemyss and one other man were tried next year for their share in the riot; but both were acquitted, and none of the ringleaders ever was brought to justice. A bill passed the Lords to disqualify the Lord Provost of Edinburgh from ever again holding office, to imprison him for a twelvemonth, to abolish the City Guard, to raze the Nether Port, and to fine the city in £1500 for Porteous' widow; but only the first and last clauses were carried in the Commons, and these only by a casting vote and after the fiercest opposition from all the Scotch members. Indeed, the Porteous Riot paved the way for the rebellion of the '45.

See vol. xvii. of the *State Trials* (1816); Scott's *Heart of Midlothian* (1818); and *Criminal Trials illustrative of the 'Heart of Midlothian'* (1818).

Porter, a kind of beer favoured by London porters, hence so called about 1750. See BEER, Vol. II. p. 37.

Porter, DAVID, an American naval officer, was born at Boston, Massachusetts, 1st February 1780, the son of a naval officer who fought through the Revolution. He was appointed midshipman in 1798, and lieutenant the year after; saw service against privateers in the West Indies, and against Tripoli in 1801-3; became captain in 1812, and captured the first British war-ship taken in the war. In 1813, with the *Essex* (32 guns), he nearly destroyed the English whale-fishery in the Pacific, and took possession of the Marquesas Islands; but in March 1814 his frigate was destroyed by the British in Valparaiso harbour, and Porter returned home on parole. He afterwards commanded an expedition against pirates in the West Indian waters, and was court-martialled for compelling the authorities at Porto Rico to apologise for imprisoning one of his officers. Porter resigned in 1826, and was for a time at the head of the Mexican navy. In 1829 the United States appointed him consul-general to the Barbary States, and then minister at Constantinople, where he died, 3d March 1843. Farragut, it is worth noting, was his adopted son. See the Life (1875) by his son.

DAVID DIXON PORTER, admiral of the American navy, who was born at Chester, Pennsylvania, 8th June 1813. He accompanied his father on his cruise against the pirates, and afterwards was for some time a midshipman in the Mexican service. He entered the United States navy in 1829, was employed on the coast survey from 1836 to 1841, when he became lieutenant, and then served till 1845 on the Mediterranean and Brazil stations, afterwards returning to the coast survey. From 1849 to 1853 he was engaged in command of the California mail-steamers. At the commencement of the civil war he was appointed commander of the steam-frigate *Powhatan*, and ordered to Pensacola; but afterwards he was placed in command of the mortar flotilla, joined Farragut, and in April 1862 successfully bombarded the New Orleans forts. In September 1862 he received the command of the Mississippi squadron, and, succeeding in running past the batteries of Vicksburg, poured a heavy cannonade on the city, and assisted materially to bring about its fall in July 1863, for which he was promoted to rear-admiral. Transferred to the North Atlantic squadron in 1864, in December he bombarded and silenced Fort Fisher, at the mouth of Cape Fear River; and in January 1865, after seven hours' fighting, the fortress was taken by the combined land and naval forces. Porter, who till 1869 was superintendent of the naval academy at Annapolis, was made vice-admiral in 1866, and in 1870 succeeded Farragut as admiral of the navy. He died at Washington, 13th February 1891. He was the author of three romances, of *Incidents and Anecdotes of the Civil War* (1885), and of a *History of the Navy in the War of the Rebellion* (1887).

Porter, JANE, authoress of the *Scottish Chiefs*, was born at Durham in 1776, daughter of an army-surgeon who died soon after her birth. She was brought up at Edinburgh and in London, and made a great reputation in 1803 by her high-flown romance, *Thaddeus of Warsaw*, which was distanced in its kind in 1810 by *The Scottish Chiefs*. The hero of the latter is a stilted and preposterous figure enough—as little of the historical Wallace as could well be, yet the book retains its interest for youthful readers, and had the merit of prompting Scott to complete *Waverley*. Other books were *The Pastor's Fireside* (1815), *Duke Christian of Lüneburg* (1824), *Tales Round a Winter's Hearth* (in collaboration with her sister Anna Maria, 1824), *The Field of Forty Footsteps* (1828), and *Sir Edward Seaward's Narrative of his Shipwreck and Consequent Discovery of Certain Islands in the Caribbean Sea* (1831), a clever fiction, edited by her, but almost certainly written by her eldest brother, Dr William Ogilvie Porter (cf. *Notes and Queries*, 1880). With this brother she spent some years at Bristol, and there she died, 24th May 1850.—Another brother, ROBERT KER PORTER (1775–1842), was a clever battle-painter, and led a wandering life. He visited Russia on the emperor's commission in 1804, accompanied Sir John Moore's expedition in 1808, became knight commander of the order of Hanover in 1832, was afterwards British consul in Venezuela, and died at St Petersburg, whither his sister Jane had gone to join him, 4th May 1845. He published books of travel in Russia, Sweden, Spain, Portugal, Georgia, Persia, and Armenia.—Her younger sister, ANNA MARIA PORTER (1780–1832), blossomed precociously into *Artless Tales* (1793–95), followed by a long series of works, among which need only be named *Octavia* (1798), *The Lake of Killarney* (1804), *The Hungarian Brothers* (1807), *The Recluse of Norway* (1814), *The Fast of St Magdalen* (1818), *Honor O'Hara* (1826), and *Barony* (1830).

Porter, NOAH, philosophical writer, was born 14th December 1811, at Farmington, Connecticut, graduated at Yale in 1831, studied theology, and was for ten years a Congregational pastor. In 1846 he became professor of Moral Philosophy at Yale, and from 1871 to 1886 he was president of the college. One of the doctorates received by him was the Edinburgh LL.D. in 1886. Of his numerous works may be mentioned *The Human Intellect* (1868), *Books and Reading* (1870), *Sciences of Nature versus the Science of Man* (1871), *Elements of Intellectual Science* (1872), *Elements of Moral Science* (1885), *Kant's Ethics* (1886). Died 4th March 1892.

Port Erin, a port on the south-west coast of the Isle of Man, on Port Erin Bay, 5½ miles W. of Castletown, has a breakwater 950 feet long, and a steamboat pier. One mile to the north-east there is a runic monumental cross. Port Erin forms part of Rushen parish (pop. 3527).

Port Essington, an inlet in the Coburg Peninsula on the north coast of Australia, forming a fine harbour. On its shores there was from 1831 to 1850 a penal settlement.

Porteus, BEILBY, was the youngest but one of nineteen children, and was born at York, 8th May 1731, his parents being both natives of Virginia. He was educated at Ripon and Christ's College, Cambridge, and graduated as tenth wrangler in 1752. He was at once made a fellow of his college, took orders in 1757, and became domestic chaplain to Archbishop Secker in 1762. His preferments were the small livings of Rucking and Witterscham in Kent (1765), which he soon exchanged for the rectory of Hunton in the same county, the rectory of Lambeth (1767), the mastership of the Hospital of St Cross, near Winchester (1769), the bishopric of Chester (1776), and of London, in succession to Dr Lowth (1787). He resigned Lambeth when made Bishop of Chester, but only gave up Hunton when appointed to the see of London. Bishop Porteus died 13th May 1809. He was a sound Churchman, yet moderate, a great enemy of profanity and Sunday concerts, and a warm friend of the West Indian slaves. He was a judicious observer of the times, as in his prudently delayed commendation of Sunday-schools. His learning was inconsiderable, and the popularity of his *Lectures on St Matthew's Gospel*, and especially his *Summary of Christian Evidences*, was solely due to the absence of better books. Porson called him 'Proteus,' and Parr described him as 'a poor paltry prelate, proud of petty popularity, and perpetually preaching to petticoats.'

See the Panegyric, rather than Life, by the Rev. Robert Hodgson (1811), editor of his works in 6 vols.; and a very full correspondence in *Notes and Queries* for 1879–81.

Port Famine, the name given by Cavendish in 1587 to a spot in Patagonia on the north coast of the Straits of Magellan. From 1843 to 1853 it was a Chilian penal colony.

Port-Glasgow, a town of Renfrewshire, on the southern shore of the Firth of Clyde, 3 miles ESE. of Greenock and 20 WNW. of Glasgow. It was founded in 1668 by the magistrates of Glasgow as a harbour for their city, the deepening of the Clyde (q.v.) not having yet been thought of. In 1710 it was constituted the head custom-house on the Clyde, and for a while took the lead of Greenock; in 1775 it was incorporated as a municipality; and by the Reform Bill of 1832 it was raised to the rank of a parliamentary burgh, uniting with Kilmarnock, &c. to return one member. Built on low alluvial ground, and backed by hills 700 feet high, it has a Doric town-house (1815), a public hall (1873), ruined Newark Castle (1597), a wet-dock of 12 acres (formed since 1834), a large graving-dock (1874), extensive timber-ponds, shipbuilding-yards, iron and brass foundries, &c. Pop. (1841) 6938; (1881) 10,802; (1891) 14,685.

Port Hamilton, a spacious, well-sheltered harbour, formed by three islands of the Nan-how group, 30 miles S. of Corea and 45 NE. of Quelpart (q.v.). It was annexed by Britain as a prospective coaling station in 1885, but abandoned in the following year. It was discovered and named by Belcher in 1845.

Port Hope, a port of entry of Ontario, on the north shore of Lake Ontario, 63 miles by rail E. of Toronto. It has a good harbour, and a trade in lumber and grain, and in the town woollens, buttons, engines, iron castings, &c. are manufactured. Pop. (1881) 5581; (1891) 5042.

Port Huron, capital of St Clair county, Michigan, is on the St Clair River where it issues from Lake Huron, and at the mouth of the Black River, 59 miles by rail NNE. of Detroit. The rivers are crossed by four iron bridges. The city has a fine custom-house (1877), shipyards and dry-docks, sawmills, grain-elevators, and machine and railroad shops. Much pine timber is brought down by the Black River. A railway tunnel passing under the St Clair River connects the town with Sarnia, in Canada (see ST CLAIR); there is also a steam-ferry to Sarnia, and steamboats ply daily, except in winter, between Port Huron and Detroit. Pop. (1880) 8883; (1890) 13,543.

Portici, a town of Italy, on the slope of Vesuvius, 5 miles by rail SE. of Naples. Its environs are delightful, and are dotted over with country-houses. The royal palace built (1738) by Charles III. is now an agricultural college. There are a small fort, fishing, and sea-bathing. Silk-worms are reared and ribbons made. Pop. 12,272.

Portioners. See HEIR, Vol. V. p. 626.

Port Jervis, a town of New York, on the Delaware River, 88 miles by rail NW. of New York City. It contains railroad shops, planing and other mills, glass-works, and manufactories of boots and shoes, gloves, and watch-cases. Pop. (1880) 8678; (1890) 9327.

Portland, (1) the largest city and chief seaport of Maine, and capital of Cumberland county, on Casco Bay, 108 miles by rail NE. of Boston. It is situated on a narrow peninsula, embracing 2½ sq. m., with broad shaded streets, and handsome public and private edifices, including a court and custom-house, post-office, city hall, observatory, and Baxter and Mechanics' Halls. There are rolling-mills, and locomotives, machinery, boilers, stoves, carriages, and shoes manufactured, and sugar and petroleum refined. The harbour, which is defended by three forts, is large, deep, and well sheltered; there are wharves, elevators, and dry-docks, and an important trade is carried on; steamers ply direct to Liverpool in winter. The place was first settled by an English colony in 1632.

In 1866 a fire destroyed $10,000,000 worth of property. Portland is the seat of Episcopal and Roman Catholic bishops, and was the birthplace of Longfellow. Pop. (1870) 31,413; (1890) 36,425.—(2) PORTLAND, the metropolis of Oregon, and capital of Multnomah county, is on the Willamette River, 12 miles from where it joins the Columbia (about 100 from the ocean) and 772 by rail N. of San Francisco. It has railway communication with St Paul and Council Bluffs also, and is a prosperous port of entry, large ocean-going ships coming up to this point. A handsome city, well built, with fine, shaded streets, it has a court-house, a United States government building, numerous churches and schools, and an asylum for the insane. There are iron-foundries, machine-shops, sawmills, canneries, breweries, and manufactures of furniture, flour, shoes, &c. Clearing-house returns show $93,000,000 for 1890—exports, $12,000,000. Portland was founded in 1844, and became a city in 1851. Pop. (1870) 8293; (1880) 17,577; (1890) 46,385.

Portland, DUKES OF. See BENTINCK.

Portland, ISLE OF, a rocky peninsula of Dorsetshire, connected with the mainland by the Chesil Bank (q.v.), and 4 miles S. of Weymouth by a branch-line (1865). It is 4½ miles long, 1¾ wide, 9 in circumference, and 2890 acres in area. From its highest point, the Verne (495 feet), it shelves with a gradual and almost unbroken slope to Portland Bill (20 feet), the southern extremity, where stand two lighthouses (1716–89), showing fixed lights 210 and 136 feet above sea-level, and between which and the Shambles, a dangerous reef, 3 miles south-east, a surf, called the Portland Race, is raised by the rushing of the impetuous tides. The cliffs have in places been worn into fantastic caverns; and ancient raised beaches are well marked near the Bill. Portland is one solid mass of oolitic limestone, which has been largely quarried for building purposes since the 17th century, when Inigo Jones employed it for Whitehall and Sir Christopher Wren for St Paul's. Goldsmiths' Hall, the Reform Club, and Pall Mall generally are also built of it; and the yearly export now ranges between 50,000 and 70,000 tons.

There are three different qualities of Portland stone, the three strata lying close together. The top bed, called *Roach*, is unsuited for fine hewn work, since it is full of fossils, but it is hard and durable, and does well for the walls of docks, foundations, and the like. The *Whit Bed*, which comes next, yields the best stone for fine buildings. It varies in texture from a fine close grain to the roe-like structure characteristic of oolitic limestones, and is free from shells. Its colour is a pleasing grayish white. The *Base Bed*, not quite so much quarried as the others, is of finer grain and whiter than the Whit bed; but it is softer and better suited for internal than external architectural work. An analysis of this stone by Professor Daniell shows the following composition: Silica, 1·20; carbonate of lime, 95·16; carbonate of magnesia, 1·20; iron and alumina, ·50; water and loss, 1·94; besides which ingredients there is often a trace of bitumen present. Portland stone is also quarried in the 'Isle' of Purbeck and the Vale of Wardour.

The formation of a magnificent harbour of refuge has been described at BREAKWATER, where also a map is given; most formidable fortifications have moreover been constructed, the Verne in especial being crowned by Fort Victoria. Other features of the 'Isle' are its great convict-prison, dating from 1848, and holding upwards of 1500 convicts (see PRISONS); Portland Castle (1520), built by Henry VIII., and held for Charles I. till 1646; Bow and Arrow Castle, ascribed to Rufus; and Pennsylvania Castle (1800), built by Governor Penn, the great Quaker's grandson. The inhabitants of the 'Isle' long remained a peculiar people, intermarrying, and preserving, generation after generation, the many curious customs of their forefathers. The 'Isle' itself is remarkable for its copious and excellent spring-water and for its small breed of black-faced sheep, whose flesh, well known as 'Portland mutton,' is much esteemed for its flavour. Pop. (1851) 5195; (1881) 10,061; (1891) 11,000.

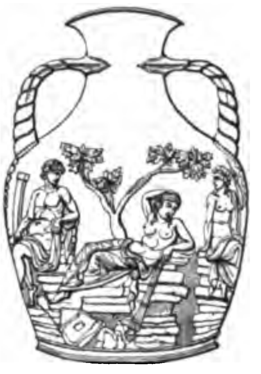
See Damon's *Geology of Weymouth and Portland* (1860), and an article in the *Cornhill* (1882).

Portland Beds. See JURASSIC SYSTEM.

Portland Cement. See CEMENT.

Portland Sago. See ARUM.

Portland Vase, a celebrated ancient Roman glass vase or cinerary urn found during the pontificate of Urban VIII. (1623–44) in a marble sarcophagus (of Alexander Severus, it is thought, and his mother Mammæa) in the Monte del Grano, near Rome. It was at first deposited in the Barberini Palace at Rome, and hence it is sometimes called the Barberini Vase. It was bought in 1770 by Sir William Hamilton (q.v.), and in 1787 by the Portland family, who in 1810 deposited it in the British Museum, where it is now shown in the 'Gold Room.' The ground of the Portland Vase is of dark-blue glass, and the figure-subjects which adorn it are cut in cameo style in an outer layer of opaque white glass. In the official *British Museum Guide* (1890) it is stated that the composition is supposed to represent on the obverse Thetis consenting to be the bride of Peleus, in the presence of Poseidon and Eros; on the reverse, Peleus and Thetis on Mount Pelion. On the bottom of the vase is a bust of Paris. The vase was broken to pieces by a lunatic in 1845, but the fragments were very skilfully united again. The Portland Vase is 10 inches high, and is the finest specimen of an ancient cameo cut-glass vase known. There are only two others of similar character which approach it in beauty—viz. an amphora in the Naples Museum and the Auldjo Vase. But fragments of the same kind of glass exist with work upon them quite as fine. In the end of the 18th century Josiah Wedgwood, the famous potter, made fifty copies in fine earthenware of the Portland Vase, which were originally sold at twenty-five guineas each. One of these now fetches £200.



Portland Vase.

Port Louis, the capital and principal port of the British colony of Mauritius, is situated on an excellent harbour on the north west coast, and is enclosed by a ring of lofty hills. It is defended by forts (1887-91), is a coaling station of the British navy, and has barracks and military storehouses. There are three graving-docks beside the harbour, through which all the commerce of Mauritius (q.v.) passes. The drainage has been greatly improved of late. The city contains the government house, a Protestant and a Roman Catholic cathedral, a royal college, &c. Pop. (1889) 61,170.

Port Mahon (anc. *Portus Magonis*), the capital of the island of Minorca (q.v.), is beautifully situated on a deep, narrow inlet in the south-east of the island. Its harbour is one of the finest in the Mediterranean, and is protected by powerful forts and fortifications. Building stone, shoes, cottons, cattle, and honey are exported. Pop. 15,842. The town was held by the English from 1708 to 1756, and again from 1762 to 1782. It was they who made it a first-class fortress.

Port Moody. See VANCOUVER.

Porto Alegre, capital of the Brazilian state of Rio Grande do Sul, stands at the north-west extremity of the Lagõa dos Patos, by means of which it communicates with the sea. It was founded in 1742, is well built, and has about 35,000 inhabitants. It contains a cathedral, an arsenal, military and normal schools, an episcopal seminary, and a German club. Most of the wholesale trade is in the hands of the Germans, who number some 3000. Railways bring the produce of the interior down to the port, which, however, can only be entered by ships drawing 8½ feet. There are manufactories of pianos, furniture, brandy, and beer.

Portobello, a Scottish watering-place on the southern shore of the Firth of Forth, 3 miles E. of Edinburgh. Its first house (1742) was built by one of Admiral Vernon's seamen in the expedition against Puerto Bello, and hence it derived its name; but it dates, like its eastern extension Joppa, almost wholly from a time later than 1804. An esplanade, ¾ mile long, skirts the broad level sands; and there are a promenade pier of 1250 feet (1871), municipal buildings (1878), half-a-dozen churches, and manufactures of pottery, bricks, bottles, &c. Portobello, with Leith and Musselburgh, returns one member to parliament. Pop. (1841) 3587; (1881) 6926; (1891) 8682.

Portobelo (*Puerto Bello*), a small decayed seaport town of Colombia, on the northern shore of the Isthmus of Panamá, almost due north of the town of Panamá. It has an excellent harbour, discovered by Columbus in 1502, but is very unhealthy, and has fallen into decay since 1739, when it was stormed by Admiral Vernon, during the war between England and Spain. Pop. 1300.

Porto Ferrajo. See ELBA.

Porto-Maurizio, a town of North Italy, stands embowered in olive-groves on the Gulf of Genoa, by rail 69 miles SW. of Genoa and 41 E. by N. of Nice, and consists of an old town on the hills and a new town next the sea, with a small harbour. Pop. 6309.—The *province* has an area of 468 sq. m. and a pop. (1889) of 136,738.

Porto Novo, a small port on the Coromandel coast of India, 145 miles S. of Madras by rail. Both the Danes and the Dutch had formerly a factory here. The place is celebrated for the battle fought here on 1st July 1781, when Sir Eyre Coote, with 8000 men, defeated Hyder Ali and an army of 60,000. From 1824 on for some years there was an iron-foundry here, the ore being brought from Salem. Pop. 7823.

Porto Rico, or PUERTO RICO, a Spanish West India island, lies 75 miles E. of Hayti or St Domingo. An oblong in shape, it has an area of 3530 sq. m., about five-sixths the area of Jamaica, and measures 110 miles from east to west, and 40 from north to south. It is traversed from east to west by ranges of mountains, 1500 feet in average height, though Mount El Yunque rises to 3670 feet. From the base of the mountains rich alluvial tracts extend to the sea on all sides, and are watered by innumerable short streams. The higher parts are covered with forests. Rain falls in much greater abundance on the north than on the south of the island. The principal crops are sugar, coffee, and rice (the food of the people), though tobacco, maize, yams, bananas, plantains, and tropical fruits are also grown. Large herds of cattle and horses are fed on the lowland pastures. The imports consist of cotton and woollen goods, metals and hardware, and provisions, as rice, flour, ale, fruits, &c., and reach a value between two and three millions sterling; they are supplied principally by Great Britain, the United States, and Spain in nearly equal proportions. The exports are sugar, coffee, molasses, tobacco, and cattle, valued at two to two and a half millions, from three-quarters to one and a quarter million being for sugar and the same value for coffee. Spain and the United States are the chief customers; France and Great Britain come next. The population increases rapidly: in 1800 it was 155,400; in 1834, 358,800; in 1864, 615,844; in 1880, 754,313 (429,473 being white); and in 1888, 813,937. The chief towns are St John's (q.v.), the capital, Mayaguez (pop. 27,000), and Ponce (40,000). Slavery was abolished in 1873. Porto Rico was discovered by Columbus in 1493. Ponce de Leon founded the first Spanish settlement in 1510. An attempt to shake off the Spanish yoke in 1820–23 was unsuccessful.

Portpatrick, a decayed fishing-village in Wigtownshire, 7¾ miles SW. of Stranraer by rail. It is sheltered by high cliffs, and has a pleasant south-westerly exposure, but the coast is rocky and the sea boisterous, while there are no facilities for bathing, although the village enjoys some reputation as a watering-place. Portpatrick is but 21½ miles direct north-east of Donaghadee in County Down, was long the Gretna Green for Ireland, and the chief place for the importation into Scotland of Irish cattle and horses, while it was a mail-packet station from 1662 till 1849. A pier was built in 1774, and a great artificial harbour was commenced from Rennie's designs in 1821, but ultimately was found impracticable as a place of shelter owing to the violence of the south-westerly swell and the winds that blow for eight months of the year. The public confidence in the harbour received its death-blow from the wreck of the *Orion* steamship within the port in 1850, when about seventy souls perished within a few yards of the crowded street. The lighthouse was removed in 1869, and the harbour-works fell quickly into hopeless ruin, after having cost the country £500,000. Pop. of parish (1831) 2239; (1891) 1213.

Port Phillip, the gate of Melbourne, discovered in 1802 by Lieutenant Murray, and named in honour of Captain Phillip, the first governor of New South Wales (q.v.). Victoria itself was originally called the district of Port Phillip.

Portraits, COMPOSITE, a method of indicating the facial characteristics of a family or group of persons, while at the same time suppressing the peculiarities of individual members. Mr Francis Galton has thus prepared type faces each composed of a number of individuals specially celebrated for some particular branch of art, science, or occupation. The results are recognised as of considerable value to the student of anthropology.

One way of obtaining these composite portraits is to take full-face photographs of each person composing the group, of such a uniform size that two fixed horizontal lines pass, one through the inner angle of the eyes, the other through the line dividing the lips, while a third fixed perpendicular line equally divides the nose; by this means the photographs are brought approximately to the same size, and corresponding portions of the various faces occupy similar positions. Now suppose there are ten individuals in the group, and that any one negative would require half an hour to produce a good print, then each negative is printed for one-tenth of half an hour, and is carefully adjusted so that each succeeding negative occupies the same position on the print as the preceding one; thus a composite portrait will result, each of the ten likenesses having an equal share in its production. Where any characteristic is common to all or several, that peculiarity will be more or less pronounced; where, however, only one or two persons possess a peculiarity, it is scarcely, if at all, noticeable. By taking a negative of a succession of positives a composite negative will result capable of indefinite reproduction. The result is often a highly idealised portrait representative of the family, or of the poet, statesman, mathematician, gaol-bird, &c., and typical of the group it represents.

Portree. See SKYE.

Portreeve, once the English name of the principal magistrate in a port town, especially in London (q.v.).

Port Royal. See JAMAICA.

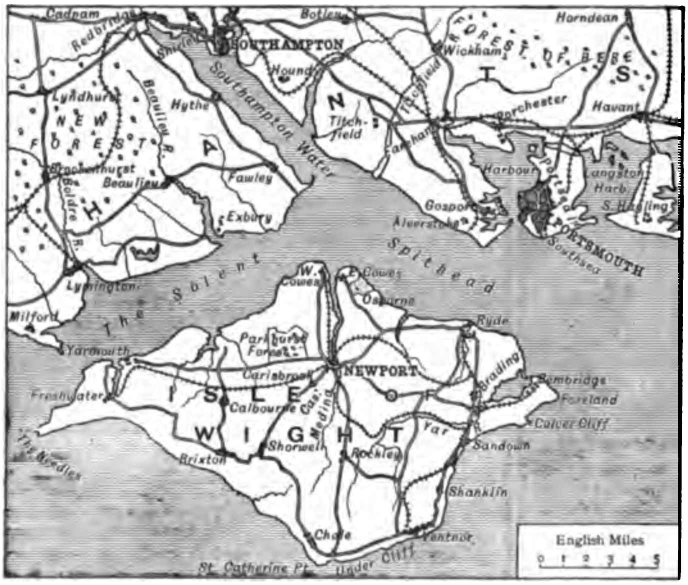
Port-Royal des Champs, a convent of Cistercian nuns, nearly 8 miles SW. of Versailles, which obtained much celebrity during the 17th century. It was founded for nuns by a member of the family of Montmorency in the early part of the 13th century, and soon after its establishment obtained from the pope the privilege of receiving lay persons, who, without taking monastic vows, desired to live in religious retirement. The discipline of the convent having been much relaxed in the 15th and 16th centuries, one of its worst abuses—that of appointing the superior, not on account of fitness, but from considerations of family or other worldly or political motives—became in the end the occasion of its complete reformation under Marie Angélique Arnauld (q.v.). The community was removed to Paris in 1626, and in 1633 to a new convent, Port-Royal de Paris; and from this time the old establishment of Port-Royal des Champs was exclusively devoted to the use of a lay community. This community soon numbered among its permanent inmates some of the most distinguished scholars of that age, Antony Arnauld, Le Maistre, Antony and Louis Isaac le Maistre de Sacy, Nicole, Lancelot, Séricourt, and others. Their rule of life was most austere, rising at 3 A.M., devoting many hours to prayer and spiritual reading and instruction, and a portion of the day to manual labour. One of their public services was the establishment of a school, for which they prepared well-known educational books, the Port-Royal Greek and Latin Grammars, General Grammar, Geometry, Art of Thinking ('Port-Royal Logic,' new ed. by Professor Spencer Baynes, 1881), &c. But Port-Royal is best known for its adhesion to the Jansenist movement (see JANSEN). The nuns of Port-Royal having refused to subscribe the formulary condemning the Five Propositions, a royal order was issued in 1660 for the suppression of the school and the removal of the boarders of Port-Royal des Champs; and the abbess and several other nuns were arrested, and confined as prisoners in other monasteries. After the 'Peace of Clement IX.' they were permitted to return; but the two communities were placed under separate government. When the final steps for the repression of the Jansenist party were taken about 1707 a formal bull was issued by Pope Clement XI. for the suppression of Port-Royal des Champs, and the transfer of its property to Port-Royal de Paris. The nuns were finally dispersed and distributed over convents of different orders throughout France. The property of the convent and church was transferred to the Paris house, and all the buildings of Port-Royal des Champs were levelled to the ground by order of the king. See Sainte-Beuve, *Port-Royal* (4th ed. 6 vols. 1878); Charles Beard, *Port-Royal* (2 vols. 1861).

Portrush, a watering-place in County Antrim, 6¼ miles by rail N. of Coleraine, and 7 W. by S. of the Giants' Causeway, with which it is connected by an electric tramway (1883). The town is built on the isthmus of a short peninsula, looking to the Causeway cliffs on the one side, and to Inishowen and almost Malin Head on the other. It has fine stretches of firm sand for bathing, and has communications by steamer with Morecambe and Glasgow. Pop. 1322.

Port Said, a town of Egypt, on the west side of the Suez Canal, on a desolate strip of land between Lake Menzaleh and the Mediterranean. The place owes its origin to the Suez Canal (q.v.), being named after Saïd Pasha, its promoter, and depends wholly on the canal trade, being mainly a coaling station for steamers. Pop. (1882) 16,560.

Portsea Island, a small island on the south coast of Hampshire, has on its west side Portsmouth Harbour and on its east side Langston Harbour, and is separated from the mainland on the north by a narrow channel, crossed by several bridges. It is four miles long by from two to three broad, and contains the towns of Portsea and Portsmouth.

Portsmouth, the chief naval arsenal of Great Britain, and an important seaport, market-town, and municipal, parliamentary, and county borough, in the south of Hampshire, stands on the southwest shore of Portsea Island (q.v.), at the entrance to Portsmouth Harbour, and opposite the town of Gosport (q.v.), with which it communicates by means of a steam-bridge. It is 74 miles SW. of London, 44 W. of Brighton, and 23 SW. of Southampton. Besides the parish of Portsmouth, the limits of the municipal and parliamentary borough, which are co-extensive, include also the parish and town of Portsea, and the out-wards Landport and Southsea, and comprise the whole of Portsea Island, with the exception of a small portion in the northeast corner. Pop. of the borough (1821) 69,479; (1851) 72,096; (1871) 113,569; (1881) 127,989; (1891) 159,255. Portsmouth is for the most part a mean-looking, dirty town, but has the most complete fortifications in Britain. These comprise, on the landward side, the outer line of the Portsdown forts and the Hilsea lines; to seaward, the Spithead (q.v.) forts. A portion of the bastioned ramparts, which formerly encircled both Portsmouth and Gosport, and were so imposing in appearance, have since 1872 been removed as useless. Southsea, which is situated outside the walls skirting Southsea Common, is rapidly increasing, and is now a fashionable watering-place. In the town proper there are few objects of note. Pleasing views may be had from the ramparts and batteries, of the harbour, the roadstead of Spithead, and the Isle of Wight. Many improvements have been carried out in Portsmouth, including improved drainage, and the opening of the Victoria Park in 1878; also a new town-hall has been built at a cost of £140,000, which was opened by the Prince of Wales in 1890. Among the few notable buildings may be mentioned the church of St Thomas, whose chancel and transept date from the close of the 12th century, the nave and tower from 1698, and which contains a ghastly cenotaph in memory of the murdered Duke of Buckingham. The Garrison Chapel, Early English in style, and finely restored by Street in 1867, is a fragment of the hospital of St Nicholas, founded in 1212 by Bishop Peter de Repibus. In it Charles II. married Catharine of Braganza; and in front of it is buried the brave Sir Charles James Napier (q.v.), who died in this neighbourhood in 1853. The dockyard of Portsmouth, in the district of Portsea, was till 1872 only 116 acres in extent; but vast works have since then been carried out at a cost of £2,500,000, which have increased the area to a total of 293 acres. Of this immense naval establishment the most noteworthy, if not the most recent, features are the mast and rope houses, hemp-stores, rigging-stores, sail-loft, and the dry-docks, spacious enough to admit the largest vessels, and offering every facility for their speedy repair. The twelve docks, 22 to 36 feet deep, are lined with solid masonry, roofed over, and closed by lock-gates. Of the various building-slips, one of them, roofed and covered in, is so large that three or four vessels can be in process of construction under it at the same time. The Wood Mills contain a number of most ingenious block-making machines, the invention of Sir Isambard Brunel (q.v.), in which rough timber, introduced at one end, is cut, squared, drilled, bored, and turned into the required shape. About 150,000 blocks are made here annually, and the machines require the attendance of no more than four men. In the smithy anchors are forged by aid of a Nasmyth's hammer.


Cadnam
Redbridge
Botley
SOUTHAMPTON
Shirley
Horndean
FOREST OF BERE
Wickham
Hound
Southampton Water
Titchfield
N
T
S
Lyndhurst
NEW FOREST
Hythe
Beaulieu R.
Titch-field
Porchester
Havant
A
Fareham
Brockenhurst
Beaulieu
Fawley
Harbour
Portsea
Langston Harb.
S. Hayling
Boldre R.
H
Exbury
Gosport
Alverstoke
PORTSMOUTH
Southsea
Spithead
The Solent
Lymington
W. Cowes
E. Cowes
Osborne
Milford
Ryde
Yarmouth
Parkhurst Forest
Carisbrook
NEWPORT
Brading
Bembridge
Foreland
Freshwater
ISLE OF WIGHT
Calbourne
Cas.
Medina
Culver Cliff
Yar
Sandown
The Needles
Brixton
Shorwell
Rockley
Shanklin
Chale
Ventnor
Under Cliff
St. Catherine Pt.
English Miles
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The dockyard also contains the residences of the superintending officers, and a school of naval architecture.

Portsmouth Harbour, about 400 yards wide at its entrance, expands into a spacious basin, extending inland for about 4 miles, and having a breadth of 3 miles along its northern shore. Large war-vessels can enter and lie at anchor at all times of the tide, there being 4 fathoms of water in the channel at low water. The outward entrance is defended by Forts Monckton and Gilkicker, and Southsea Castle. The position of this harbour is highly favourable. It is situated in the middle of the channel, close to the magnificent anchorage of Spithead, where 1000 ships of the line may ride without inconvenience, and is under shelter of the Isle of Wight, and opposite the French arsenal of Cherbourg.

The local trade of Portsmouth is chiefly supported by the dockyard and other public establishments. Brewing is largely carried on. Coals, potatoes, corn, and timber are imported from British coasts, and potatoes, granite, corn, timber, cattle, and wine from abroad. The only exports are pottery (shipped at Fareham) and coal-tar pitch.

The importance of this port dates only from the reign of Henry VIII. Its defences were commenced by Edward IV. and strengthened by Elizabeth, and afterwards in a more thorough manner by William III. Here, in a house that still remains in the High Street, and which was then an inn called the 'Spotted Dog,' the Duke of Buckingham (the 'Steenie' of King James) was assassinated by John Felton. On the 29th of August 1782, when its commander, Admiral Kempenfeldt, was writing in his cabin, the *Royal George* went down at Spithead, and nearly 1000 lives were lost. Charles Dickens was born at 387 Mile End Terrace, Commercial Road, Landport, Portsea; and other worthies of Portsmouth have been Walter Besant, the younger Brunel, Jonas Hanway, Sir Frederick Madden, George Meredith, and John Pounds.

See L. Allen's *History of Portsmouth* (1817), H. Slight's *Chronicles of Portsmouth* (1828), H. P. Wright's *Story of the 'Domus Dei' or Garrison Church* (1873), W. H. Saunders' *Annals of Portsmouth* (1880), and Murrell and East's *Extracts from Portsmouth Records* (1884).

Portsmouth, (1) the metropolis and only seaport of New Hampshire, is on the south bank of the Piscataqua River, 3 miles from the Atlantic, and 57 miles by rail NNE. of Boston. Built on a beautiful peninsula, overlooking a capacious and deep harbour, with smooth rock bottom, it is a handsome old town, many of its streets lined with shade-trees, and is a favourite summer-resort. It has a custom-house, and some shipbuilding is still carried on; the manufactures include cotton, hosiery, shoes, iron-castings, and beer. At Kittery, on an island opposite, is a United States navy-yard, with large ship-houses and a floating balance-dock, 350 feet long by 105 wide, with twenty-four pumps. Portsmouth was settled in 1623, and was capital of the state till 1807. Pop. (1890) 9827.—(2) Capital of Scioto county, Ohio, stands among hills in an iron region, on the Ohio River, at the mouth of the Scioto, and at the south terminus of the Ohio Canal, 106 miles by rail ESE. of Cincinnati. It has several iron-foundries, rolling-mills, stone-mills, and sawmills, and manufactures stoves, nails, steel springs, furniture, machinery, boots, &c. Pop. (1890) 12,394.—(3) A city and port of Virginia, capital of Norfolk county, on the Elizabeth River, opposite Norfolk. Gosport, with its navy-yard, &c. (see NORFOLK), is a suburb. Portsmouth contains a dry-dock and a naval hospital, and exports naval stores, iron, lumber, cotton, and early vegetables for the north. Pop. (1890) 13,268.

Portsmouth, DUCHESS OF. See CHARLES II.

Port Townsend, capital of Jefferson county, Washington, is on Puget Sound, near Juan de Fuca Strait, 47 miles N. of Seattle. It has a good harbour, and an important United States customs station, at which all vessels entering or leaving the sound must report. Pop. (1880) 917; (1890) 4558.

Portugal, a kingdom of Europe, on the west side of the Iberian Peninsula, stretches 350 miles between 36° 59′ and 42° 8′ N. lat., and varies in width from 70 to 140 miles between 6° 10′ and 9° 31′ W. long. Its eastern and northern boundaries are Spain, its western and southern the Atlantic

Ocean. Details of provincial areas and populations are given in the subjoined table.

Province.	Area in sq. m.	Pop. (1881).
Minho	2807	1,014,768
Traz os Montes	4291	396,676
Beira	9049	1,377,432
Estremadura	6870	946,472
Alemtejo	9415	367,169
Algarve	1872	204,037
Azores	922	269,401
Madeira	315	132,223
Total	35,541	4,708,178

The population increases steadily but slowly: in 1851 it numbered 3,487,000; in 1874, 4,160,315; and in 1881, 4,708,178. But fully 16,500 persons emigrate every year, the majority going to America, chiefly to Brazil.

Physical Aspects.—In respect of its physical structure and conformation, Portugal forms an integral part of the Iberian Peninsula (see SPAIN). The coast is low and flat, and sandy, except for one or two short distances, as immediately north and south of the mouth of the Tagus, and at Cape St Vincent in the extreme south-west. The two northern provinces are diversified by spurs (5000 feet) of the mountains of Spanish Galicia. The most important mountain-range of Portugal is the Sierra da Estrella (6540 feet), a westward continuation of the Spanish Sierra Guadarrama system. The Sierra Morena is continued westwards in southern Portugal. In like manner, the principal rivers of the country—the Guadiana in the south, the Tagus in the centre, and the Douro and Minho in the north—are simply the lower courses of what are geographically Spanish rivers. The Mondego, which reaches the sea about half-way between the Tagus mouth and that of the Douro, is the longest river that has its sources in the country. Portugal has numerous mineral springs, a large proportion being impregnated with sulphur. Minerals exist in fairly rich abundance, but are not worked to the extent they could be, chiefly from want of fuel and cheap means of transit. Salt is prepared in large quantities in the salt marshes; copper, iron, lead, manganese, antimony, gypsum, lime, and marble are extracted and in part exported. About 5500 persons in all are engaged in mining, the yield of which reaches the total value of £224,000 per annum.

Climate.—The vicinity to the ocean tempers the climate of Portugal, and exempts it from the dry heat by which Spain is visited. The inequalities of the surface produce, however, diversities of climate; for, while snow falls abundantly on the mountains in the northern provinces, it is never seen in the lowlands of the southern districts, where spring begins with the new year and harvest is over by midsummer. Rain falls abundantly all the year round, especially on the coast, and from October to March. As a general rule, the climate is healthy in the elevated districts, even of the southern provinces; but malaria and fever prevail in the low flat lands and near the salt marshes. The mean annual temperature ranges from 60° F. at Oporto to 63°·5 at Lagos on the south coast.

The animal life and plant life do not differ from those of Spain (q.v.).

Occupations.—The soil is generally rich, except in the mountainous parts; but agriculture is everywhere in a backward state, little more than half the area of the country being put to profitable use. Arable land occupies only 15¼ per cent.; grass-land, 24 per cent.; orchards, 7 per cent.; forest, 3 per cent.; vineyards, 2¼; and olive-groves, about the same extent. The cereals chiefly grown are maize, wheat, rye, barley, and rice, but not in sufficient quantity for the wants of the people. Potatoes, vegetables (especially onions), flax, fruits (oranges, lemons, chestnuts, almonds, &c.) are grown in large quantities. But the cultivation of the vine and of the olive are the most prosperous branches of industry; from the former is derived the rich red wine familiarly known as Port, from its being shipped at *O Porto*, 'the port.' The total quantity of wine annually produced in Portugal amounts to 88,000,000 gallons. Cattle are reared in the north, sheep and goats in the centre, and swine in the oak forests of the south. In the vine districts of the north and centre the soil is mostly owned by peasant proprietors; in other parts of the country great estates are owned by the nobles and let to tenants to cultivate. The rearing of silkworms and the keeping of bees are pursued with some energy. Fish is abundant in all the rivers and off the coasts. Tunny and sardines are exported; and of late attention has been given to the rearing of oysters.

Commerce, &c.—Portugal is not a manufacturing country; what industry there is is principally concentrated in the two chief towns, Lisbon and Oporto. In all, some 91,000 persons are engaged in industrial pursuits, and of these nearly 40,000 are employed in weaving wool. The rest cut cork, manufacture cotton, linen, silk, leather, glass and porcelain, paper, and gold and silver filigree, and carry on various other industries. In 1889 the mercantile marine of Portugal comprised 443 vessels (43 steam), measuring in all 77,906 tons. During the four years ending 1887 the Portuguese ports were entered by an average of 5565 ocean-going vessels of 3,404,500 tons, but in 1893 by 5873 of 5,793,000 tons; of these totals, nearly half in number and more than half in tonnage were British. In 1893, 1450 miles of railway were open, and 300 more in course of construction. The exports, consisting principally of wine, copper, salt, cork, fish, oxen, fruits, vegetables, and wool, average 5½ millions sterling in value annually. More than one-half of this total is for wine, the actual value ranging between £1,580,200 (in 1879) and £3,751,770 (in 1886). Of this again the greater part is for port wine, exported to Britain, 3 to 4 million gallons annually, valued at 1 to 1¼ million sterling; and to Brazil, to an annual average of £608,000. France takes every year about £868,000 worth of the common wine of the country. The value of all the exports sent to Great Britain every year ranges from 2½ to nearly 4 millions sterling. Apart from wine, the principal items are cork, copper, live oxen, and wool. From Great Britain Portugal imports chiefly cottons (½ to ¾ million sterling), woollens, coal, metals, machinery, and butter, to the annual value of 1¾ to 2½ millions sterling. Her total imports, which, in addition to the articles mentioned, embrace bullion, flour and wheat (more than £1,000,000 annually), glass, live-stock, silk, timber, linen, &c., reached the value of 11¼ millions in 1889, a steady increase from 7¼ millions in 1885. Germany, France, and the United States rank next after Great Britain as sources whence Portugal draws her imports.

Finance.—In spite of her commercial prosperity, Portugal cuts a bad figure in her financial arrangements. For years there has been an annual deficit, which is mostly met by loans, so that the national debt is rapidly increasing. Whereas in 1878 the national income was £5,673,000, the expenditure was £7,629,500; ten years later the income had increased to £8,468,000, but the expenditure was £10,000,000. The national debt has increased from £20,974,000 in 1856 to £64,333,000 in 1871, and £148,490,103 in 1893, besides £4,784,777 of floating debt. The interest for the country's loans is accordingly some £5,000,000, by a long way the heaviest item in the national expenditure.

Defence.—Every Portuguese above twenty-one years of age is liable for service in the army. Twelve years is the period of service, three years with the colours and nine in the reserve. On the peace footing the army embraces in all about 33,000 men; the war strength is about 150,000 men of all arms. The fleet consists of 1 ironclad, 10 corvettes and screw-steamers, 21 gunboats and transports, 5 torpedo boats, 13 sailing-vessels, and 7 training and coastguard ships, the whole manned by 2850 sailors and 250 officers.

Religion, Education.—The state religion is that of the Church of Rome, but toleration is extended to all other creeds. There are three ecclesiastical provinces presided over by the Cardinal Patriarch of Lisbon, the Archbishop of Braga, who is primate of the kingdom, and the Archbishop of Evora; these dignitaries rule over fourteen bishops. The monasteries were dissolved in 1834, their properties, yielding about one million sterling annually, being appropriated by the state. Education is superintended by a council, at the head of which is the minister of the Interior, and is entirely free from the supervision and control of the church. Compulsory education was enacted in 1844, but is far from being fully enforced, consequently Portugal lags behind in education and general intelligence. There are nearly 4000 elementary schools, with 180,000 pupils; 22 lyceums, with 8260 pupils; numerous private schools; polytechnic academies at Lisbon and Oporto; and clerical, medical, agricultural, naval, and military training-schools. The one university at Coimbra (1300), one of the oldest in Europe, has five faculties, 75 professors, and about 900 students. Schools for training in the industrial arts are in great favour; there are 28 in the country, headed by larger institutes at Lisbon and Oporto. Lisbon has a learned society (the Academy of Sciences), and a public library (1796) of 200,000 volumes. There are other libraries at Coimbra (1591), with 84,000 vols., and at Oporto (1833), with 100,000 vols.

Constitution.—Portugal is a constitutional monarchy, the crown being hereditary alike in the female and the male line. The parliament, or *Cortes*, consists of the House of Peers and the House of Deputies. By a law of 1885 the former will, when the necessary changes have been made, eventually consist of one hundred life members elected by the king and fifty elected indirectly, five by the university and scientific societies and forty-five by popular electors. The House of Deputies consists of 149 members, elected directly by all citizens above twenty-one years of age who possess certain qualifications of property or status. Parliaments are elected every four years; sessions last three months in the year. The deputies are paid 11s. a day. The executive is wielded by a cabinet of seven ministers, chosen by the premier (one of the seven), who himself is selected by the king. The departments are Interior, Justice, Public Works, Finance, Marine and Colonies, War, and Foreign Affairs. The sovereign also consults a council of state, of not more than sixteen members, nominated for life, and generally including ex-ministers and present ministers. Justice is administered by rural magistrates in 146 district courts, in 3 courts of appeal (at Oporto, Lisbon, and Azores), and in the supreme tribunal of the kingdom at Lisbon.

People.—The Portuguese are a mixed race—originally Iberian or Basque, with later Celtic admixture. Galician blood (derived from the ancient Gallaici, presumably Gallic invaders) predominates in the north; Jewish and Arabic blood are strongly present in the centre, and African in the south. The Portuguese differ essentially from their Spanish brethren, whom they regard with inveterate hatred and jealousy, mainly on account of their past attempts to subvert the independence of Portugal. The opinions of observers differ as to the national traits of the people. They seem, however, to be generally sober, good-natured, obliging, and patriotic, but shiftless and dirty. Both Lisbon and Oporto have a population exceeding 100,000; no other town reaches 30,000. Lisbon is the capital, Oporto the centre of the port-wine trade, and the chief town of northern Portugal.

The colonial possessions of Portugal are enumerated in the subjoined list:

	Area in sq. m.	Pop.
AFRICA—		
Cape Verde Islands	1,486	110,926
Senegambia (Guinea)	26	5,945
St Thomas and Prince's Island	417	21,000
Ajuda (fort, Guinea Coast)	13½	700
Angola (embracing the districts of Congo or Ambriz, Loanda, Benguela, and Mossamedes)	312,000	2,000,000
Mozambique	(?)80,000	(?)600,000
ASIA—		
Goa (in India)	1,262	445,450
Diu, Daman, &c.	102	55,313
Timor	6,290	300,000
Macao (in China)	4½	70,000
Total	401,601	3,609,334

See Crawfurd, *Portugal, Old and New* (1880); Aldama-Ayala, *Compendio Geografico-estadistico* (Madrid, 1880); Willkomm, *Pyrenäische Halbinsel*; *Blackwood's Magazine* (1891); and Murray's *Handbook* (4th ed. 1887).

HISTORY.—The earliest accounts of the western portions of the Spanish peninsula are derived from the Romans, who followed the Carthaginians as conquerors (138 B.C.) of the western Iberians and Celts. Under Augustus the peninsula was divided into three provinces, one of which, Lusitania, has, until quite recent times, been regarded as nearly identical with the present kingdom of Portugal; but the Augustan province of Lusitania lay wholly on the south side of the Tagus. The history of Portugal was in early times coincident with that of the Iberian Peninsula as a whole; and, along with the rest of the peninsula, Portugal was thoroughly Romanised in the days of the empire. After the Romans withdrew, the peninsula was overrun by Visigoths from the north, and at a later period by Saracens from the south. Under Roman, Visigothic, and Saracenic rule the people were prosperous and well governed, but became enervated by luxury and unwarlike ease. About the middle of the 11th century northern Portugal fell under the sway of Ferdinand I. of Castile. In 1094 Henry of Burgundy, who had married a natural daughter of Alfonso VI., son and successor of Ferdinand, received from that monarch the county of Portugal (from the Minho to the Tagus) as a dependent fief. Under his widow, Theresa (1114–28) the country acquired a sense of national unity and a certain measure of independence. Their son, Alfonso I., made Portugal an independent kingdom (1143)—through the victory of a picked body of Portuguese knights over a picked body of Castilian knights in a tournament—and gained signal advantages over the Arabs, whom he fought for twenty-five years, his greatest exploits being the victory in the plain of Ourique, in Alemtejo, in 1139, the capture (with the help of English crusaders) of Lisbon in 1147, and of Alcacer do Sal in 1158. The Burgundian House, which continued in possession of the throne for 440 years, gave to Portugal some of its best kings. The immediate successors of Alfonso I. were engaged in incessant wars against the Moslems and in severe struggles with the clergy and nobles, who were always ready to combine against the sovereign; but, although often baffled in their attempts to uphold the independence of the crown, the dignity of the kingdom was, on the whole, well maintained by the representatives of this family, who were, moreover, distinguished as the promoters and champions of the maritime glory of Portugal. Sancho (died 1211), the 'builder of cities,' especially distinguished himself by his care for the material welfare of his kingdom, and by his bold fight against the claims of Pope Innocent III. and that pope's supporters, the Portuguese bishops. His son, Alfonso II., summoned the first Portuguese Cortes. Alfonso III. (1248–79) conquered the southern province of the kingdom in 1250, and made Portugal what it practically is in area at the present time. His son Diniz (Denis) must be regarded as the founder of Portuguese commerce and mercantile enterprise. He likewise encouraged agriculture and the industrial arts, and protected learning, in furtherance of which he founded in 1300 a university at Lisbon, subsequently transferred to Coimbra. Diniz was succeeded in 1325 by his son, Alfonso IV., surnamed the Brave, whose reign was almost wholly occupied in wars with the Castilians and the Moslems (see CASTRO, INEZ DE). It was during his reign that the friendly commercial relations with England began. With Alfonso's grandson, Ferdinand I., the legitimate branch of the Burgundian House became extinct in 1383. After some disturbances Ferdinand's illegitimate brother, John, was recognised by the Cortes as king in 1385; four months later the allied Portuguese and English army won at Aljubarrota a glorious victory over the Castilians, who had invaded the country. John's reign (he died in 1433) was eventful, not merely on account of the internal reforms which he introduced, and of his steady maintenance of the prerogatives of the crown, but chiefly as being associated with the first of those important geographical discoveries and commercial enterprises which made Portugal for a while the greatest maritime power of Europe. During this reign, on May 9, 1386, the treaty of Windsor cemented the firm alliance and national friendship between Portugal and England, that was further confirmed by the marriage of King John to the daughter of John of Gaunt (1387). To John's son, Henry the Navigator (died 1460), is due the merit of having organised several voyages of discovery, which culminated in the acquisition of the Azores, Madeira, Cape de Verde, and other islands. At this time, too, the slave-trade began, the Portuguese bringing captive negroes to cultivate the large estates of their southern provinces. During the reign of John II. (1481–95), who broke the power of the feudal nobles, Bartholomeo Diaz doubled (1486) the Cape of Good Hope; and Vasco da Gama, in the reign of John's successor, Manoel, successfully achieved the passage by sea to India in 1497. The discovery of Brazil (1500), and the settlements made there and on the western coast of India by Albuquerque (q.v.), increased the maritime power and fame of Portugal, which were further extended under Manoel's son, John III., who ascended the throne in 1521.

At this period Portugal ranked as one of the most powerful monarchies in Europe, and Lisbon, the great distributing centre of the products of the East, as one of its most important commercial cities. Sudden as this prosperity had been, its decline was almost more abrupt, and may in a great measure be accounted for by the destruction of the old nobility, the extensive emigration that went on to the new colonies, the expulsion of the numerous wealthy and industrious Jews, on whose able financial management the commercial interests of the Portuguese were largely dependent, and the introduction of the Inquisition (1536), and of the Jesuits (1540), whose baneful supremacy gave rise to much tyranny and oppression, both in the colonies and at home, and in various ways stamped out the old spirit of the people, and crippled the resources of the nation. The influence of the Jesuits over John's grandson, Sebastian (1557), was responsible for the defeat of the Portuguese, and the capture and death of their young king, at the battle of Alcazar al-Kebir in Africa in 1578. And the extinction of the old Burgundian line in 1580, after the brief reign of Sebastian's uncle, Cardinal Henry, plunged the country into difficulties and misfortunes. After a struggle for the throne between half-a-dozen candidates, none of whom found favour with the nation at large—they clung to the delusive hope that Sebastian was still alive, and would return from the hands of his Moorish captors—Philip II. of Spain succeeded in securing to himself the crown of Portugal and annexing the kingdom to the Spanish monarchy. This involved it in the ruinous wars of Spain against England, in the Low Countries, and in Germany, while the Dutch and English, in retaliation for Spanish aggressions at home, attacked and seized the Portuguese possessions in the Indian Archipelago and in South America. At length the insolence of Philip IV.'s minister, Olivarez, brought matters to a crisis; and in December 1640, after a forced union of sixty years, Portugal was freed, by a bold and successful rising of the nobles, from all connection with Spain, and the Duke of Braganza, a descendant of the old royal family, was placed on the throne (1641), under the title of John IV. The war with Spain, which was the natural result of this act, turned out, under the guidance of the famous Count Schomberg (who fell at Boyne battle, 1690), and with the assistance of 3000 English troops, favourable to Portugal, and was terminated in 1668 by the treaty of Lisbon, by which the independence of Portugal was formally recognised by the Spanish government. But her ancient glory had departed; she had lost many of her colonies, and of those she still retained Brazil alone was prosperous; the nation was steeped in ignorance and bigotry; and the Portuguese, from having been one of the greatest maritime powers of Europe became virtually a commercial dependent, rather than ally, of Great Britain, especially after the Methuen (q.v.) Treaty of 1703. Under the reign of Joseph I. (1750–77) the genius and resolution of the minister Pombal (q.v.) infused temporary vigour into the administration, and checked for a time the downward tendency of the national credit. But Pombal's efforts to rouse the people from their sloth, and infuse vigour into the government, were checked by the accession of Joseph's daughter, Maria, who, with her uncle-husband, Pedro III., allowed things to turn back into their old channels. The mental alienation of Maria led, in 1799, to the nomination of a regency under her eldest son, John. This prince, who showed considerable capacity in early life, on the outbreak of the war between Spain and France threw himself wholly on the protection of England; and finally, when he learned that Napoleon had determined on the destruction of his dynasty, left Portugal in 1807 and transferred the seat of government to Rio de Janeiro, the capital of Brazil (q.v.).

This act was immediately followed by the occupation and annexation of Portugal by the French—a measure which gave rise to the Peninsular War (q.v.). The victory of Vimeira, gained by the combined English and Portuguese army in 1808, freed the land from its French assailants; and in 1816, on the death of Queen Maria, the regent succeeded to the joint crowns of Portugal and Brazil. But even after the French were driven out of the Peninsula and Napoleon's power was broken for ever, the new king, John VI., still continued to reside at Rio de Janeiro, leaving Portugal to be governed by English officers, Marshal Beresford and others. This gave occasion to abuses and discontent, which resulted, in 1820, in a revolution at Lisbon, and in the proclamation of a constitutional form of government, very democratic in spirit, in the place of the pre-existing feudal absolutism. John hurried to Portugal, and there signed the constitution and ratified the independence of Brazil, which proclaimed his son Pedro emperor. On the death of John in 1826, Pedro IV., after organising the government of Portugal on the model of the English parliamentary system, renounced the Portuguese crown in favour of his daughter, Maria da Gloria, a child of seven, on condition that she married her uncle, Miguel. The latter, who had availed himself of every opportunity to thwart the liberal policy of his father and brother, waited only for the embarkation of the English troops to break the oath which he had taken to maintain the constitution, and, gathering round him the clergy, the army officers, the old nobility, and all who were in favour of the former order of things, was through their aid declared king by the Cortes in June 1828.

Then ensued a period of indescribable confusion and misrule. At length, in 1832, Pedro was enabled, chiefly by means of a loan from Englishmen, to raise an army, and make a landing at Oporto. Charles Napier virtually destroyed Miguel's fleet off Cape St Vincent in 1833. Shortly afterwards Queen Maria made her entry into Lisbon; and in the following year Miguel signed the Convention of Evora, by which he renounced all pretensions to the throne, and agreed to quit Portugal. The death of Pedro in the same year, after he had effected several important reforms, including the reintroduction of the constitution of 1826, proved a heavy misfortune to Portugal, which suffered severely from the mercenary rule of those who occupied places of trust about the person of the young queen. Her marriage, in 1835, with Augustus, Duke of Leuchtenberg, and, after his death at the end of a few months, her marriage with Ferdinand of Saxe-Coburg, were followed by grave political disturbances. A branch of the democrats, known as the Septembrists, from the month in which they made their first decisive stand against the government, loudly demanded (1836) the abrogation of the charter promulgated by Pedro (known as the Charter of 1826), and the restoration of the democratic constitution of 1824. This contest of the charters continued through the entire reign of Maria, and party feeling ran so high that it resulted more than once in hostilities. The government was alternately in the hands of Septembrists and Chartists; one Cortes was dissolved after another; finally, in 1852, a revised charter was drawn up that proved acceptable to all parties. Shortly afterwards the queen died, and her eldest son ascended the throne in 1853 as Pedro V., under the regency of his father. The latter used his power discreetly; and by his judicious management the financial confusions and embarrassments were partially removed. Upon the sudden death of Pedro in 1861 his brother was proclaimed king as Luis I. He steadily adhered to constitutional principles, and laboured at measures of internal improvement; but ever since the beginning of the century the royal power has been growing weaker and weaker. The financial condition of the country has also gone steadily from bad to worse, in spite of fairly favourable commerce. The rush of the European powers to appropriate African soil, and divide it amongst them, since the opening of the interior through the Congo, in some degree awoke the old colonial enterprise of the Portuguese, and touched their national pride, making them cling all the more tenaciously to the fragments of colonial territory still left to them in Africa. But the awakening came too late; the march of events and the energy of her rivals have wrested from her many square miles that she claimed as her own, but had done next to nothing to colonise and develop. England in the end of 1889 compelled Portugal to abandon her claims to Nyassaland, and two years later a treaty was signed defining the respective spheres of influence of the two countries in East and West Africa, especially in the basin of the Zambesi. Further delimitations were agreed upon in 1891. In the meantime Charles I. had succeeded his father, October 1889. The action of Britain occasioned an outburst of strong popular feeling in Portugal, which the republicans turned to their own advantage; and they were greatly helped by the successful revolution of the republicans in Brazil and the expulsion of the emperor (November 1889). But in the home country their advantage proved to be of only a temporary nature.

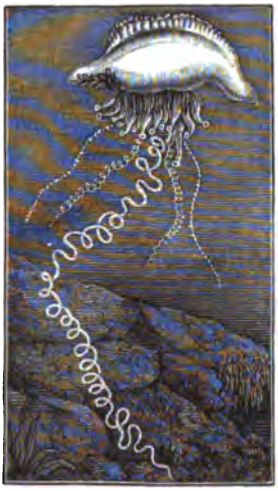
See Morse Stephens, *Portugal* ('History of Nations' series, 1891); M'Murdo, *History of Portugal* (1888); Schaefer, *Geschichte von Portugal* (5 vols. 1836–54); works by the native historians Herculano (1848–57), Da Silva (1860–71), Coelho (1874), and Da Luz Soriano (1866–82); R. H. Major, *Life of Prince Henry of Portugal* (1868); and Carnota, *Memoirs of Duke of Saldanha* (1880).

LANGUAGE AND LITERATURE. — Portuguese, like every other branch of the Romance family of languages, has grown out of a local form of the *Lingua Romana Rustica*, and in course of time has had ingrafted upon it many elements of Arabic from the Saracen invaders, and numerous verbal and idiomatic characteristics of the Frankish and Celtic dialects which were introduced with the Burgundian founders of the monarchy. The earlier forms of Portuguese bore close affinity to Galician; and, although Portuguese presented strong resemblance to its sister-language, the Castilian, in so far as both possessed numerous words of identical origin, it differed so widely from the latter in regard to grammatical structure as almost to merit the designation of an original tongue. The antipathy existing between the Portuguese and Spaniards, and the consequent strenuous efforts of the best writers among the former to keep their language distinct, and to resist the introduction of further Castilian elements, had the effect of making Portuguese still more dissimilar from the sister-tongues of the peninsula, and the result has been a language that differs from pure Spanish in having an excess of nasal sounds and fewer gutturals, with a softening or lisping of the consonants, and a deepening of the vowels, which renders it the softest, but feeblest, of all the Romance tongues. The earliest specimens of genuine Portuguese belong to the beginning of the 13th century, and consist for the most part of collections or books of song (see CANCIONERO), which, both in regard to form and rhythm, resemble the troubadour or *minne* songs of the same period. Amongst the writers of these the most outstanding figure is King Diniz, who, besides being the forerunner of the Portuguese school of pastoral poets, also drew inspiration from the popular songs of his people. In the 14th and 15th centuries, whilst the romances of chivalry were popular and numerous chronicles were written, the best being that of Fernan Lopes (1380–1459), the court continued to be the centre of poetry and art; but Castilian was in greater vogue than Portuguese, which was despised by the numerous royal poets who emulated the example of Diniz, and composed love-songs and moral or didactic poems. Under the culture of these noble bards the poetry of Portugal was weak and effeminate, without the tenderness and pathos which characterised the Spanish verse 'romances' of that age. But the literature of Portugal acquired new vigour with the growth of her maritime and commercial prosperity. The *Cancioneiro Geral* (1516) of Garcia de Resende (1470-1554), which gives a general summary and extracts of the Portuguese poets of the later half of the 15th and beginning of the 16th century, is the first evidence of the change, which is most strongly exemplified in the dramas of Gil Vicente (1470-1536), and in the pastorals and eclogues of Ribeiro (*c.* 1500) and Sá de Miranda (1495-1558; q.v.), whose dramatic imitations of Horace and Terence mark the transition period between the mediæval lyrical and the later classical style. These first attempts at the drama were followed by Antonio de Ferreira's (1528-69) *Ignez de Castro*, the oldest, and still the finest, Portuguese tragedy. But the classical school, whose chief cultivators were the courtiers of Lisbon and the professors of Coimbra, found little favour among the people at large, whose enthusiasm and patriotism were deeply stirred by the discoveries and conquests of the nation in Asia, Africa, and America. The national pride and glory found expression in the works of Portugal's one really great poet, Camoens (1524-80; q.v.), who, in *The Lusiads* (1572), struck out a new path in the domain of epic poetry; while his numerous sonnets, his songs, his dramas, and other poetic productions exhibit a versatility of genius and graceful tenderness which place him in the foremost rank of European poets. Next after Camoens come the epic poets Côrte-Real (1540-93), Mousinho de Quebedo, F. de Andrade (1540-1614), Pereira de Castro (1571-1632), and Sá de Menezes (died 1664). To the same period belongs the dramatist Ferreira de Vasconcellos (died 1585).

With Camoens the language and poetry of Portugal reached the culminating point of their development. During the dominion of Spain the Portuguese so far lost all feeling of national independence that they at length renounced their native tongue, and adopted the language of their rulers. With the restoration of political independence, under the sway of the House of Braganza, a reaction took place; but the 17th and 18th centuries produced few Portuguese writers who attained more than an ephemeral and purely local reputation—bombast, or slavish imitation of Spanish and Italian writers, being the predominant characteristics of the Portuguese school of light literature. Some good historical writers belong, however, to this period, as Jacinto Freire de Andrade (1597-1657), whose life of Joao de Castro, Viceroy of India, still holds its place as a monument of classical Portuguese prose; the great Indian missionary, the Jesuit Father Antonio Vieira (1608-97), whose sermons and letters are regarded as models of style and diction; De Barros (1496-1570), the historian of *The Conquest of the Indies;* Da Faria e Sousa (1590-1649), De Brito (1569-1617), and Brandão (1584-1637), who wrote *Monarchia Lusitana;* A. de Resende (1498-1573); and F. X. de Menezes (1673-1743). During the 18th century French literary canons and models were slavishly followed by most Portuguese writers of verse, of whom the best known is Da Cruz e Silva (1731-1800). But in the beginning of the 19th century Portuguese poetry was partially elevated from its previous low grade by two men, who, although they professed to observe a strictly classical style, possessed a delicacy of taste, and a genial creative power, which saved them from falling into the absurdities that had generally characterised the school in Portugal. The elder of these, F. M. do Nascimento (1734-1819), although specially noted as an elegant lyric poet, deserves notice for his graceful miscellanies; while Manoel du Bocage (1766-1806), his less cultivated rival and contemporary, must be regarded as the most original and truly national of the modern poets of Portugal. His sonnets rank as the finest in the language, and these, with his numerous idylls, epigrams, and occasional poems, composed in various styles and modes of versification, have had a host of imitators, among the best of whom are the dramatist, J. B. Gomes (died 1803); De Macedo (1761-1831), the epic poet; and the satirist, T. da Almeida (1741-1811). The best of the recent Portuguese poets are A. de Castilho (1800-75) and D'Almeida Garrett (1799-1854). The last named was the most versatile and popular writer of his time in Portugal. Next to them come Herculano (1810-79), who is also one of Portugal's best historians; Da Silva Mendes Leal; De Lemos, founder of the Coimbra school; Palmeirim, De Passos, De Deus, Braga, and Do Quental. Other modern writers who deserve mention are the historians Da Luz Soriano and Latino Coelho; Branco and Biester, playwrights; the novelists Rebello da Silva (who ranks after Herculano as a scientific historian) and De Queiroz; and Lobo (1763-1844), as a general man of letters.—Portuguese literature is also cultivated in Brazil, and, of late years, with considerable independence and success. The principal names in poetry are F. V. Barboza, De Barros, Da Cunha Barboza, A. T. de Macedo, Gonçalves Diaz, Porto-Alegre, M. de Macedo, Teixeira e Souza, and Magelhaens, the most national of them all; in history, Varnhagen, author of the *Historia Geral de Brazil*, and P. da Silva, author of the *Brazilian Plutarch;* and the epigrammatist Fonseca.

The best works on Portuguese literature are T. Braga's *Historia da Litteratura Portugueza* (20 vols. 1870-80) and F. da Silva and Acanha's *Diccionario Bibliografico Portuguez* (12 vols. 1858-85). Other useful works are Bouterwek, *History of Spanish and Portuguese Literature* (Lond. 1823); Denis, *Histoire Littéraire du Portugal* (Paris, 1826); P. da Silva, *La Littérature Portugaise* (Paris, 1866); and Loiseau, *Hist. de la Litt. Portugaise* (Paris, 1885).

Portuguese Man-of-War (*Physalia*), a remarkable genus in the class Cœlenterata, in the sub-class Siphonophora. It is common in tropical seas, floating on the surface with an inflated brightly coloured bladder, sometimes 6 inches in length, and with a pendent colony of individuals, among which there is no little division of labour. Most important are the nutritive and reproductive members, and long stinging tentacles which stream for several feet into the water. The stinging power, normally used in benumbing the small animals on which the floating colony feeds, is sufficient to cause intense irritation in those who incautiously test it. The Physalia floats for the most part passively, and is occasionally driven to British coasts. An allied genus, Rhizophysa, is even more remarkable, with a large float and long stem.



Physalia utriculus.

Portulaceæ, or PORTULACACEÆ, a natural order of exogenous plants, nearly allied to Caryophyllaceæ. The species are not very numerous;

they are much diffused over the world, and are shrubby or herbaceous, generally succulent, mostly growing in dry places. The flowers are often large and beautiful, but ephemeral. The foliage is bland and insipid. Some species are used as salads and pot-herbs, of which the best known is Purslane (q.v.). The tuberous roots of *Claytonia tuberosa*, a Siberian plant, are used for food. The genera Calandrinia and Portulaca furnish some beautiful annuals.

Port Wine (i.e. *Porto* or *Oporto Wine*), a species of red wine, hot and heady, which is produced chiefly in a mountainous district of Portugal, called Cima de Douro, and exported from Oporto and Lisbon. The vine from which this wine is produced is generally planted on craggy slopes with a southern exposure. The wine, when pure and unadulterated (which is very seldom the case), does not acquire its full strength and flavour till it has stood for some years, to allow for the disturbance of the spirit to subside, and the antagonistic ingredients of the mixture to harmonise; but care must likewise be taken that it is not allowed to become too old. The colour of new port wine varies from pale rose to deep red, and changes with age, becoming a deep tawny brown, which is permanent. By far the greater portion of the wine made is mixed with spirit even during the time of fermentation, in order to give the new wine the ripeness and strength which exporters require, and which the wine does not naturally attain till it has stood for some time; the proper colour is also given by a mixture known as *jeropiga*, which is a preparation of elder-berries, molasses, raisin-juice, and spirit. It is an excess of this jeropiga in the inferior sorts of port which communicates to them the medicated odour so frequently noticed. The extreme 'headiness' of port is chiefly due to the liberal admixture with spirit, and this is the case with all the sorts generally exported, which average 38 per cent. of spirit. From the time when port came into demand (about 1700, though it was known in England for a considerable time before this) down to 1826 its export was a monopoly in the hands of the English merchants; and the amount of wine produced increased, with tolerable steadiness, year after year, till the three years ending 1840, when it reached 34,790 pipes of 126 gallons. The ultimate effect of this monopoly of the Oporto Wine Company was to increase the price of port wine in England, and at the same time so to deteriorate its quality that in course of time it became of less demand, and was largely supplanted by southern French and other wines. Since that period it has fluctuated, being sometimes more and sometimes less than this figure; in 1850 the exportation reached 37,487 pipes. Between 1880 and 1890 the exports to Great Britain ranged from 3,000,000 to 4,000,000 gallons (not all for consumption in that country), and the value from £900,000 to £1,340,000. The *natural* port wine, with less than 26 per cent. of proof spirit, is very wholesome and invigorating. The exports of port wine from Oporto in 1880 were 55,700 pipes, valued at £1,471,000; and in 1888, 44,670 pipes, valued at £1,218,150.

Porus. See ALEXANDER THE GREAT.

Poscharevatz. See PASSAROWITZ.

Poseidon. See NEPTUNE.

Posen (Polish *Poznan*), a province of Prussia, bounded N. by West Prussia, E. by Poland, S. by Silesia, and W. by Brandenburg. Area, 11,178 sq. m. The Warthe traverses it from east to west, and is navigable throughout the greater part of its course, as is also the smaller Netze. The Vistula touches Posen on the north-east. The province belongs to the great plain of north Germany; there are several lakes in the east. Like Pomerania, it is essentially an agricultural province, nearly 62 per cent. of the area being arable land, 13 per cent. meadows, and 20 under wood. More than 55 per cent. of the total is in the hands of large landed proprietors (see also MECKLENBURG). Grain, potatoes, and hops are the principal products. The industry is not much developed, being limited chiefly to machinery, cloth, bricks, sugar, and beer. Pop. (1890) 1,751,642, of whom 880,000 are Poles, mostly in the rural districts, 725,000 Germans, principally in the towns, and 51,000 Jews. There is a Roman Catholic archbishop of Gnesen and Posen. The chief towns are Posen (the capital), Gnesen, Bromberg, Lissa, and Rawitsch. Posen formed an integral part of Poland till 1772, when, at the first partition, the districts north of the Netze were given to Prussia; to these were added in 1793 Great Poland, except Masovia, the whole being incorporated under the name of South Prussia. In 1807 Posen was included in the duchy of Warsaw; but by the Congress of Vienna it was re-assigned to Prussia under the title of the Grand-duchy of Posen. In 1848 the Poles gave the Prussian government considerable trouble. See History by Chr. Meyer (1881).

POSEN, the chief town of the province, and a fortress of the first rank (1827–53), is situated on the Warthe, 158 miles by rail E. of Berlin. One of the most ancient cities of Poland, it became the seat of a Christian bishop in 968, and it was the capital of the early Polish dukes. In the 16th century it was an important trading mart, but by the end of the same century had begun to decline. Recent improvements have rendered it one of the pleasantest towns in Prussia; it has regularly built streets and squares and handsome suburbs. The fortifications have been strengthened by detached forts built in 1876–84. The cathedral, a Gothic pile dating from 1775, has attached to it the 'Golden Chapel' of Count Raczynski, which is adorned with valuable treasures and works of art. The principal secular buildings are the town-house (1508), containing valuable archives; the Raczynski Palace, with a library; the Dzialynski Palace, with archives; and the archiepiscopal palace. There is a provincial museum of antiquities. The chief manufactures are artificial manures, agricultural implements, furniture, carriages, &c.; and there are likewise several breweries, distilleries, and flour-mills. Pop. (1875) 60,998; (1890) 69,627, about one-half being Poles, the other half Germans, though the Jews number nearly 7000. See Histories by Lukaszewicz (1881) and Öhlschläger (1866).

Posidonia. See PÆSTUM.

Posidonius, a Stoic philosopher, born at Apamea, in Syria, about 135 B.C., who studied at Athens, and settled at Rhodes, whence in 86 he was sent as envoy to Rome. Here he became intimate with Cicero, Pompey, and other conspicuous Romans. He died at the age of eighty-four, leaving works on philosophy, astronomy, and history, of which only fragments have been preserved.

Posilipo (from a villa here called *Pausilypon*, 'Sans-souci,' which at one time belonged to the Emperor Augustus), a mountain on the north-west of Naples, close by the city, from of old a noble site for the villas of wealthy citizens. It is remarkable for the tunnel known as the Grotto of Posilipo, through which the road from Naples to Pozzuoli (anc. *Puteoli*) passes. The grotto varies in height from 20 feet to 80 or more, is 20 to 30 feet wide, and 755 yards long. It is traditionally said to have been made in the reign of Augustus, but is probably earlier. Above the eastern archway of the grotto is the so-called

'Tomb of Virgil.' At the base of the hill anciently stood the poet's villa. During the middle ages the common people believed the grotto to be the work of the poet, whom they regarded as a great magician. Two other tunnels penetrate through the hill, one to the north of the grotto, 800 yards long, 39 feet high, and 33 feet broad, made for the tramway, and another constructed at the command of Agrippa in 37 B.C., but only discovered in 1812.

Positivism, the System of Thought and Life founded by Auguste Comte (1798–1857; q.v.), is defined by him as consisting essentially of a 'philosophy and a polity which can never be dissevered; the former being the basis, and the latter the end, of one comprehensive system, in which our intellectual faculties and our social sympathies are brought into close correlation with each other.' He chose the word *Positive* on the ground of its indicating the *reality* and *constructive tendency* which he claimed for the doctrine in its theoretical aspect, while he anticipated that in the future the term would acquire a wider meaning by suggesting also similar ideas in the sphere of feeling and action. The two primary characters of Positivism, the philosophy and the polity, were finally welded into a whole under the conception of a religion, which has for its creed the new synthesis established by the one, and for its practice the scheme of moral and social reorganisation proposed by the other. We may best consider Positivism under these three aspects.

Positive Philosophy.—Comte's primary aim was to put an end to the intellectual and social anarchy which had resulted from the destructive criticism and the revolutionary upheaval of the 18th century, by supplying an interpretation of phenomena which should organise our knowledge of the world, of man, of society, into a consistent whole. Such a universal synthesis must the new philosophy provide to form a sure basis for a new art of life.

Historical analysis revealed to Comte, as a law of mental growth, the progress of all human conceptions through three distinct phases. The primitive stage he called the *theological;* the transition stage, the *metaphysical;* and the final stage, the *positive.* The meanings which he attaches to these words are most concisely explained by Stuart Mill's translation of them into volitional, abstractional, experiential. The transition was effected by the gradual acceptance of the scientific method of induction from observation of phenomena as the only sound basis of explanation, all inquiry into causes other than phenomenal being finally given up as fruitless. Science, therefore, is the instrument capable of effecting the desired unity; and the problem of the positive philosophy is a threefold one: (1) to bring all knowledge within the sphere of scientific investigation; (2) to extend scientific methods through the whole territory of each division; (3) to co-ordinate the results obtained from the separate sciences, so as to approach an expression of all our knowledge in terms of a single doctrine. All three parts of this problem Comte considered to be in a large degree solved by his *Classification of the Sciences.*

He observed that the several classes of conceptions advanced from the theological to the positive stage with different degrees of facility, and on inquiring into the law of progression he found that the order of emancipation of the various sciences was determined by the degree of complexity and the consequent relations of dependence. A preliminary distinction was made between the abstract and the concrete sciences, the former treating separately of the general laws manifested by all the phenomena of any class, and the latter depending on these and treating of definite objects under the several aspects in which they may be viewed. The concrete sciences, Comte considered, did not yet admit of co-ordination, and he confined his classification to the abstract sciences, which he placed in the following series: (1) Mathematics; (2) Astronomy; (3) Physics; (4) Chemistry; (5) Biology; each of these drawing its data from the preceding science, and adding a new order of conceptions peculiar to itself. This series he found coincident with the sphere of knowledge then supposed to admit of scientific treatment. But there remained the phenomena of human character and society, forming a wide field of inquiry to which positive methods had never yet been applied. Certain tentative efforts had indeed been made to construct a so-called science of history—notably by Montesquieu and Condorcet—but no one before Comte had formulated the principles on which such a task might be accomplished. By his discovery of the methods proper to a rational study of social phenomena, and by his dicta—that owing to the complexity of the conditions involved, the laws of such phenomena cannot be determined *a priori*, but must be inductively observed, and afterwards verified and co-ordinated by deductive application of the general laws of life; that the statical condition of each historical period must be viewed in its totality, as determined by the interaction of the various classes of social factors; that intellectual evolution affords the true measure of social progress—by his enunciation of these and other doctrines Sociology was created and established in the hierarchy as the last and crowning science of the series.

The whole realm of fact was now included in the domain of positive inquiry, and Comte next addressed himself to the task of rationalising the separate departments of knowledge. In the earlier portion of this task his mathematical aptitude ensured him a large measure of success; while in biology he paved the way for further developments by his organisation of the materials then available. His main services, however, in scientific co-ordination were in the department of sociology. Besides the formal constitution which he gave to the new science, his chief substantive contribution was his enunciation of the fundamental law of intellectual development, already referred to as the cardinal doctrine of the positive philosophy. The progress of thought, moreover, from theological to positive conceptions was shown to be coincident with a progression in social action from an aggressive militarism, through a period of defensive attitude, to the final régime of industrialism. The two series of transitions are mutually dependent, our increasing knowledge of the conditions of our existence and our systematic efforts to modify them naturally reacting on each other.

The main problem of the positive philosophy, the unification of knowledge, was not yet ripe for its final solution in the days of Comte, but his classification of the sciences is regarded by his followers as affording an admirable framework for the theory of evolution advanced at a later date with the claim of supplying this want. Comte was fain to be content with the demonstration of a subjective unity in the subservience of all the sciences to the needs of man.

Positive Polity.—On the basis of the philosophy he had thus established Comte founded a scheme of individual and social conduct. The ethical portion he did not live to complete, but in his elaborate exposition of the art of social politics we have ample insight into his views on what he considered an integral part of his system. We have space here only for a bare outline.

The most complete life must be that which rests on the fullest knowledge. We naturally strive to improve those conditions of our existence which we can affect in the direction indicated by the clearer light of a new synthesis. What, then, are the evils or imperfections of our lot which may be remedied by applying positive philosophy to life? Cosmical laws are wholly beyond our direct influence, and we can only to a limited extent affect the conditions of their action. But in the science of man we ourselves are the factors, and our efforts to modify our environment form the subjective aspect of what is, objectively considered, a law of social development.

Comte believed the first requisite of systematic action to be the recognition of a central intellectual and moral authority dissociated from practical politics, which he proposed to secure by organising a *Spiritual Power*, consisting of philosophers, supported by the state. This class, exerting a purely *moral* control, yet supreme in all affairs of private and social life in virtue of its natural prestige, would have only an indirect influence on political action. The temporal power should be in the hands of capitalists, the captains of industry—chosen by their own order and naming their successors—who would feel a moral responsibility to the spiritual power, especially when the authority of the thinkers should be strengthened by the support of women and of the working-classes, whose ready adherence to positive principles Comte firmly anticipated. Besides the corrective influence of each of these powers on the other, an efficient check on despotic control on the part of either is provided in the perfect freedom of opinion and expression allowed—a freedom the more valuable that it would rest on a system of scientific and moral education, which it would be one of the chief functions of the spiritual power to direct and enforce.

With the decline of militarism and the growth of industrialism Comte foresaw that political action would in the future be mainly directed on the organisation of labour for the benefit of society at large. No idleness would be permitted; all would be workers. The distinction between the capitalists and the workmen, the rich and the relatively poor, would remain; but the former would be taught to hold their wealth and power as in trust from society to be used for the benefit of all, while the latter would also come to regard themselves as performing public functions, serving society each in his place. These views are substantially similar to such more recent economic teaching as that of Carlyle and Ruskin in Great Britain.

In the sphere of morals the main office of the spiritual power would be to strengthen the social tendencies of man at the expense of the personal, a process made possible by the development of the affections originally called forth in family life. In the sphere of intellect it should regulate and concentrate the labours of its members, putting an end to the present 'dispersive speciality' of scientific aims, and determining the direction of all intellectual efforts by reference to social needs. In pursuance of the constructive principle of Positivism Comte applies these general doctrines to the immediate future, by propounding a scheme of concerted action for a great Western Republic, embracing the French, English, German, Italian, and Spanish nations—an organisation imperfectly effected by the influence of Feudalism and Christianity.

Positivist Religion.—Such are the creed and the practice of Positivism. But a religion is more than creed and practice; there must be a sentiment, an appeal to the heart, a satisfaction of the feelings. The conception of an object of love and reverence proposed by Comte to succeed the idea of a Deity (whose existence he considered it impossible either to affirm or deny) is that of *Humanity*, regarded as a collective unity, a *great being*, consisting of all the men and women past, present, and to come, whose lives have been or shall be devoted to the well-being and progress of the race. This being, partly ideal yet wholly real, capable of being definitely conceived, and not beyond the reach of our services, would gather round it all our affections for our fellow-men; gratitude and reverence for those whose struggles and achievements in the past have made us what we are; love and sympathy for all around us who are striving after better things; hope and effort for the more perfect life of those yet unborn. Comte looked on the religion of Humanity as fulfilling all the highest aims sought by the religions of the past, and especially as succeeding naturally to Christianity, the historical value of which he thoroughly appreciated as a transitional phase of religious development. The worship of Humanity was to consist in prayer, taking the form of high resolve strengthened by effort after ideal communion with the noble spirits among the dead; and in public commemorations, for the observance of which a calendar was suggested, associating each day of the year with some great name in the roll of mankind, and arranged so as to illustrate the course of human progress. The spiritual power would carry on the traditions of the priesthoods of former religions, preaching self-abnegation as the rule of life that brings the highest happiness, and offering no reward, save a place in the 'choir invisible' of the great and good, whose names are cherished in the hearts of those who follow them, and whose influence will live to the end of time.

Positivism is of too recent origin to be adequately treated except in an account of its genesis, and the above outline of the system has therefore been entirely confined to the works of its founder. In his lifetime Comte attached to himself a body of disciples more remarkable for intellectual eminence than for numbers. The most prominent of these was M. Littré (q.v.), who afterwards edited his master's works, and established a review with the title of *La Philosophie Positive*. His discipleship, however, did not extend to the later developments of the system. Near the end of his life Comte founded the Positivist Society, an organisation which still has its headquarters in Paris; but it has extended to most other countries, and the number of adherents increases slowly but steadily. The *Revue Occidentale*, their organ in the press, is published quarterly in Paris. Among the best known of the English Positivists are Dr Congreve, Mr Frederic Harrison, Dr Bridges, and Professor Beesly, who have translated Comte's chief works and have published many expository and illustrative papers and addresses. There are two centres of Positivist activity in London, each with connections in other large towns. One of these, which is presided over by Dr Congreve, has introduced more of a ritual into its services; while the best-known group, associated chiefly with the name of Mr Frederic Harrison, and having its headquarters at Newton Hall, Fetter Lane, devotes itself mainly to extending a knowledge of the system by public addresses and various forms of practical effort.

Among sympathetic critics of Positivism are many thinkers of eminence imbued with the positive spirit, and more or less indebted to the genius of Comte. Stuart Mill, in his work on *Auguste Comte and Positivism* (1865), though taking an independent standpoint, speaks in terms of high appreciation not only of the leading doctrines of the positive philosophy, but also of the conception of humanity as a *Grand Être*, which is the keystone of the new religion. Many of the details of ritual and worship, however, were repugnant to him, as they have proved to many; and, while exaggerating the importance of these, he makes an arbitrary separation between the earlier and the later portions of Comte's career. His book should be read along with Dr Bridges' reply, entitled *The Unity of Comte's Life and Doctrines* (1866). Mr Herbert Spencer has taken more pains to vindicate his independence of Comte than to acknowledge his obligation to him. His references to his great predecessor mostly concern their disagreements. In two essays, one on *The Genesis of Science* and the other on *The Classification of the Sciences*, he opposes Comte's views on these subjects; and he has even thought it necessary to publish an article entitled *Reasons for dissenting from the Philosophy of M. Comte.* Mr Spencer's exposition of the theory of evolution is regarded by Positivists as a valuable contribution to that scientific philosophy the inauguration of which they claim for their master. G. H. Lewes, in the chapter on Comte in his *History of Philosophy*, calls him the greatest thinker of modern times, and declares himself an ardent adherent of the positive philosophy. For the religious aspects of Positivism, however, Lewes' feeling is one of partial sympathy only. In George Eliot's works the influence of Comte's doctrines is evident, and she has devoted one of her poems to the interpretation of the Positivist conception of immortality. In addition to the works of these writers, the following are the most important criticisms of Positivism, representing various degrees of sympathy and antagonism: John Morley, article 'Comte' in *Ency. Brit.*; Professor Edward Caird, *Social Philosophy and Religion of Comte*; Dr J. M'Cosh, *Christianity and Positivism*; Dr Martineau, in *Types of Ethical Theory*; Professor Huxley, 'Scientific Aspects of Positivism,' in *Lay Sermons*; and Mr A. J. Balfour, *Religion of Humanity*.

Among critics wholly antagonistic to Positivism are naturally to be found the theologians and so-called metaphysicians—i.e. all whose explanations of phenomena either assume the action of supernatural beings or are expressed in terms of abstractions such as *vital principle, inherent tendency, nature.* Such thinkers, Positivists contend, generally profess little knowledge of scientific fact; but with these may be included many scientific specialists whose contracted view of the phenomenal world unfits them for general conceptions, and leaves them open to theological and metaphysical influences beyond the immediate sphere of their own specialty. The opposition of these classes follows from the refusal of Positivism to recognise the claims of such modes of thought to other than an historical importance.

Posse Comitatus ('the *posse* of the county'—the infinitive 'to be able' being used in late Latin as a noun, and meaning power or force), the whole force of the county, consisting of knights and men above the age of fifteen, with constables, who attend the orders of the sheriff to assist in enforcing process or quelling riots. Justices of the peace can also, if apprehensive of an organised resistance, command the services of the posse comitatus, and it is the sheriff's duty to raise the necessary number of men. But practically, in modern times, constables and special constables are all the assistance given or required. See SHERIFF.

Possession is the relation which subsists between a person and a thing, when the person has control over the thing, and maintains his control with the intention of exercising rights over the thing. A man may be in possession of what is not his own; a thief enters into unlawful possession of another's goods; a farmer has lawful possession of his landlord's property. Again, a man may own a thing without possessing it, and the law prescribes the forms of action, &c. whereby an owner may recover possession of his property. In a reasonably well-governed community possession is evidence of right to possess; the person in possession is therefore protected against all the world, unless there is some other person who can show that he has a better title: this is what is meant by saying 'possession is nine points of the law.' We speak sometimes of an interest in possession, as distinguished from an interest in reversion or remainder: thus, the person who is entitled to receive the rent of land has an interest or estate in possession, though he does not possess the land. In common speech possession is frequently used as synonymous with property; but for legal purposes the two ideas must be carefully distinguished. See Hunter's *Roman Law;* and Pollock and Wright's *Essay on Possession in the Common Law* (1888). There may be joint-ownership in either personal or real property, one of the characteristics of this kind of ownership being 'benefit of survivorship'—i.e. if one of the joint-owners dies his interest accrues to the other, and does not go to the deceased co-owner's heirs and representatives. In partnership, when one partner dies his share belongs to his own personal representatives.

Possession, DEMONIAC. See DEMONOLOGY, EXORCISM.

Posset, a dietetic preparation, made by curdling milk with some acidulous liquor, such as wine, ale, or vinegar. White wine or sherry is usually preferred, but sometimes old ale is used. The milk is boiled, and whilst it is still on the fire the acidulous matter is added; if sherry, about a wine-glassful and a half to the pint of new milk is the proportion, or twice the quantity if ale. A tea-spoonful of vinegar or of lemon-juice is sometimes used instead; one or two tablespoonfuls of treacle may be added, to sweeten. Taken at bedtime, it is used for colds and coughs.

Post-captain. See CAPTAIN (NAVAL).

Postglacial and Recent System. The deposits belonging to this system contain the remains of plants and animals, few of which are not still existing species. The beds consist of more or less incoherent and unconsolidated materials, which have been formed under very diverse conditions. They are represented by the low-lying alluvial flats that occupy the sites of silted-up lakes, and the bottoms of valleys at moderate elevations above the streams and rivers. Most of the bogs of northern and central Europe belong to the same system, but some had commenced to form towards the close of the glacial period. Many bogs overlie the remains of old forests, and not infrequently trees, occupying the place of growth, occur in the peat at various levels. Two such 'buried forests' have been met with in the bogs over a wide region in north-western Europe. At many places on the coasts of the British Islands and the opposite shores of the Continent peat with buried trees passes out to sea, and has been dredged up from the sea-bottom at considerable distances from the land. The only other formations that need be mentioned are the raised Beaches (q.v.) which are met with at various heights above the present sea-level, and the local moraines and fluvio-glacial gravels of the higher valleys of the Scottish Highlands. Some of these moraines come down to the level of the 45 to 50 feet beach.

The flora and fauna of the period are essentially the same as at present. In the earlier stages of the period, however, the flora of north Germany, Denmark, southern Sweden, &c. was arctic-alpine, and that flora was accompanied by the northern mammals, including the reindeer, &c. Later in the period, as the climate became more genial, the northern flora and fauna disappeared from the low grounds of temperate Europe, and the present plants and animals took their place. Of the more notable mammals of the period in Britain were *Megaceros* (Irish deer), *Bos primigenius*, and *Bos longifrons.* The oldest traces of man met with at this stage belong to the Neolithic phase.

Several geographical and climatic changes appear to have supervened in postglacial and recent times. After the Scandinavian flora and fauna had been succeeded in our area by the present assemblage of plants and animals, the climate appears to have become even more genial than it is in our day. Great forests spread far north into regions where trees do not now grow, and reached elevations on the mountains which they cannot now attain. At the same time many southern types of molluscs migrated into northern seas, some of which have since died out, or still survive in diminished numbers and dwarfed in size. To this genial stage belong the great oaks and other leafy trees in the lower buried forests of the bogs. Eventually the climate changed and became wet and cold. The British area, formerly continental, was insulated and of less extent than now—the sea overflowing the low ground of Scotland up to a height of 45 to 50 feet above its present level. Local glaciers then made their appearance in many mountain-glens, and even descended in some places to the sea. The 'carse-clays' (45–50 feet terrace) belong to this stage. The climate was not so favourable for the growth of great trees, which were now more restricted in their vertical and horizontal range. Over wide areas the forests decayed and became buried by mosses and their allies. The general occurrence throughout north-western Europe of a second well-marked 'buried forest' seems to indicate a return to more genial climatic conditions, giving rise to a second period of great forests, which gradually overspread much of the moory and waste lands. Coincident with this second forest-epoch there appears to have been a gain of land, at least in Scotland, but there is no evidence to show that Britain again became continental. The second forest-epoch was succeeded as the first had been by somewhat cold and wet conditions, under the influence of which the forests decayed, while swamps and morasses increased. At the same time the Scottish area became depressed for some 25 feet or thereabout below its present level. The last physical change of which there is clear evidence is the final retreat of the sea, while the general aspect of the bogs (in which the rate of decay exceeds that of growth) would seem to indicate that we are living under drier conditions than obtained when the second forest-epoch came to a close. See Europe, Stone Age.

Post-horn. See Horn.

Posting, the forwarding of passengers from place to place by means of relays of horses. Posting was long in Britain, as it is yet in some parts of the Continent, a government monopoly. See Post-office.

Post-mortem Examination. Examination of the body after death is a duty which has frequently to be discharged by medical men in various circumstances, of which the most important are (1) cases of sudden or accidental death; (2) cases of lingering illness, in which the nature of the disease had not been determined during life; and (3) cases of suspected suicide or homicide. Such examinations cannot legally be undertaken until twenty-four hours have elapsed after death, and permission or warrant must be obtained for the performance of the examination. In ordinary cases where the examination is necessary or advisable for the purpose of throwing light upon the nature of the fatal illness, and where no judicial question is involved, the consent of the parents, relatives, or guardians must be procured. In medico-legal cases the order of the coroner (in England) or of the procurator-fiscal (in Scotland) is essential. In such cases the examination should always be performed by two medical men, one of whom, it is desirable, should be an expert. In all cases the position of the body and of the surrounding objects should be carefully noted, as they often throw light upon the cause of death. The external appearances of the body, such as the presence of rigidity and of putrefactive changes, should be observed, as affording a certain clue to the period at which death occurred. In medico-legal autopsies every organ in the body should be carefully examined, and its condition briefly but accurately noted. A careful microscopic examination should follow if there be the least doubt as to the nature of the diseased condition present. Finally, in cases of suspected poisoning portions of the organs must be subjected to chemical analysis. The study of the changes wrought in the various organs by disease has been one of the most potent factors in advancing scientific medicine.

Post-nuptial Contract. See Husband and Wife, Settlement.

Post-obit (Lat. *post obitum*, 'after death') is a bond or security given by heirs and others entitled to reversionary interests, whereby, in consideration of a sum of money presently advanced, the debtor binds himself to pay a much larger sum after the death of some person, or of himself. Whenever, as is not unusual, the payment is uncertain, and depends on the obliger outliving somebody else, very high interest is required, or rather a very much larger sum is agreed to be repaid than what is advanced. These are generally usurious bargains; but the obligee or creditor can enforce payment of the full amount; though, if there is a gross case of inadequacy in the proportions amounting to fraud, a court of equity will interfere.

Post-office, (1) a government department whose chief business it is to convey letters from place to place; and (2) any office or agency appointed by that department for the reception, despatch, or delivery of letters. Although letter conveyance is the primary work of the post-office, many other branches of business have been assumed by it. The word *post* is derived from the Latin *positus*, meaning 'placed,' 'fixed,' and comes to have its particular application from the posts, or stages, at which on the roads of the Roman empire couriers were maintained for the purpose of conveying news and despatches. Herodotus mentions that a system of couriers existed in the Persian empire; and Xenophon states that post-stations or houses were established by King Cyrus. Marco Polo describes a similar system existing in China in the 13th century, the stations being only three miles apart, thus securing great rapidity of communication. Among the ancient Aztecs in Mexico a complete system of couriers was likewise maintained, the stations being about two leagues apart, and providing a rapid means of communication by foot-messengers. In all these cases the posts seem to have been set up for government service only.

The first letter-post in the modern acceptation of the word seems to have been established in the Hanse towns in the early part of the 13th century. A line of letter-posts followed, connecting Austria and Lombardy, in the reign of the Emperor Maximilian, which are said to have been organised by the princes of Thurn and Taxis; and the representatives of the same house established another line of posts from Vienna to Brussels, connecting the most distant parts of the dominions of Charles V. The family of Thurn and Taxis continued to enjoy certain privileges in connection with these posts down to 1867, when they were ceded by treaty to the Prussian state, and have since been assumed by the German empire.

In England in early times both public and private letters were sent by special messengers only; later on they were frequently conveyed by common carriers plying with their pack-horses. In the reign of Edward I. 'posts' were established where horses could be had for hire by messengers wearing the royal livery; and in the reign of Edward II. horses were kept by private persons for hire, so that private messengers might travel 'post.' In 1481, when Edward IV. was at war with Scotland, a system of relays of horses was established in the north (probably from York to Edinburgh) in order to provide the king with the latest news in his camp. This arrangement, however, ceased on the restoration of peace. In 1548 the charge for post-horses impressed for government service was fixed by statute at a penny a mile. Camden mentions the office of 'Master of the Postes' as existing in 1581; but the duties of the 'Master' were probably confined to the supplying of post-horses. The foreign or alien merchants in London established a post-office of their own from London to the outports in the year 1514, appointing their own postmasters; but dissensions occurred among them, and the matter was referred to the government in 1568. At this time also the English merchants complained of unfair treatment by the foreign-post; and the consequence was that the government set up a post-office for letters to foreign countries for the benefit of the English merchants. The first inland post was established by Charles I., who in his proclamation of 1635 refers to the uncertainty of communication between England and Scotland. The proclamation thus proceeds: 'Wherefore, he now commands his Postmaster of England for foreign parts to settle a running post or two, to run night and day between Edinburgh and London, to go thither and come back again in six days, and to take with them all such letters as shall be directed to any post-town in or near that road.' At the same time by-posts were to be connected with the principal towns lying off the main line of posts. In 1637 a proclamation prohibited any messengers or foot-posts to carry letters other than the messengers of the king's postmaster-general, with certain specified exceptions. This inland post was placed under the charge of Thomas Witherings, who, with William Frizell, had been entrusted with the English post for foreign letters from the year 1632. In 1640, in consequence of irregularities, Witherings was superseded in his office, which was then entrusted to Philip Burlamachi. Eight main postal lines throughout England were at this period set up. The rates of postage for a single letter were as follows: not exceeding a distance of 80 miles, 2d.; 140 miles, 4d.; for any greater distance in England, 6d.; to Scotland, 8d. In 1649, in the time of the Commonwealth, the court of Common Council for London set up a post in rivalry with that of the parliament; but the Commons promptly put an end to the undertaking. Material changes were effected in the post-office by Cromwell and his parliament in 1657, and an ordinance bearing on the subject furnishes a motive for the establishment of posts—'that they will be the best means to discover and prevent many dangerous and wicked designs against the Commonwealth.' At the Restoration the settlement of the post-office made during the Commonwealth was confirmed, and its substance was re-enacted by statute 12 Carolus II. chap. 35, which act, being the first strictly legal authority for the establishment of the post-office, has always been looked upon as its charter. Although in 1635 something was done towards establishing posts between England and Scotland, little was attempted as regards internal communication in Scotland till 1695, when the Scotch parliament passed an act for the general establishment of a letter-post. In 1683 an upholsterer named Robert Murray set up a penny post for the conveyance of letters and small parcels about London, which business was subsequently assigned to Thomas Dockwra. This undertaking was, however, seized by the government as being an infringement of its privileges, and Dockwra was granted a pension of £200 a year by way of compensation. This system was the commencement of the London Postal District service, and Dockwra was afterwards appointed its controller. About the year 1700 robberies of the posts were so frequent in the neighbourhood of the Borders that acts were passed by the Scotch and English parliaments making robbery of the post punishable with death and confiscation. In 1708 a Mr Povey attempted to set up a halfpenny post in London; but this was suppressed as the result of a lawsuit at the instance of the government. By a statute passed in 1710 the post-office was remodelled, a general post-office for the three kingdoms and the colonies being established under 'Her Majesty's Postmaster-general.' This officer was empowered to keep one chief letter-office in London, one in Edinburgh, one in Dublin, one in New York, and one in the West Indies. The Irish parliament in 1784 passed an act, giving the Irish post-office a separate existence, and creating an independent postmaster-general; but the offices were again united under the British postmaster-general in 1831. In the year 1776 a penny post for Edinburgh and Leith was set up by Peter Williamson, and carried on until about 1792, when it was absorbed by the General Post-office. In 1720 Ralph Allen (1694–1764) obtained a lease for life of the cross-posts at a rent of £6000 a year; and so greatly did he improve the revenue from this source that he realised an annual profit of £12,000, which he lived to enjoy for forty-four years.

The institution of mail-coaches (see COACHING) marks a very important period in the history of the post-office. Their introduction is due to Mr John Palmer, manager of the theatre at Bath, who submitted his scheme to Mr Pitt in 1783. In order to carry out his plan Mr Palmer was appointed Controller to the General Post-office, with a salary of £1500 a year and 2½ per cent. on any excess of revenue over £240,000 a year. The running of mail-coaches commenced in 1784, the plan being carried out, like the later great scheme of Sir Rowland Hill, in the face of vehement opposition on the part of officers of the post-office. The new method of conveyance, however, proved most successful, both on account of greater safety to the mails, and acceleration of the correspondence. In 1792 Mr Palmer was suspended from his office, an allowance of £3000 a year being made to him in lieu thereof; but after a long struggle with the Treasury parliament in 1813 made him a grant of £50,000. The mail-coach era may be said to have covered a period of sixty years, during which time the great road engineers so improved the highways that the speed of the coaches was increased from about six to fully ten miles an hour. Mails were first sent by railway in 1830 over the line between Liverpool and Manchester.

In order of time the next great feature in the history of the post-office is the uniform penny postage scheme of Mr (afterwards Sir) Rowland Hill (q.v.). He suggested his plan of reform in 1837. It evoked strong opposition within the post-office and from a section of the public without; but it was eventually adopted by a majority of 100 in the House of Commons, and the scheme was launched on the 10th January 1840. Immediately prior to that date the inland postage rates were as follows for an ordinary single letter:

From any post-office to any place not exceeding 15 miles from such post-office	4d.
Above 15 miles and under 20 miles	5d.
" 20 " 30 "	6d.
" 30 " 50 "	7d.
" 50 " 80 "	8d.
" 80 " 120 "	9d.
" 120 " 170 "	10d.
" 170 " 230 "	11d.
" 230 " 300 "	12d.
For every additional 100 miles	1d.
and for every letter carried over the Borders an additional	½d.

The extra halfpenny was charged as an indemnity for toll dues from which, by the Act 53 of Geo. III., 1813, mail conveyances in Scotland having more than two wheels were not exempt. These were the initial rates payable for single letters—i.e. letters written upon single sheets. If a letter contained an enclosure the letter became a double letter, and double postage was claimed. For a letter weighing an ounce the charge was quadrupled, and each quarter of an ounce in addition added an additional rate to the charge. Under the uniform penny postage scheme the postage was levied according to weight, commencing with a penny for a letter not exceeding half an ounce, and a penny for every additional half ounce, irrespective of distance within the kingdom which the letter had to be conveyed. The uniformity of rate as regards distance has been maintained till the present day, though the Rowland Hill scale has been altered. Thus, in 1871 the initial half ounce letter ceased (as regards inland letters), and the scale became as follows: Not exceeding 1 oz., 1d.; not exceeding 2 oz., 1½d.; not exceeding 4 oz., 2d., and ½d. for every 2 oz. up to 12 oz.; 1d. being charged for each additional ounce. In 1885 this comparatively heavy charge over 12 oz. was removed. The privilege of Franking Letters (q.v.) enjoyed by members of parliament till 1840, which was a great loss to the revenue, ceased on the introduction of the uniform penny postage. Envelopes were introduced, bearing a revenue stamp or mark for postage, and known as the Mulready envelopes, from the name of the artist who prepared the design; but the public would not take to them, and their issue was discontinued. Postage-stamps were, however, introduced at this time, and have since continued to be used. The following figures show to what extent cheap postage has stimulated the correspondence of the country. In 1839 the number of letters passing through the post, including franked letters, was 82,500,000; in 1840 the number at once rose to 169,000,000; and in 1890 the number was no less than 1,650,200,000. In addition to this mass of written matter, besides 217,100,000 post-cards, the following articles passed through the post in 1890: Book-packets and circulars, 441,900,000; newspapers, 159,300,000. For some years after the introduction of Rowland Hill's scheme there was a deficit in the post-office revenue, but this was soon covered by the rapid growth of business, and for many years the post-office has paid in large yearly profits to the Treasury. In 1890 the gross revenue from all branches of post-office business was £12,211,614; the expenditure, £8,865,527; and the net revenue, £3,346,087. It is not to be doubted that the railway system must be credited with a large share of the means whereby it has been possible so greatly to develop the transmission of correspondence throughout the country. Mail-coaches could not have carried the bulk and weight of matter now transmitted. Halfpenny post-cards were introduced in October 1870, and the penny postage upon newspapers was at the same time reduced to ½d.

By an arrangement entered into between the postmaster-general and certain railway companies, dating from the 1st February 1891, the latter are empowered to convey single letters for the public, between their stations, on behalf of the post-office, provided the letters do not exceed 1 oz. in weight. Such letters must bear a postage-stamp of the value of 1d., which goes to the revenue, and a railway stamp of the value of 2d., which goes to the companies as payment for conveyance.

In March 1891 a system of express delivery for letters and parcels was established in London and certain of the more important towns in the kingdom; and shortly thereafter it was made general throughout the country. The delivery is effected by means of the messenger force employed in the telegraph service. When railway, omnibus, or tramcar conveyance only is used by the messenger, the fee, in addition to the ordinary postage, is twopence for the first mile, and threepence for each additional mile. Higher fees are charged for cab conveyance.

Postal Union.—Under the terms of a treaty concluded at Berne on the 9th October 1874, the object of which was to secure uniformity in the treatment of correspondence, and the simplification of accounts, as well as the reduction of rates within certain limits, and whose provisions were carried into operation generally on the 1st July 1875, the whole of Europe, the United States of America, Egypt, British India, and all the colonies of France were at the outset, or shortly thereafter, included in the Union, and many other countries and colonies have since joined it. The rates of postage to the several states concerned will be found set forth in the British *Post-office Guide.* The international accounts in respect of postages are based upon a month's return of correspondence taken every third year. The rates of postage *to* Great Britain are not always the same as those *from* Great Britain, each country having a certain limited discretion in fixing rates.

Registered Letters.—In 1779 the postmaster-general issued an order that postmasters should dissuade the public from sending letters by post containing cash in gold or silver, rings, or bracelets, &c.; but this order was rescinded in 1792. At the same time postmasters were again authorised to accept such letters; but before placing them in the mail-bags they were required to copy the addresses of the letters on the front of the letter bill and to tie the letters up with the bill. This mode of giving greater security to letters of value seems to have been the initial stage in the development of the registered letter system. The modern plan of registration is based on the principle that every registered letter must be signed for in passing from hand to hand; and, although the postmaster-general gives guarantee (under special conditions) to but a comparatively small amount, the system affords almost absolute security of transmission. The number of letters registered in the United Kingdom in 1890 was 11,357,935. The fee for inland registration, in addition to the ordinary postage, had for many years been fixed at twopence; but on the 1st June 1891 a combined system of registration and insurance was introduced for letters and parcels, with fees ranging from twopence to sixpence, and a maximum insurance of £25.

Money Orders.—In the year 1792, by permission of the postmaster-general, some half-dozen clerks who had charge of the 'country roads,' or despatching divisions, in the London General Post-office, set up a system of remittances for the public to and from the post-offices in England and the chief post-offices in Edinburgh and Dublin, the postmasters at these places acting as agents in the scheme. This was the origin of the money-order system, which for a long period was carried on by the clerks on their own account. It was not till the year 1838 that it became a recognised branch of the post-office establishment. In the earlier years the rates of commission were very high, thus preventing any extensive development of the business, but for many years the charges have been, especially for small amounts, on a very moderate scale. In the period from 1859 till the present time the money-order system has been extended to a great many of the colonies and to foreign countries, and every year further extensions are being made. In 1890 the number of money-order offices in the United Kingdom was 9437. The amount of business done in that year was as follows: Inland orders, 9,027,750, £23,333,417; colonial orders, 453,102, £1,631,616; foreign orders, 893,292, £2,200,872.

Postal Orders.—In pursuance of the recommendations of a committee appointed by the Treasury, of which the late Mr George Moore, the philanthropist, was chairman, the transmission of money by means of postal orders was put into operation on the 1st January 1881. This simple method of remitting small sums of money has grown rapidly in public favour, and each year adds largely to the amount of business done. In 1890 the total number of orders issued was 44,712,548, representing an aggregate value of £17,737,802, 4s.

Post-office Savings-banks.—By Act 24 Vict. chap. 19, a system of savings-banks in connection with the post-office was established in 1861, affording great facilities for thrift to the industrial classes and to young people. The rate of interest payable to depositors is 2½ per cent., calculated upon complete pounds remaining with the post-office complete months. No single depositor may deposit more than £30 in any one year. The number of offices opened for savings-bank business up to the 31st March 1862 was 2532, while on the 31st December 1889 the number open was 9353. In this latter year the deposits numbered 8,101,120, amounting to £19,814,308, and the withdrawals were 2,757,848, amounting to £16,814,268. On the 31st December 1889 a total amount, including interest, remained to the credit of depositors of £62,999,620. The interest credited to depositors for the year was no less than £1,443,186. The post-office savings-bank is largely used by friendly societies, provident institutions, and penny banks as a safe place of deposit for their funds. Since 1880 depositors have been enabled to invest their savings in government stocks with little or no trouble. On the 31st December 1889 the total amount of stock so held was £4,175,634, distributed over 46,993 persons. Under regulations of 1888 the minimum amount of stock purchasable was reduced from £10 to 1s. See SAVINGS-BANKS.

Government Insurances and Annuities.—An Act 27 and 28 Vict. chap. 43, 1864, empowered the postmaster-general to grant life-insurance policies and annuities within certain limited amounts; and the scheme was brought into operation on the 16th April 1865. These branches of business have not developed beyond very narrow limits, and, in so far as the scheme may have been devised to make life insurance and the buying annuities on the part of the less well-to-do more general, the attempt has hitherto proved a failure.

Post-office Telegraphs.—Prior to 1870 the business of conveying telegraphic messages for the public was in the hands of several rival telegraph companies and the railway companies; but by the Act 31 and 32 Vict. chap. 110, 1868, the postmaster-general was authorised to acquire, work, and maintain electric telegraphs; and by Act 32 and 33 Vict. chap. 73 he acquired (with certain exceptions) the exclusive privilege of sending telegraphic messages within the kingdom. The actual transfer of the working system took place on the 5th February 1870. The tariff was, like the inland postage, a uniform tariff within the United Kingdom, the minimum charge being 1s. for twenty words, with free addresses. In the first complete year of the new management (1870–71) the total number of telegrams of all classes transmitted was 9,850,177. On the 1st October 1885 the minimum charge for a telegram was reduced to 6d. for twelve words, addresses ceasing to be sent free. In the year 1889–90 the number of messages transmitted was 62,403,399. The total sum laid out as capital in connection with the purchase of the telegraphs was £10,880,571; and the annual interest on this sum, amounting to £299,216, is not borne on the post-office votes. In the year 1889–90 the revenue from this branch of the service was £2,363,836, and the expenditure £2,262,310. The revenue received for private wires erected by the post-office for persons and firms was £126,917. The number of offices open for the transaction of postal telegraph business in 1890 was 7352. See TELEGRAPH.

Parcel Post.—This is the most recent of the greater undertakings entered into by the post-office. By the Post-office (Parcels) Act, 1882 (45 and 46 Vict. chap. 74), the post-office was empowered to convey parcels by post on different conditions from ordinary postal packets; the remuneration to the railway companies for the conveyance of the parcels in bulk being fixed at eleven-twentieths of the gross inland postage received for the parcels, the post-office performing all duties of collection and delivery. This business was entered upon by the post-office on the 1st August 1883, the parcels conveyed being exclusively inland parcels. At the outset the maximum weight of a parcel was fixed at 7 lb. On the 1st May 1886 the maximum weight was raised to 11 lb., and an alteration made in the scale of postage, the charge for a parcel of 11 lb. being fixed at 1s. 6d. In the first year of the parcel post the number of parcels transmitted was upwards of 22,900,000. On the 1st July 1885 parcel business was extended to certain of the colonies and to foreign countries, and from year to year this connection with places abroad becomes more widely extended. In the year ended 31st March 1890 the total number of parcels of all kinds delivered in the United Kingdom was 42,852,570, the gross postage upon which was £952,113. This vast system of parcel carriage is said not to have damaged to any very considerable extent the parcels business of the railway companies, and consequently it must be held to be a new convenience created for the public, the value of which it is impossible to estimate.

Inland Revenue Licenses.—Through the medium of the post-office the inland revenue department finds a ready means of issuing a great variety of licenses throughout the country. In the year ended the 31st March 1890 the number of licenses so distributed was 1,518,136, representing a sum of £908,163.

Mail-packet Service.—Occasional reference is made in old writings, and in official records, to the employment of vessels called packets, for the conveyance of the mails, but there seems hardly any continuous account of the services performed by those vessels. In the time of Charles I. packets between Dublin and Chester, and between Milford Haven and Waterford, conveyed government despatches, and in 1639 one Nicholas Herbert agreed to have his barque in readiness at Whitehaven, 'with one sufficient master, and other meet and able sailors,' to carry letters for His Majesty or the council at Dublin for £10 per lunar month. It would seem that for some time anterior to 1788 the packets belonged either to the crown, to members of the post-office staff, or to their friends, for in that year a commission upon fees of public offices recommended that this system should be abandoned, and that contracts should be obtained by public advertisement. The recommendation was, however, only partially acted upon at that time, and no public contracts were entered into, apparently, until after 1837, at which period the packet service was placed under the management of the Admiralty. Another committee in 1848 strongly urged an extension of the contract system, and a similar recommendation was made by Lord Canning's Committee of Inquiry into packet-contracts in 1853. This committee also recommended that the stipulation as to the arming of the packets should be omitted in future contracts, and the committee's views in this matter were then given effect to. The mail-packet contract business remained in the hands of the Admiralty till the 1st April 1860, when the whole management was taken over by the post-office. In order to establish rapidity and regularity of service, it has been necessary from time to time to grant vast subsidies to the mail-packet contractors, in those cases where the exigencies of trade had not secured these conditions; but the growth of commerce and greater competition have enabled the post-office in many cases to obtain easier terms. At the close of the 17th century a mail-packet was a vessel of some 85 tons, and in the last years of the 18th century a mail-packet on the Falmouth station, reckoned fit to proceed to any part of the world, was one of about 179 tons. The packets at this time sailing to and from the Continent were of about 70 tons burthen. About 1840 packets performing the American service were vessels of about 400 or 500 tons burthen. Steam-vessels were first employed in the packet service in 1821, since which time vast strides have been made both in the speed and carrying capacity of these ships. The British mail-packets are to be seen in almost every sea on the globe. For the Atlantic service steamers of from 7000 to 10,000 tons are employed, making the transit from shore to shore in six days. So late as 1829 the time allowed for a packet trip to and from America was 105 days. The contract services at home are very numerous, and those to foreign stations are almost co-extensive with the high seas. In the year 1889–90 the total payment made by the post-office for packet services was £665,375, full details of which will be found in the postmaster-general's annual report.

Rates and Regulations.—In the scope of an article like this it is impossible to review the past rates of postage and changes of regulations that have taken place from time to time. The conditions applicable to the business in relation to the public will be found fully set forth in the Post-office Guide, which may be consulted at any post-office, and to which the reader is referred.

Staff.—The highest authority in the post-office is the postmaster-general. This official is a member of the government, a privy-councillor, and sometimes a cabinet minister. All important measures of administration, appointments of officers, and dismissals are passed under the authority of the postmaster-general in the form of minutes. The chief permanent officials are: the secretary, a financial secretary, four other secretaries in London, a surveyor-general in Scotland, and a secretary in Ireland. The several secretaries under the first secretary take charge of separate branches of post-office business. Another important officer is the receiver and accountant general. This officer is responsible for the whole vast accounting work of the post-office, the collection of its revenue, and the distribution of its expenditure. He has no power, however, except by effecting economies of work or reforms of method, to reduce the latter or to increase the former. The bases of revenue and expenditure are fixed by higher authority. The total number of persons employed by the post-office (1890) is 113,550. Of these 61,054 are established officers, and 52,496 unestablished and persons not giving their whole time to post-office work. The total number of employees comprises 89,373 males and 24,177 females. The salary of the postmaster-general is £2500 per annum, and of the chief-secretary a maximum of £2000. On a change of government the postmaster-general demits his office.

Espionage of Letters.—The post-office statute of Queen Anne contains a prohibition, repeated in subsequent acts, against letters being opened or detained by persons in the service of the post-office, except under a warrant from one of the principal secretaries of state. During the 18th century such warrants were often granted upon very trivial pretexts. At Bishop Atterbury's trial in 1723 copies of his letters, intercepted in the post, were produced as evidence against him; and it would seem that about 1735 a system was kept up at immense expense for the examination of home and foreign correspondence. In 1782 the correspondence of Lord Temple, then lord-lieutenant of Ireland, was subjected to such treatment in the post. The 19th century brought a change for the better in this respect, and in 1806 Lord Spencer initiated the custom of recording the dates of all warrants granted, and the grounds upon which they were issued. Since 1822 the warrants have been preserved at the Home Office; and a House of Commons return in 1853 shows that, in the preceding ten years, only six letters were detained and opened—four in cases of felony. When Sir James Graham (q.v.) was Home Secretary in 1844 a warrant was issued for the arrest and opening of the letters of Mazzini, the matter contained in them being conveyed to the Austrian minister. This act involved the government of the day in serious public obloquy, and produced a widespread, though groundless, distrust in the security of the ordinary correspondence of the country. It may safely be held that this power of opening letters in the post has been very rarely exercised in recent years.

Dead-letter, or Returned-letter Office.—A department of the post-office appointed to deal with letters, books, newspapers, &c. which cannot be delivered to the persons to whom they are directed. When a letter or other postal packet is refused at the address which it bears it is kept by the postmaster, if an inland letter, &c., one day, and if a colonial or foreign letter, &c., three days, before being sent to the returned-letter office. Inland letters are here opened, and those which contain the writers' addresses are at once returned to them; while those which furnish no indication of the addresses of the senders, and contain nothing of value, are at once destroyed. Letters which bear the senders' addresses on the outside, in the form of medallion or otherwise, are, however, usually returned without being opened. Foreign and colonial letters, after being retained from one week to one month, are returned unopened to the country of origin for disposal. A register is kept of letters found to contain value. In the year 1889–90 the following numbers of articles were received in the various offices constituting this department: letters, 6,311,102; post-cards, 841,076; book-packets (including circular-letters passing at book-post rates), 6,661,201; newspapers, 551,022; patterns or samples, 27,486; parcels, 107,863. Of the letters 119,386 were re-issued to corrected addresses, and 5,539,551 returned to the senders, while 214,839 were returned unopened to foreign countries. Of the total parcels received 81,277 were either re-issued to corrected addresses or returned to the senders. The returned-letter department has not only principal offices in London, Edinburgh, and Dublin, but branch offices in the other more important towns.

Offences against the Post-office.—In view of the vastly important services rendered to the public by the post-office, involving the imposition of great responsibility upon its officers, and of the necessity which obviously exists for the protection of the revenue (the conveyance of letters being a state monopoly), the legislature have thought fit to pass special enactments for the regulation of the one and the safeguarding of the other. In addition, enactments have been passed from time to time bearing upon the other branches of post-office business. The following are some of the offences recognised in the enactments: Every person employed by or under the post-office who steals, secretes, or destroys a post-letter is guilty of felony, and if it contain a chattel or money the punishment is increased. Strangers also who steal letters or other postal packets out of the custody of the post-office or its officers are likewise guilty of felony, and similarly punishable; and a person who fraudulently retains or wilfully keeps or detains a letter or other postal packet delivered to him by mistake, or which having been lost in course of conveyance he may have found, is punishable by fine and imprisonment. The moment a letter or other postal packet is put into the post-office, or is delivered to a person authorised to receive such missives for the post, the protection of the statutes commences, and it ceases on the letter or packet being delivered at the place of its address. If a postman delay the delivery wilfully, or if an officer of the post-office disclose or intercept or wilfully delay a telegraphic message, he commits a misdemeanour. Receivers of post-letters or their contents stolen or taken from the post-office are guilty of felony. By the 1 Vict. chap. 36 sect. 2, any person sending or conveying otherwise than by post letters or packets not exempted from the exclusive privilege of the postmaster-general, or performing otherwise than by the post any services incidental to conveying letters or packets from place to place, is liable to a penalty of £5 for every such letter or packet. This exclusive privilege or monopoly does not extend to newspapers. There are, however, exceptions to the general rule as regards letters or packets. Thus, a letter may be conveyed by a private friend and not by the post-office. Letters sent by messengers on purpose, on the private affairs of the sender or receiver, commissions and legal writs, letters of merchants sent by their own vessels or along with goods to which they relate, are likewise excepted. But no person is permitted even to collect these excepted letters for the purpose of sending them in the manner described, for this is infringing the exclusive privilege of the post-office. Moreover, certain persons are expressly prohibited from carrying letters even gratuitously—viz. common carriers, unless the letters relate to goods in their carts or wagons; owners, masters or commanders of ships, except letters of the owners of the ships or such as relate to goods on board; and passengers or other persons on board ships.

By statute the transmission of telegrams within the United Kingdom is secured to the postmaster-general as a monopoly, and telegrams enjoy many of the protective privileges applicable to post-letters. The postmaster-general has power to arrest in the post any missive bearing thereon any words, marks, or designs of an indecent, obscene, or grossly offensive character. Under the Post-office (Money Orders) Acts, 1848 to 1883, an officer of the post-office who with a fraudulent intent issues a money order or postal order, or re-issues a postal order previously paid, is liable to penal servitude not exceeding seven years; and any person who forges an order, or utters a forged order, is liable to penal servitude for a longer term. An officer of the post-office who fraudulently embezzles or misappropriates moneys or securities entrusted to or received by him by virtue of his employment is liable to penal servitude not exceeding fourteen years.

By 43 and 44 Vict. chap. 33, sect. 3, any person who, with intent to defraud, obliterates, adds to, or alters any such lines or words on a postal order as would, in the case of a cheque, be a crossing of that cheque, or knowingly offers, utters, or disposes of any order, with such fraudulent obliteration, addition, or alteration, is guilty of a felony, and is liable to the like punishment as if the order were a cheque. By the Act 45 and 46 Vict. chap. 74, relating to the parcel post, that act is to be deemed to be a post-office act within the meaning of the Post-office (Offences) Act, 1837 (1 Vict. chap. 36), and subject to its provisions. The Post-office Acts apply to *parcels* in like manner as they apply to other postal packets. Act 47 and 48 Vict. chap. 76—the Post-office (Protection) Act, 1884—deals with a variety of offences under the following heads: prohibition of placing injurious substances in or against post-office letter-boxes; prohibition of sending by post explosive, dangerous, or deleterious substances, or indecent prints, words, &c.; prohibition of affixing placards, notices, &c. on a post-office, letter-box, or other post-office property; prohibition of imitation of post-office stamps, envelopes, cards, forms, and marks; prohibition of fictitious stamps; prohibition of false notice implying that any place is a post-office, postal telegraph office, or post-office letter-box; obstruction of officers of the post-office or of business in a post-office; retaining of clothing by officers of the post-office on ceasing to be officers; forgery and improper disclosure of telegrams. Contraventions of these prohibitions entail penalties generally ranging from twelve months' imprisonment with hard labour, or a fine of £200, to fines not exceeding forty shillings.

Foreign Post-office Systems.—The advantages of the post are now enjoyed, in a greater or less degree, by all civilised countries; and the several systems bear in their main features a general resemblance to the British system, upon which, in many cases, they have been modelled. At the same time details of marked difference may be observed, each country having adapted its system to its own particular wants. Thus, in certain countries subscriptions to the newspapers and accounts for merchandise are collected by the post-office; the parcel post conveys larger and heavier articles than are conveyed in Great Britain; a system of sending through the post letters of declared value is in force in some; and a different means is employed for transferring mails to and from mail trains while running. Besides this, the classification of postal matter in regard to rates of postage is not uniform. The amount of matter conveyed through the post between Great Britain and certain foreign countries is enormous—e.g. the average number of sacks of mails despatched weekly in 1890 from Britain to the United States was 1200, and to the Australian colonies 410.

United States.—The beginnings of a postal service in the United States date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established 'a post to goe monthly from New York to Boston;' in 1702 it was changed to a fortnightly one. A general post-office was established and erected in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was appointed in 1692; and by act of parliament in 1710 (see p. 347) he was directed to keep his principal office in New York, 'and other chief offices in some convenient place or places in other of Her Majesty's provinces or colonies in America;' a monopoly was established which included also the transport of travellers, and a tariff was fixed. The system, however, proved a failure, until 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded £3000.

In 1789, when the post-office was transferred to the new federal government, the number of offices in the thirteen states was only about seventy-five. A conspectus of the remarkable progress in the ensuing century is supplied in the table below. Outstanding events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage-stamps (1847), of stamped envelopes (1852), of the system of registering letters (1855); the establishment of the free-delivery system, and of the travelling post-office system (1863); the introduction of the money-order system (1864), of postal cards (1873), and, between the last two dates, of stamped newspaper-wrappers, and of envelopes bearing requests for the return of the enclosed letter to the writer in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of 'postal notes' payable to bearer (1883); and the establishment of a special delivery system (1885), under which letters bearing an extra ten-cent stamp are delivered by special messengers immediately on arrival. The telegraph is not in the hands of the post-office, and among other features not yet adopted by the United States service are post-office savings-banks and the parcel post. The postmaster-general is a member of the cabinet. Under him about 100,000 persons are employed, of whom some 60,000 are postmasters. Most of these, except letter-carriers and clerks, are liable to be removed on the accession to federal office of a new political party. The following table shows the increase, during the first century of the department's history, in offices, length of mail routes in miles, revenue, &c.

Years.	Offices.	Miles.	Revenue.	Expenditure.
1790	75	1875	$37,935	$32,140
1800	903	20,817	280,804	213,994
1810	2,300	36,406	552,866	495,969
1820	4,500	72,492	1,111,927	1,160,926
1830	8,450	115,176	1,850,583	1,932,708
1840	13,468	155,739	4,543,522	4,718,236
1850	18,417	178,672	5,552,971	5,212,953
1860	28,498	240,954	8,518,067	19,170,610
1870	28,492	231,232	19,772,221	23,998,837
1880	42,989	343,888	33,315,479	36,542,804
1890	62,401	..	60,858,783	66,645,083

As will be seen, the United States post-office department, unlike that in Great Britain, is carried on at a loss; this is due to the large amount of postal matter of certain classes carried at less than the cost of conveyance and distribution, and to some kinds of correspondence being carried altogether free. In 1890 the numbers of letters, packets, newspapers, &c. conveyed by post in the United States were as follows:

Letters, post-cards, &c.	2,289,950,015
Newspapers, &c.	778,428,515
Other articles	519,247,199
Articles sent free of postage	376,509,165
Articles of all kinds for foreign countries	41,273,312
Grand total	4,005,408,206

The number of post-offices in the United States is larger than in any other country; but as regards the number of persons employed the United States takes third rank. It provides a post-office for every 1003 persons, while in Great Britain the proportion is one to every 2105 persons.

See the articles STAMPS, TELEGRAPH. Tho following works may also be consulted: Postmaster-general's Annual Reports, issued yearly since 1855; *Her Majesty's Mails*, by Lewins; *Life of Sir Rowland Hill*; *The History of Penny Postage*, by Sir R. Hill and G. B. Hill (1880); *Fifty Years of Public Work*, by Sir Henry Cole (1884); *The History of the Post-office to 1836*, by H. Joyce (1893); *Forty Years at the Post-office*, by F. E. Baines (1895); *The Royal Mail* (1885), and *The Post in Grant and Farm* (1895), by the present writer.

Post-Tertiary. See QUATERNARY.

Posy. See RING.

Potash. See POTASSIUM.

Potash Water. See AERATED WATERS.

Potassium (sym. K, equiv. 39) is one of the alkaline metals. The letter K is selected as its symbol, as being the first letter of *Kali*, the Arabic word for potash, the letter P being already taken as the symbol for phosphorus. The following are the chief characters of this metal. It is of a bluish-white colour, and presents a strong metallic lustre. It melts at 146·5° (62·5° C.), and at a red heat is converted into vapour. Its affinity for oxygen is so great that on exposure to moist air it immediately becomes covered with a film of oxide, and hence it must be kept below the surface of naphtha. When heated it burns with a violet flame. Its intense affinity for oxygen is well shown by throwing it into water, on which, from its low specific gravity, ·865, it floats. The metal abstracts oxygen from the water, and forms oxide of potassium (potash); while the liberated hydrogen carries off a small portion of the volatilised potassium, and, taking fire from the heat evolved by the energetic chemical action, burns with a brilliant violet flame. The experiment is a very beautiful one, the burning metal swimming about rapidly on the water, and finally disappearing with an explosion of steam, when the globule of melted potash becomes sufficiently cool to come in contact with the water.

Potassium does not occur in the native state, and can only be obtained by the reduction of its oxide, potash. In 1807 Davy prepared it by decomposing its hydrated oxide (potash) by means of a voltaic current, but this process is not applicable on the large scale. It is now usually manufactured by distilling a mixture of carbonate of potash and charcoal in an iron retort.

If proper proportions are taken, the mixture is wholly converted into carbonic oxide and potassium, as is shown in the equation:

$$\overset{\text{Carbonate of Potash.}}{K_2CO_3} + 2C = K_2 + \overset{\text{Carbonic Oxide.}}{3CO}.$$

Potassium forms two compounds with oxygen, viz. a protoxide, K_2O, which constitutes potash, and is strongly basic, and a peroxide, K_2O_4. Of these the former is the only important one.

Potash can be procured in the anhydrous form by heating thin slices of the metal in air perfectly free from moisture or carbonic acid. It is white, very deliquescent, and caustic. When moistened with water it becomes incandescent, and the water cannot be expelled by any degree of heat. A far more important substance is the *Hydrate of Potash* or *Caustic Potash* ($KOH = K_2OH_2O$). This is commonly prepared by dissolving carbonate of potash in ten times its weight of water, and gradually adding to the boiling solution a quantity of slaked lime, equal in weight to half the carbonate of potash used. The resulting compounds are carbonate of lime, which falls as a precipitate, and hydrate of potash, which remains in solution; the changes being expressed by the equation:

$$\overset{\text{Carbonate of Potash.}}{K_2CO_3} + \overset{\text{Slaked Lime.}}{CaOH_2O} = \overset{\text{Carbonate of Lime.}}{CaCO_3} + \overset{\text{Hydrated Potash.}}{2KOH}.$$

The clear supernatant fluid is removed by decantation, or by means of a siphon, into a clean silver or iron basin, and is rapidly evaporated till it flows tranquilly like oil; it is then either cast into cylinders in metallic moulds, or is poured upon a cold slab, and solidifies on cooling. As so obtained it is very impure, but by solution in alcohol and evaporation a very pure article is produced.

Hydrated potash, on solidifying after fusion, occurs as a hard, grayish-white, opaque body, with a crystalline fracture, which may be readily again fused into a colourless oily fluid, but which only volatilises at a very high temperature. It is soluble in about half its weight either of water or of alcohol, and rapidly absorbs both carbonic acid and moisture from the atmosphere. It acts as a powerful caustic, and quickly destroys both animal and vegetable tissues, and hence its solutions can only be filtered through asbestos or pounded glass or sand. Its affinities are so powerful that few vessels are capable of resisting its influence. Its solution must be preserved in glass bottles into the composition of which no oxide of lead enters, as it has the property of dissolving this oxide out of the glass. Vessels containing silica (porcelain, earthenware, &c.) are decomposed, and platinum itself is oxidised when heated in contact with it.

The *salts* which potash forms with acids are for the most part readily soluble in water, and colourless, unless (as, for example, in permanganate of potash) the acid is coloured. Most of them are crystallisable, and they all communicate a violet tint, characteristic of potash, to the flame of spirit of wine and to that of the blowpipe. Many of them occur in animals and vegetables, and the ashes of plants contain them in large quantity.

Carbonate of Potash, K_2CO_3, is obtained by burning plants in dry pits, dissolving the ashes in water, evaporating till the sulphates, chlorides, &c. separate in crystals, and then boiling the mother liquid to dryness in iron pots. The quantity of pure carbonate of potash contained in it is liable to great variation, and for pharmaceutical purposes it must be dissolved in water and crystallised, the crystals containing about 20 per cent. of water. Carbonate of potash is extremely deliquescent, and is soluble in less than its own weight of water, but is insoluble in alcohol. It has an acrid, alkaline taste, and its reaction upon test-paper is strongly alkaline. It is a compound of great importance, both as a chemical reagent and as entering largely into the preparation of most of the other compounds of potash, and into the manufacture of soap and glass. The commercial carbonate is often called *Pearl Ashes*. *Bicarbonate of Potash*, $KHCO_3$, is obtained in white rhombic prisms, by passing a current of carbonic acid gas through a strong solution of carbonate of potash. These crystals are permanent in the air, but are decomposed by heat; water and carbonic acid being evolved, and the simple carbonate left. This salt is much less soluble than the carbonate, requiring four parts of cold water for its solution, which is nearly neutral to test-paper, and has a much milder taste than the preceding salt. It is employed as an antacid in medicine. The *Sulphate*, K_2SO_4, and *Bisulphate*, $KHSO_4$, may be prepared by treating potash with sulphuric acid. *Nitrate of Potash* has been already described under the head NITRE. *Chlorate of Potash*, $KClO_3$, occurs in white rhomboidal tablets of a pearly lustre. It has a cooling taste like that of nitre. It fuses at a gentle heat without decomposition, but on increasing the heat it gradually gives off all its oxygen, and is converted into chloride of potassium, according to the equation:

Chlorate of Potash.		Chloride of Potassium.		Oxygen.
$2KClO_3$	$=$	$2KCl$	$+$	$3O_2$.

It is not very soluble, as it requires for solution 16 parts of cold and 1·7 parts of boiling water. It even surpasses nitrate of potash as an oxidising agent; and if combustible substances, such as carbon, sulphur, or phosphorus, be heated or forcibly rubbed with it, a detonation or explosion occurs. This salt is employed in the manufacture of Matches (q.v.), in certain operations in calico-printing, and for filling the friction-tubes employed for firing cannon: the best mixture for these tubes consisting of 2 parts of this salt, 2 of sulphide of antimony, and 1 of powdered glass. A mixture known as *White Gunpowder*, consisting of chlorate of potash, dried ferrocyanide of potassium, and sugar, has been employed for blasting purposes, but its preparation is accompanied by so much danger that it is seldom used. This salt does not occur as a natural product, but may be obtained along with chloride of potassium by passing a current of chlorine gas through a hot solution of caustic potash. The two salts are easily separated by crystallisation, as the chlorate is comparatively insoluble, and the chloride extremely soluble. *Hypochlorite of Potash* can only be obtained in solution. Under the title of *Eau de Javelle*, it is sold as a bleaching agent. It is obtained by passing chlorine gas through a cold dilute solution of carbonate of potash, when chloride of potassium and hypochlorite of potash are formed, from which the chloride may be removed by crystallisation. The *Phosphates of Potash*, formed by the different varieties of phosphoric acid, are sufficiently noticed in the articles PHOSPHORUS and MANURE. The *Silicates of Potash* are important compounds in connection with the manufacture of glass; they also enter into the composition of Fuchs's *Soluble Glass* (see GLASS), or *Water-glass*, and have been employed as a coating by which the decay of magnesian and other limestones may be prevented. The *Chromate* and *Bichromate of Potash* are noticed in the articles CHROMIUM and CALICO-PRINTING. The haloid salts of potassium may be passed over very briefly. The *Chloride of Potassium*, KCl, is obtained in large quantity in the preparation of chlorate of potash, or may be procured by burning potassium in chlorine gas, when the result of the brilliant combustion which takes place is this salt. In its general characters it closely resembles common salt, NaCl, except that the former communicates a violet and the latter a yellow tint to the flame of alcohol. It is a constituent of sea-water, of salt marshes, and of many animal and vegetable fluids and tissues. The *Bromide* and *Iodide of Potassium* are noticed in the articles BROMINE and IODINE. *Fluoride of Potassium*, KFl, possesses the property of corroding glass. There are several sulphides, the most important being the *Liver of Sulphur*, prepared by fusing together carbonate of potash and sulphur. Besides its use in skin diseases, it is much employed by florists to prevent mildew on roses. The *Yellow* and the *Red Prussiate* (or the *Ferrocyanide* and *Ferricyanide*) *of Potash* are noticed in the article FERRIDCYANOGEN. The *Cyanide of Potassium*, KCy, may be procured by heating potassium in cyanogen gas, when brilliant combustion occurs, and the resulting product is this salt. It may, however, be more cheaply and easily prepared by fusing together 8 parts of ferrocyanide and 3 of carbonate of potassium. This salt forms colourless deliquescent crystals very soluble in water. It exhales an odour of hydrocyanic acid, and is nearly as poisonous as that acid. Its great deoxidising power at a high temperature renders it a valuable agent in many of the finer operations of metallurgy.

The following are the ordinary tests for the potassium compounds: (1) Solution of tartaric acid added in excess to a moderately strong solution of a potassium salt gives after some time a white crystalline precipitate of cream of tartar (see TARTARIC ACID). The result is hastened by stirring or shaking. (2) Solution of bichloride of platinum gives a crystalline yellow precipitate, which is a double salt of bichloride of platinum and chloride of potassium. If not previously acid, the mixture to be tested should be acidulated with hydrochloric acid. (3) The violet tint occurring in the presence of potassium in the outer flame of the blowpipe, or in the flame of spirit, has been already noticed. (4) The spectrum of a flame containing potassium exhibits a characteristic bright line at the extreme limit of the red, and another one at the opposite violet limit of the Spectrum (q.v.).

In medicine the following compounds are used: *Caustic Potash*, or *Hydrate of Potash*, KOH, which occurs in hard white pencils. From its power of dissolving the animal tissues, it is sometimes used as a caustic, although its great deliquescence renders it somewhat difficult to localise its action to the desired spot. In bites of venomous serpents, mad dogs, &c. it may be applied with advantage, and it is useful in destroying warts and fungoid growths of various kinds. *Solution of Potash*, commonly known as *Liquor potassæ*, is obtained by the process already given for the preparation of hydrate of potash. Liquor potassæ, in combination with a tonic infusion, is of service in cases of dyspepsia which are accompanied with excessive acidity of the stomach, such, for example, as often occur in habitual spirit-drinkers. It is also frequently given with the view of rendering the urine alkaline, or of diminishing its acidity in cases in which that secretion is too acid. The usual dose is ten drops, gradually increased to as much as a fluid drachm. *Acetate of Potash*, $KC_2H_3O_2$, is obtained by the action of acetic acid on carbonate of potash, and occurs in white foliaceous satiny masses. In its passage through the system it is converted into carbonate, and thus renders the urine alkaline. In small doses, as from a scruple to a drachm, it acts as a diuretic, and is of service in some forms of dropsy. Combined with other potass-salts, it is much given in acute rheumatism. The two carbonates and the sulphurated potash have been already referred to.

The *Chlorate of Potash* has come much into use as a popular remedy for sore throats. For this purpose it is usually employed in the form of compressed pellets, which are allowed to dissolve slowly in the mouth.

Potato (*Solanum tuberosum;* see SOLANUM), one of the most important of cultivated plants, and in universal cultivation in the temperate parts of the globe. It is a perennial, having herbaceous stems, 1 to 3 feet high, without thorns or prickles; pinnate leaves with two or more pair of leaflets and an odd one, the leaflets entire at the margin; flowers about an inch or an inch and a half in breadth, the wheel-shaped corolla being white or purple, and more or less veined, followed by globular, purplish fruit, of the size of large gooseberries; the roots producing tubers. The herbage has a slightly narcotic smell, although cattle do not refuse to eat a little of it, and the tender tops are used in some countries like spinach. The tubers are, however, the only valuable part of the plant.

It was long customary to speak of the potato as a native of mountainous districts of tropical and subtropical America; but it has never been clearly determined where it is really indigenous, and where it has spread after being introduced by man. Humboldt doubted if it had ever been found truly wild; but subsequent travellers, of high scientific reputation, express themselves thoroughly satisfied on this point. It has been rendered certain that long before the Spaniards reached the New World the potato was cultivated by the Incas and other Andean nations. It seems to have been first brought to Europe by the Spaniards, from the neighbourhood of Quito, in the beginning of the 16th century, and to have spread from Spain into the Netherlands, Burgundy, and Italy, but only to be cultivated in a few gardens as a curiosity, and not for general use as an article of food. It is said to have been brought to England from Virginia by Sir John Hawkins in 1563; and, again, in 1586 by Sir Francis Drake, to whom indeed a statue, as the introducer of the potato, was erected at Offenburg, in Baden, in 1853. Anyhow, it cannot have attracted much notice; and though Raleigh is believed to have planted potatoes both at his Devonshire birthplace Hayes, and on his Munster estates, it was a long time before they began to be extensively cultivated. It long received throughout almost all European countries the same name with the Batatas or Sweet Potato (q.v.), which is the plant or tuber meant by English writers down to the middle of the 17th century in their use of the name potato. Gerard, in his *Herball*, published in 1597, gives a figure of our potato under the name of *Batata Virginiana;* but so little were its merits appreciated that it is not even mentioned in the *Complete Gardener* of Loudon and Wise, published more than a century later, in 1719; whilst another writer of the same time says it is inferior to skirret and radish! It began, however, to be imagined that it might be used with advantage for feeding 'swine or other cattle,' and by-and-by that it might be useful for poor people, and for the prevention of famine on failures of the grain-crops. The Royal Society took up this idea, and in 1663 adopted measures for extending the cultivation of the potato, in order to the prevention of famines. To this the example of Ireland in some measure led, the potato having already come into cultivation there to an extent far greater than in any other European country, and with evident advantage to the people. From Ireland the cultivation of the potato was introduced into Lancashire about the end of the 17th century, soon became general there, and thence spread over England; so that before the middle of the 18th century it had become important as a field-crop, which it became in the south of Scotland some twenty or thirty years later, about the same time in Saxony and some other parts of Germany, but not until the later part of the century in some other parts of Germany and in France. In France the potato was long supposed to cause leprosy and fevers, and the extension of its culture was mainly due to the exertions of Parmentier (1778). In Prussia Frederick the Great took an interest in it, and promoted it by compulsory regulations.

The potato is of great importance as affording food both for human beings and for cattle; and next to the principal cereals is the most valuable of all plants for human food. It is also used for various purposes in the arts. No food-plant is more widely diffused; it is cultivated in subtropical countries, and struggles for existence in gardens even within the Arctic Circle, yielding small and watery tubers, although the effects of late spring frosts, or early autumnal frosts, upon its foliage often prove that it is a plant properly belonging to a climate milder than that of most parts of Britain. No more important event of its kind has ever taken place than the general introduction of potato culture into the husbandry of Britain and other European countries. It has exercised a beneficial influence on the general welfare of the people, and has increased the national wealth, notwithstanding the occasional occurrence of famine and distress (notably in the years 1846 and 1847) in Ireland and elsewhere from the failure of the crop. The results —due mainly to excessive and imprudent cultivation of the potato—confirmed two great laws, that plants long very extensively or almost exclusively cultivated in any district, however successfully they may be cultivated for a time, are sure to fail at last; and that the exclusive, or almost exclusive, dependence of a people on one source or means of support is unfavourable to their welfare in respect to all their interests.

Humboldt calculates that the same extent of ground which would produce thirty pounds of wheat would produce one thousand pounds of potatoes. But potatoes are not nearly so nutritious as wheat, and the constant employment of them as the chief article of food is not favourable to the development of the physical powers, and is consequently in its protracted influence unfavourable to mental energy. All this is too well illustrated in Ireland and the Highlands of Scotland, in a race capable of the highest development. It is calculated that 100 parts of good wheat-flour, or 107 parts of the grain, contain as much actual nutriment as 613 parts of potatoes. The inferiority of the potato in nutritious power is very much owing to the comparatively small quantity of nitrogenous substances which it contains, in consequence of which it is most advantageously used along with some very nitrogenous article of food, in Britain generally with animal food, in some parts of Europe with curds or with cheese. The potato tuber, in a fresh state, contains about 71 to 80 per cent. of water; 15 to 20 of starch, 3 to 7 of fibre or woody matter, 3 to 4 of gum, dextrine, and sugar, and 2 of albumen, gluten, and casein. There are considerable differences, however, in different varieties, in different stages of maturity, and in different soils and seasons.

Potatoes are used, both raw and boiled, for the feeding of cattle. For human food they are variously prepared by roasting or boiling, but now chiefly by boiling, a process by which they are freed from all that is narcotic and noxious in their juice. The water in which potatoes have been boiled is not wholesome, and those modes of preparing them for the table which do not admit of its complete rejection ought to be avoided.

The herbage or haulm of the potato has been used for making paper, but the results were not encouraging. The berries are sweetish, but not pleasant; they are nauseous when fermented, but yield by distillation a tolerable spirit.

The varieties of the potato in cultivation are extremely numerous—500 were exhibited at the Westminster Tercentenary Exhibition (1886). Any enumeration or classification of them is impossible. New ones are continually appearing, and old ones passing away. Those most advantageously cultivated in particular soils and climates are often found to degenerate when removed to a small distance. Potatoes differ considerably in the character of their herbage—which is sometimes erect, sometimes straggling—and in the size and colour of their flowers, but are more generally distinguished by the size, form, and colour of their tubers, which are round, long, or kidney-shaped, white, red, dark purple, variegated, &c.

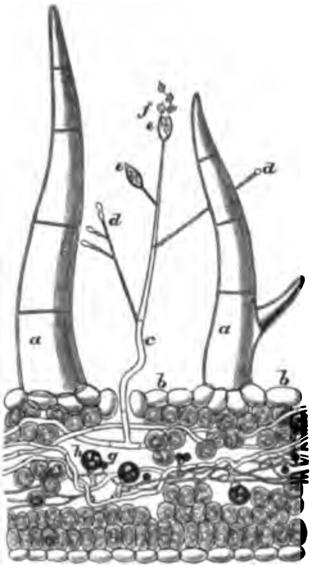
New varieties of potato are produced from seed; but potatoes are ordinarily propagated by planting the tubers, or cuttings of the tubers, each containing an *eye* or bud. Much has been written by gardeners and agriculturists on the comparative advantages of planting whole tubers or cuttings; but the latter method generally prevails.

Potatoes are planted in drills, made either by the spade or plough, or in *lazy beds*, which are always made by the spade, and are beds in which the sets of potatoes are covered over with earth dug out of the alleys. The alleys serve, although imperfectly, for drains in undrained land. The cultivation of potatoes as a field-crop seems to have been first attempted in lazy beds. They are still common in many parts of Ireland, but are now scarcely ever seen in England or Scotland. They are very suitable for strong, heavy, and somewhat moist land, and are profitably used in reducing some kinds of soil to cultivation, but are generally unsuitable for field-culture, owing to the expense of labour required. In strong, heavy land potatoes are cultivated in raised drills; in lighter and drier soils the raising of the drills is unnecessary. Manure is invariably given, consisting generally of farmyard dung and artificial manures. Common dressings consist of from fifteen to twenty-five tons of dung per acre, with from five to ten cwt. of artificial manure, such as guano, dissolved bones, superphosphate, a little potash, and perhaps nitrate of soda or salts of ammonia instead of guano. The cultivation of potatoes, after they are planted, whether in the field or garden, consists chiefly in keeping the ground clear of weeds, and in earthing up the plants, to promote the formation of tubers. Potatoes are taken up by the fork, by turning over the drills with the plough, or by an implement specially designed for the purpose, known as a potato-raiser. Where the crop is grown extensively this implement is now almost universally used, and performs its work expeditiously and thoroughly. Garden potatoes are generally used long before they are really ripe, forming a favourite dish in a very unripe state, when they are far from being a safe article of food, and contribute not a little to the prevalence of cholera and kindred diseases in summer. In recent years the growing of early potatoes for use in the large towns has been prosecuted to a large extent and with much success on the coast of Ayrshire and other similar parts favoured with a genial climate. To facilitate this the seed is forced in small boxes in which it is placed over winter, and from which it is taken in spring when the shoots are 2 to 4 inches long and planted in well-manured drills. Potatoes from seed thus prepared may be dug about three weeks earlier than if the seed had not been sprouted. The main field-crop is allowed to ripen thoroughly, and is capable of being stored for winter and spring use. The planting of potatoes in the open air cannot be successfully practised in most parts of Britain before February or March, and in many seasons the later-planted are found as early as the earlier-planted, and more productive. The storing of potatoes is variously accomplished in dry lofts or sheds, in airy cellars or barns, and in *pits*, which are sometimes holes excavated to a small depth in the earth, with the potatoes piled up above the surface of the ground, in a conical, or in a roof-like form, sometimes mere heaps of one or other of these forms upon the surface of the ground, and covered with straw and earth to keep out light and frost. Potato-pits should always be well ventilated by means of pipes or otherwise, as without ventilation the potatoes are apt to heat and sprout. Potatoes taken from the ground before they are quite ripe are extremely apt to heat and sprout.

The potato crop is now an important one in almost all the rotations practised in Britain, although its cultivation is in most districts not quite so extensive as before its failure from the *potato disease* in 1845 and subsequent years, and farmers are more careful not to depend too much upon it. It very commonly succeeds a grain-crop, but sometimes is advantageously planted on land newly broken up from grass.

But, besides its value as a culinary vegetable, the potato is important in other respects. Its starch is very easily separated, and is in large proportions; hence it is cheaper than any other kind. It is manufactured on a very large scale. It is chiefly used in textile manufactories under the name of *farina*, which is converted into dextrine or British gum (see STARCH). In Holland and in Russia, where there is much difficulty in keeping potatoes through the winter, and there is consequently a necessity for using the crop quickly, large quantities of starch are made, and this is converted into sugar or syrup (see SUGAR). The refuse of the starch-manufactories is all utilised; it is pressed out from the water, and used either for pig-feeding or for manure. In the north of Europe much spirit for drinking is made from potatoes; it is called Potato-brandy.

The potato is subject to several diseases, the chief of which is that serious fungous affection now commonly known as the *potato disease*. This disease was first observed in Germany; the earliest known outbreak of a grave character occurred at Liége in 1842. It broke out in Canada in 1844, and at once proved very destructive. In the following year it made its appearance in the British Isles, having been first observed in the Isle of Wight. Its ravages in Ireland in 1846 and 1847 brought a terrible famine upon the small farmers of that country, and at frequent intervals since it has caused great loss in the potato crop.



Section of potato leaf, lower surface uppermost, showing *a,a*, hairs of the plant; *b,b*, epidermal cells; *c*, hydra, or thread of the fungus *Phytophthora infestans*; *d,d*, conidia or bud spores; *e,e*, zoospores; *f*, zoospore bursting to liberate the zoogonidia; *g*, antheridia or male portion, and *h*, oogonia or female portion, of a fungus in the central tissue of the leaf, but whether portions of the Phytophthora, as once asserted, or of another fungus, Pythinur, is doubtful (*Gardener's Chronicle*, 1891).

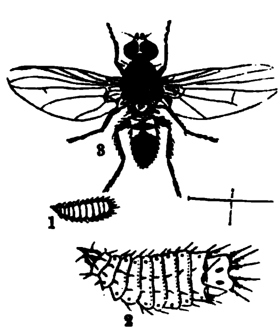
It has been proved beyond doubt that a particular fungus always accompanies this peculiar and destructive disease. The point is still doubted by some, but it is now very generally believed that this fungus is the main cause of the disease. This mysterious fungus, *Phytophthora infestans*, runs through a strange life-cycle every year, and is by no means easily kept at bay. It is believed that, except in temperatures below 40° and above 77° F., it is always present, ready to pounce upon a weak potato-plant, and liable to develop into an epidemic should the climatic conditions be favourable to fungus-life. These conditions are damp, dull, calm weather, and a moist or wet soil, enveloped in mists morning and evening. The fact that the fungus is unable to bear a temperature above 77° or below 40° is of practical importance. The tomato is also subject to the attacks of the Phytophthora, but the ravages of the fungus may be stopped by raising the temperature of the tomato-house to over 77° F. On the potato crop the fungus generally makes its appearance about the third week in July, almost invariably beginning its attack in the leaves of the potato-plant. There it is first seen in a delicate white bloom, accompanied by dark blotches, caused by the spawn of the fungus having pierced the leaf and set up putrefaction. With favourable climatic conditions it will now develop with great rapidity—a single germ multiplying ten thousand times in a few days in a temperature from 60° to 68° F. The fungus ramifies throughout the leaves, blasting them as it proceeds, and causing an offensive odour which is now unfortunately familiar to the farmer. The spores of the fungus are so light and fine that they float through moist air, and are carried about and spread from one patch of potatoes to another by insects and birds. From the leaves the germs spread to the leaf-stalks, the stems, and the tubers. The spawn readily pierces the skin of the tuber, consuming or rotting the cells, and corroding the starch, and ultimately reducing the potato to a black mass of rottenness. In this last stage of its yearly course of destruction the fungus provides means of continuing its curious life. It produces some kind of 'resting-spores,' which, possessed of amazing vitality, lie dormant during winter and spring, and carry on the disease to the crop of the succeeding year, which in its turn passes the fungus through another round of its mysterious life, to be handed on again from crop to crop as before. There is still uncertainty as to the precise character of these spores; but, be what they may, their tenacity of life is great.

Of the many remedial measures that have been tried, the following have been found most useful in preventing or mitigating the onslaught of the fungus: (1) Earthing up the drills with a deep covering of earth, with the view of preventing the fungus from passing down the stem, or through the soil to the tubers; (2) cutting off the diseased potato-tops before the fungus reaches the tubers; (3) removing and burning all dead and decaying potato stems, leaves, and tubers, especially after a crop which has been attacked by the disease; (4) planting varieties which have been known to be exceptionally successful in resisting the disease; (5) growing the potato crop under such general cultural, sanitary, and manurial conditions as will ensure to the fullest extent possible the healthy and vigorous development of the crop; (6) careful selecting and storing of potatoes to be used as seed; and (7) dressing the potato-tops, both before and after the appearance of the disease, with sulphate of copper. No certain prevention or absolute remedy has as yet been discovered, but all these measures have been carried out with advantage. The discovery of the copper remedy is likely to be of great importance to potato growers. This is the mixture—about 3 to 6 parts of sulphate of copper and quicklime to 100 parts of water—which proved so effectual in combating the allied parasite fungus, *Peronospora infestans*, that attacks the vines, and there is good reason to believe that it will be almost equally successful in averting the potato disease. It is well known that a vigorous variety of potatoes grown under conditions favourable to its healthy development is most successful in resisting the fungus. It is with the potato as with a human being—deprive it of wholesome food and healthy sanitary surroundings, and disease will speedily ensue. The prevalence of this particular disease in recent years is a sure indication of a deterioration in the constitutional vigour of the cultivated potato. The other diseases from which the potato crop is liable to suffer are *Curl*, *Scab*, *Dry Rot*, *Wet Rot*, and a fungus known as *Peziza postuma*. *Curl* is a disease affecting the foliage and general health of the potato-plant, and does not seem to be necessarily connected with the presence of any vegetable parasite or insect enemy.—*Scab* is a disease of the tubers, which become covered with brown, oblong, and finally confluent and cup-shaped spots, whilst under the surface is a powdering of minute olive-yellow grains, a fungus called *Tubercinia scabies*, of the division Hyphomycetes.—*Dry Rot* is also ascribed to the growth of a fungus of the same order, *Fusisporium solani*, and attacks the tubers either when stored for winter or after being planted. It was first observed in Germany in 1830, and caused great loss in that country throughout many years. The tissues of the potato-tuber become hardened and completely filled with the mycelium of the fungus, which at last bursts forth in little cushion-shaped tufts loaded with fructification.—*Wet Rot* differs from dry rot in the tubers becoming soft and rotten instead of hard and dry, and is always characterised by the presence of a fungus referred by Fries to his genus Periola, but which Berkeley regards as another form or stage of the same fungus which causes or is inseparably connected with dry rot. Both dry rot and wet rot have often been observed along with the *potato disease*, which, however, is always characterised by the presence of another peculiar fungus.—*Peziza postuma* has occasioned heavy losses, chiefly in Ireland, by destroying the leaves before the crop has matured. See books on potato-culture by Pink (1879), Cox (1880), Fremlin (1883), and Ward (1891), and on the potato-blight by Bravender (1880).

Potato, SWEET. See SWEET POTATO.

Potato-beetle. See COLORADO BEETLE.

Potato-fly (*Anthomyia tuberosa*), a dipterous insect of the same genus with the Radish-fly, Cabbage-fly, Turnip-fly, &c. In its perfect state it is very like the House-fly. The maggots are often abundant in bad potatoes in autumn, and are different from the maggots of the House-fly, being horny, spiny, bristly, and tawny; the long tail ending in six long bristles. The pupa is very like the larva.



Potato-fly (*Anthomyia tuberosa*): 1, Larva, or maggot, natural size; 2, larva magnified; 3, Potato-fly.

The Potato-frog Fly (*Euteryx solani*, Curtis) and the caterpillar of the Death's-head Moth (*Acherontia atropos*, Linn.) feed on the leaves and stems of potatoes, but rarely do serious damage.

Potchefstroom, a town in the south of the Transvaal, South Africa, 105 miles SW. of Pretoria. Pop. 2000.

Potemkin, GREGORY ALEXANDROVITCH, the most celebrated of the Empress Catharine II.'s favourites, was born near Smolensk on 16th September 1736, the descendant of a noble but impoverished Polish family. Having entered the Russian army, he managed (1762) to attract the notice of the czarina by his handsome face and athletic figure; he was attached to her household, and in 1774 was preferred as her recognised favourite. From 1776, when the Emperor Joseph of Austria made him a prince of the Holy Roman Empire, till the year of his death he was the director of the Russian policy in Europe. It was at his instigation that the khan of the Crimea put himself (1783) under Russian protection. Four years later Catharine paid a visit to his government in the south, and the 'hoax' which he then played off on his sovereign is described by De Ségur (*Mémoires*). He caused an immense number of wooden painted houses to be constructed, and grouped into towns and villages along the route the czarina was to take, and hired people to act the part of villagers, merchants, tradesmen, and agriculturists, engaged in their various pursuits. The czarina's vanity was hugely gratified at the seeming improvements of the country under her rule, and she covered Potemkin with titles and honours. Almost immediately after this a war broke out with the Turks, and Potemkin was placed at the head of the army, with Suwaroff serving under him. Otchakoff was taken after a terrible siege, and Suwaroff won the great fights of Bender and Ismail—of all of which Potemkin reaped the credit when he entered St Petersburg in triumph in 1791. That same year he was seized with sudden illness whilst travelling between Jassy and Otchakoff, and died October 15, and was buried at Kherson. He was a man of considerable ability in court intrigue and statesmanship; his skill as a general has been both affirmed and denied. Personally he was licentious, coarse in his habits, and utterly tyrannical and unscrupulous; in spite of his lavish extravagance he heaped up an immense fortune.

See *Memoirs* (Lond. 1812), and the Life in German by his secretary Saint-Jean (new ed. Karlsruhe, 1888).

Potential, in dynamical science, is a quantity of peculiar importance. Its value, as a mathematical function in the theory of attraction, was recognised by Laplace in the *Mécanique Céleste*. The name was, however, given by George Green (1793–1841) in 1828, when its broad dynamical significance was for the first time explicitly stated and powerfully developed. The theory of the potential, in fact, is co-extensive with the dynamics of what are known as *Conservative* systems. When such a system is made to pass from one configuration to another, the work done against the forces of the system depends only upon the initial and final configurations, and in no way upon the particular series of changes by which the passage is made. For instance, the work done against gravity in lifting a given mass to a height of 500 feet is exactly the same whether the mass is lifted vertically up, by a balloon, say, or more laboriously taken up the gentle slope of a hill. The earth and the mass form, so far as gravitation is concerned, a conservative system. Practically, however, in dragging a mass up a slope a certain amount of work, greater or smaller according to circumstances, must be done against friction, and this will depend upon the character of the course taken. We know that the work so done is lost and cannot be recovered in dynamic form (see ENERGY). These forces are in short dissipative, and so far as their action is concerned the system is not conservative, and the theory of the potential does not apply. A little consideration will show that when the forces are functions of distances only the system will be conservative. Such forces then have a potential; and, although this does not exhaust all types of force-systems which have a potential, it includes all that are certainly known to occur in nature around us. The force of gravitation and the force between electrified or magnetised bodies evidently belong to the category just described. In all such cases the potential at any point in the field of force is a definite function of the position, a mathematical expression having for any particular case a definite value, such that the difference of the potentials of two points measures the work done in carrying unit quantity (of matter, electricity, magnetism, &c.) from the one point to the other (see ELECTRICITY for some further properties of the potential). If we take the two points very close to each other, we see at once that the small difference of the potentials must equal the product of the average force into the corresponding small distance. Thus, in the notation used in the article Calculus (q.v.), we have $\Delta V = S \Delta s$, where V is the potential, S the force, and Δs the small distance. Hence $S = dV/ds$ or the force in any direction is numerically equal to the rate of change of the potential per unit-length in that direction. When the potential is known a simple differentiation in any chosen direction gives the force in that direction. It is obvious that other directed quantities besides forces may be expressible as the differential coefficients of a single non-directed or scalar quantity. Thus, in the mathematical theory of Hydrodynamics (q.v.) a very important distinction is made between motions which have a velocity-potential and motions which have not. In the former the velocity can be represented as a space differentiation of a scalar quantity; in the latter it cannot. See VORTEX for an account of fluid motion, which has no velocity-potential.

Potentilla, a genus of plants of the natural order Rosaceæ, sub-order Potentilleæ, differing from Fragaria (Strawberry) in the fruit having a dry instead of a succulent receptacle. The species are very numerous, natives chiefly of northern temperate regions, and some of them of the coldest north; most of them perennial herbaceous plants, with yellow, white, red, or purple flowers, and pinnate, digitate, or ternate leaves. They are often called Cinquefoil (Fr., 'five-leaved'); and some of the species are favourite garden flowers. A few are natives of Britain; one of the rarest of which is a shrubby species (*P. fruticosa*), forming a large bush, with pinnate leaves, and a profusion of yellow flowers, often planted in shrubberies. *P. reptans*, a common British species, with creeping stems, digitate leaves, and yellow flowers, once had a high reputation as a remedy for diarrhœa, from the astringent property of its root, of which most of the species partake with it. But *P. anserina*, a very common British species, popularly known as Silverweed, having creeping stems, yellow flowers, and pinnate leaves, which are beautifully silky and silvery beneath, has an edible root, with a taste somewhat like that of the parsnip. Swine grub it up with avidity, and it was once much esteemed as an article of food in some parts of Scotland, particularly in the Hebrides, where it abounds and has been a resource in times of famine. —The name potentilla is said to be derived from the Latin *potens*, 'powerful,' and to allude to medicinal virtues now known to merit little regard. Tormentil (q.v.) is sometimes referred to this genus.

Potenza (anc. *Potentia*), a town of South Italy, ensconced in a valley of the Apennines, 103 miles E. by S. of Naples. It is surrounded by a wall, has a fine cathedral, and disused fortifications. Potenza was shaken by earthquakes in 1273, 1694, 1812, and 1857. Pop. 17,978.—The *province* of Potenza, called Basilicata until 1871, has an area of 3998 sq. m. and (1889) a pop. of 556,309.

Pot-herbs are not, as might be supposed from the name, the vegetables chiefly used for culinary purposes, as supplying articles of food, but rather those which are of secondary importance, and valuable chiefly for flavouring, as parsley, fennel, &c.

Pot-holes. See GIANTS' KETTLES.

Poti, a seaport of Russian Caucasus, stands at the mouth of the river Rion, on the eastern shore of the Black Sea, 200 miles by rail W. of Tiflis. Here maize (£242,000), manganese (£85,000), &c. are shipped to the annual value of £366,000. The imports do not exceed £2000. Poti was seized by Russia in 1828. Pop. 3112.

Potidæa, a Corinthian colony founded on the westernmost isthmus of the Chalcidice peninsula in ancient Macedonia. By its revolt from the Athenian League (432 B.C.) it brought on the Peloponnesian war; it was besieged and taken by the Athenians (429 B.C.). The Athenian colony which was then settled there was destroyed by Philip of Macedon (356 B.C.). Cassander built up a new town, and called it Cassandria; this flourished greatly until it was captured and sacked by the Huns.

Pot-metal. Tap and pot metals are alloys of copper and lead. The proportions of the two metals vary from equal parts of each to 1 of copper and 10 of lead.

Poto'mac, a river of the United States, formed by two branches which rise in the Alleghany Mountains in West Virginia, and unite 15 miles SE. of Cumberland, Maryland, from which point the river flows in a generally south-easterly course 400 miles, and falls into Chesapeake Bay, after forming an estuary nearly 100 miles long, and from 2½ to 7 miles wide. The largest ships can ascend to Washington, and the tide reaches Georgetown. A few miles above Washington the river forms a cataract 35 feet high; and between there and Westport it falls more than 1000 feet. The scenery in this portion of its course is wild and beautiful, especially where it breaks through the Blue Ridge at Harper's Ferry. Its principal affluents are the Shenandoah, Cacapon, and Monocacy. The Potomac forms the greater part of the boundary between Virginia and Maryland.

Potoroo, or KANGAROO RAT (*Hypsiprymnus*), a genus of marsupials, related to kangaroos. None of the species are larger than rabbits. They feed on roots, for which they dig with their fore-feet. Two other genera, Bettongia and Æpiprymnus, are nearly related.

Potosí, Bolivia, capital of a department of the same name, and one of the most famous mining-towns of South America, stands in a barren district, nearly 50 miles SW. of Chuquisaca. It is built on the side of the Cerro de Potosí (15,381 feet), at an elevation of 13,000 feet above the sea, and is thus one of the loftiest inhabited places on the globe. The town has a circumference of some 4 miles; but fully one-half is composed of tottering and ruined buildings, uninhabited and desolate, and the whole place, with its squalor, dilapidation, and dirt, presents a sinister aspect. The public buildings include a handsome cathedral and a mint which employs 200 hands; and the reservoirs are also worthy of mention. The streets are steep and narrow, and there are no wagons or carriages, but only llamas and mules. The climate is very trying: all the four seasons may be experienced in one day, but usually it is bitterly cold, owing to the elevation and to the mountains all round, from which the snow scarcely ever melts. Yet is Potosí one of the principal commercial towns of Bolivia. English and French manufactures are imported; and, as the country in the vicinity produces little or nothing, all supplies have to be brought from a distance. The industry of the place is limited to silver-mining. The Cerro is still rich in this ore, although the production, owing to the exhaustion of the mines near the summit, and the frequent inrush of water in those worked at a lower level, has greatly fallen off. Potosí was founded in 1545, and in 1611 had 160,000 inhabitants. Its population does not now exceed 12,000.—The *department*, a plateau country, rich in minerals and cattle, has an area of 54,300 sq. m. and a pop. (1892) of 360,400. It is second in pop. of the Bolivian departments.

Pot-pourri (Fr.), the name of a mixture of sweet-scented materials, chiefly flowers, dried, and usually placed in a vase with a perforated lid, in order that their perfume may be diffused through rooms in which it is placed. The principal ingredients are rose-petals, lavender flowers and stalks, violets, jessamine-flowers, woodruff-leaves, cloves, orris-root, pimento, musk, sandalwood-raspings, cedar-shavings, &c. But it also, and originally, signifies a dish of different sorts of viands, and corresponds in this sense to the *Hotch-potch* (q.v.) of Scotland and the *Olla Podrida* (q.v.) of Spain. In Music the name is used for a selection of popular pieces strung together without much arrangement—a kind of medley.

Potsdam, chief town of the Prussian province of Brandenburg, and second residence town of the royal family of Prussia, is situated on an island beside the lake-like river Havel, 18 miles by rail SW. of Berlin. It is a handsome city, with broad streets, public gardens, adorned with statues of Prussian soldiers, and fine squares. The royal palace (1667–1701), in the park of which are statues of Frederick-William I., Alexander I. of Russia, and Generals Blücher, Gneisenau, Kleist, and Tauenzien; the town-house, a copy of that at Amsterdam; and the military orphanage are the finest of the public buildings. The garrison church, with a steeple 290 feet high, contains the tombs of Frederick-William I. and Frederick II.; and the Friedenskirche the tombs of Frederick-William IV. and the Emperor Frederick III. The Brandenburg Gate is a copy of Trajan's Arch at Rome. In the immediate neighbourhood of the town are more than half-a-dozen royal palaces, as Sans-Souci (1745–47), the favourite residence of Frederick the Great, surrounded by a splendid park and gardens, containing Rauch's monument to Queen Louisa and other structures; the palace of Friedrichskron, formerly the New Palace (1763–70), with nearly 200 rooms, many of which contain costly works of art; Charlottenhof, built by Frederick-William IV. in 1826; the Marble Palace, the summer residence of the Emperor William II.; and Babelsberg, the private property of the same prince. Potsdam has an observatory, and a cadet and other military schools. Its manufactories produce sugar, chemicals, harness, silk, waxcloth, beer, &c. Flower-gardening, especially of violets, is a busy industry. Alexander von Humboldt was a native. Pop., including the garrison (1890), 53,727. Potsdam owes its creation as a town to the Great Elector, Frederick-William, and to Frederick II. Prior to that period it was a fishing-village, built on the site of an ancient Slav settlement. See German works by Kopisch (1854), A. R. (1883), and Sello (1888).

Potsdam Beds, a name given in North America to the uppermost division of the Cambrian or Primordial strata.

Potstone, *Lapis Ollaris* of the ancient Romans, a massive variety of talc-schist, composed of a finely-felted aggregate of talc, mica, and chlorite. It is generally of a grayish-green colour, sometimes dark green. It occurs massive, or in granular concretions. It is soft and easily cut when newly dug up, greasy to the touch, and infusible even before the blowpipe. It becomes hard after exposure to the air. It is made into pots and other household utensils, which communicate no bad taste to anything contained in them, and when greasy are cleaned by the fire. It was well known to the ancients; and Pliny describes the manner of making vessels of it. It was anciently procured in abundance in the isle of Siphnos (Siphanto), one of the Cyclades, and in Upper Egypt. Large quarries of it were wrought on the Lake of Como, from about the beginning of the Christian era to 25th August 1618, when they fell in, causing the destruction of the neighbouring town of Pleurs, in which it was wrought into culinary vessels, slabs for ovens, &c. It is quarried in the Valais, Moravia, Norway, Sweden, Greenland, near Hudson Bay, &c.

Pott, August Friedrich, a great philologist, was born at Nettelrede in Hanover, 14th November 1802. He studied philology at Göttingen, habilitated at Berlin in 1830, in 1833 became extraordinary, in 1839 ordinary professor of the Science of Language in the university of Halle. Next to W. Humboldt, Bopp, and Grimm, the name of Pott stands prominent in the new science of comparative philology. The foundation of Pott's reputation was securely laid by his *Etymologische Forschungen auf dem Gebiet der Indogermanischen Sprachen* (2 vols. 1833–36; 2d ed. 6 vols. 1859–76), a work second in importance only to Bopp's *Comparative Grammar.* His well-known article 'Indogermanischer Sprachstamm,' in Ersch and Gruber's *Encyklopädie,* is a masterpiece of condensation, and for once of order. For his besetting fault was a lack of order and perspicuity, which made Ascoli compare his books to the plain of Shinar after the confusion of Babel had taken place. But no student ever brought to his studies a loftier spirit of devotion, or collected more massive materials for the foundation of a new science. So thorough was his treatment that all the progress of learning since has not stripped the value from his books on the Gypsies, on Personal Names, on Numerals, his essays on Mythology, African Languages, or General Grammar. He died at Halle, 5th July 1887, working to the last.

His most important books, besides those already named and countless articles and papers in the learned journals, are *De Borussico-Lithuanicæ tam in Slavicis quam in Letticis Linguis Principatu* (1837–41); *Die Zigeuner in Europa und Asien* (2 vols. 1844–45); *Die Quinare und Vigesimale Zählmethode bei Völkern aller Welteile* (1847); *Die Personennamen* (1853); *Die Ungleichheit der menschlichen Rassen, hauptsächlich vom Sprachwissenschaftlichen Standpunkt* (1856); *Doppelung als eins der wichtigsten Bildungsmittel der Sprache* (1862); *Anti-Kaulen, oder mythische Vorstellungen vom Ursprung der Völker und Sprachen* (1863); and *Die Sprachverschiedenheit in Europa, an den Zahlwörtern nachgewiesen* (1868).

Pottawattamies, a tribe of American Indians, belonging to the Algonquin stock. The early French settlers established a mission amongst them at Green Bay, and to this day many of them are Roman Catholics. They sided with the English both during the Revolution and in the war of 1812, and afterwards settled in Kansas, where one band of over 400 now live in houses and cultivate the ground. Another band, nearly 500 strong, is on a reservation in the same state, under the care of the Society of Friends.

Potter, John, D.D., an English scholar and divine, the son of a linen-draper of Wakefield, in Yorkshire, was born in 1674, studied with great diligence and success at Oxford, where he took his degree of M.A. in 1694, and in the same year received holy orders. He was appointed chaplain to Queen Anne in 1706, professor of Divinity at Oxford in 1708, Bishop of Oxford in 1715, and finally in 1737 attained the highest dignity in the English Church—the archbishopric of Canterbury. He died 21st October 1747, and was buried at Croydon. Potter's principal work is his *Archæologia Græca* ('Antiquities of Greece,' 2 vols. 1698), not superseded until the appearance of Dr W. Smith's *Dictionary of Greek and Roman Antiquities;* besides which, however, we may mention his edition of *Lycophron* (1697) and of *Clemens Alexandrinus* (1715).

Potter, Paul, the greatest animal-painter of the Dutch school, was born at Enkhuizen in 1625, and was the pupil of his father, Pieter Potter, a landscape-painter, with whom in 1631 he came to Amsterdam. He was also an excellent etcher, and so precocious that his best etched pieces, 'The Herdsman' and 'The Shepherd,' were finished in 1643 and 1644 respectively. He established himself at the Hague in 1649, where next year he married the daughter of an architect, but in 1653 he returned to Amsterdam. He died there in January 1654 at the untimely age of twenty-nine. His best pictures are pastoral scenes with animal figures, the life-size 'Young Bull' (1647, at the Hague) being especially celebrated. His 'Dairy Farm,' measuring only 19½ by 48½ inches, was sold in London on 27th June 1890 from the Stover collection for £6090, or £13 per square inch. The Rijks Museum at Amsterdam possesses the 'Bear-hunt' and seven other pictures from his easel. Very many of his productions are preserved in England.

See *P. Potter, sa Vie et ses Œuvres*, by Van Westrheene (the Hague, 1867), and Cundall, *Landscape Painters of Holland* ('Great Artists' series, 1891).

Potteries, The, a district in North Staffordshire, 9 miles long by 3 broad, the centre of the earthenware manufacture in England, includes Hanley, Burslem, Stoke-upon-Trent, Newcastle-under-Lyme, Tunstall, and other towns.

Pottery. This term, derived through the French *poterie* from the Latin *potum*, 'a drinking vessel,' is applied to all objects of baked clay. Pottery may be said to be almost contemporaneous and co-extensive with mankind; it is found with the remains of our remotest ancestors, and it is fashioned amongst the rudest of present day tribes. The art in its rudimentary condition—merely moulding wet clay into the desired form, and submitting it to the hardening heat of the sun or of fire—is so simple as to be within the capacity of the least tutored savage. The universality of the primitive art, and the many different lines along which it progressed, preclude the possibility of tracing its history in chronological sequence, and only a few of its more important developments can be noticed in the historical section.

Pottery as known at the present day is distinguished into many classes according to the nature and purity of the clay employed, the heat to which it has been exposed in firing, the glazes or enamels with which it has been covered, and the coloured or other ornamental treatment of its surface. Briefly, as regards material and baking it may be divided into (1) earthenware, which, exposed to a comparatively low heat, remains earthy in texture and can be scratched with a steel point; (2) stoneware, fired at a high heat, hard, dense, compact, and not scratched by the knife; and (3) porcelain, fired at the highest temperature, semi-fused and vitreous in structure, and, when sufficiently thin, translucent. Earthenware again may be subdivided according to the manner in which its surface is treated, being either (1) plain, as in an ordinary flowerpot; (2) lustred, as in the black surfaced pottery of ancient Greece; (3) glazed or coated with a transparent glass or varnish; and (4) enamelled or coated with an opaque white or coloured glass, which completely conceals the body over which it is spread.

Manufacture.—The dough-like condition into which clay can be worked with water, and the hardness and indestructibility it acquires by burning, are the qualities upon which the potter's art essentially depends. Clay is one of the most abundant of substances, but it is of many qualities and degrees of purity. The commonest brick clays are so coarse in texture and so impregnated with iron and other foreign ingredients that they can be used only for bricks, tiles, and the very coarsest kinds of pottery. The purest potters' clay, known as china-clay or Kaolin (q.v.), is formed by the decomposition of granitic rocks. It consists essentially of the hydrated silicate of alumina with small proportions or traces of one or more of lime, potash, soda, and magnesia. The finest china-clay of Great Britain is found in Cornwall, where it was discovered at Carclaze, 2 miles NE. of St Austell, between 1755 and 1758 by William Cookworthy. Cookworthy's discovery was of the utmost importance for the home manufacture of porcelain and fine pottery; and the development of the industry which took place under Josiah Wedgwood and others was due in no small measure to the fine material which thus became available to them. Commoner potters' clay or pipeclay is obtained principally from Poole in Dorsetshire. The materials used for the paste or body of typical varieties of porcelain and pottery are as follows: (1) *Porcelain.*—At Sèvres, kaolin, 48 parts; sand (pure white), 48 parts; chalk, 4 parts. At Dresden, kaolin, 62 parts; felspar, 26 parts; broken biscuit-porcelain, 2 parts. At Berlin, kaolin, 76 parts; felspar, 24 parts. In England three mixtures are used: for common china, ground flints, 75 parts; calcined bones, 180 parts; china-clay, 40 parts; clay, 70 parts. For fine china, ground flints, 66 parts; calcined bones, 100 parts; china-clay, 96 parts; Cornish granite, 80 parts. Fine, for modelling figures, &c., Lynn sand, 150 parts; calcined bones, 300 parts; china-clay, 100 parts; potash, 107 parts. The glazes require to be varied for nearly all, so that their fusibility may be greater or less, according to the more or less fusible character of the biscuit ingredients. (2) *Stoneware*, such as is used for jars, bottles, drain-pipes, &c., is made of several kinds of plastic clay, mixed with felspar and sand, and occasionally a little lime, but the materials vary much in different localities. (3) *Earthenware*, called also *Faience* or *Delft*, is made of various kinds of clay, varying in colour from yellow to white, according to the quality required; and more or less of powdered calcined flints are mixed with it, to give it body and hardness. Sometimes, as in porous vessels, only clay is used.

The use of calcined flint was first adopted by a Burslem potter named John Astbury, who in 1720 noticed the fine white character of a powder applied to the eyes of his horse for the cure of some ailment. He learned that the powder was made from calcined flint, and thereon he conceived the idea of using it in his pottery; and did so with great success. The ingredients, such as the clay and calcined flints, are prepared by separate means, the former in the pug-mill, which is represented in fig. 1. This is an upright, iron-bound, wooden cylinder, with an axis, A, turned by machinery; projecting from A are seven arms, *b*, each of which has three knives fixed in it, with the points outward, and so arranged that they spread over the largest amount of space in the interior; and altogether they are placed in a spiral manner, so that when in motion the clay, which is thrown in lumps into the hopper-shaped upper part of the vat, is worked down, and is so cut and kneaded by the knives that it is forced out at an opening at C in the state of soft pap. This is aided by the knives on the lower part of the lowest arm being connected together by a plate, D, which prevents all settlement at the bottom. This pap-like clay passes into a large wooden tank, in which it is agitated with water until quite incorporated, so as to resemble milk in colour and consistency. In another mill (fig. 2), of

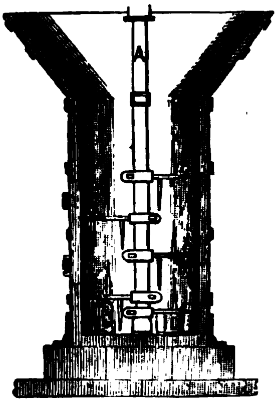


Fig. 1.

a different construction, the Cornish granite and calcined flints are reduced to a somewhat similar state. This mill is very strongly constructed, and consists of a tub-like vat, A, in the centre of which turns an axle, B, moved by machinery; in the bottom of the vat is a thick stone-bed, C, consisting of either chert or horn stone. From the upper part of the axis three strong arms, D, D, D, project like the spokes of a wheel; and strongly attached to these are stout beams, *a*, pointing downward, and nearly touching the stone-bed, C. As the axis, with its arms and beams, turns round, the beams push some large masses of the Cornish granite or of chert stone round with them, and these triturate the calcined flints and other hard materials, and stir up the water with which the vat is kept constantly supplied, whilst it overflows in a milky state, charged with the finely-divided materials, into a cistern, where it is kept stirred until it is sufficiently supplied with the solid materials, and the thickened milky liquid is then drawn off, in proper proportions, into a vat to which the prepared clay is also passed. The mixture of the two is then allowed to subside until the water is nearly clear, when it is drawn off; and the sediment is deprived of its surplus moisture, either by evaporation, or, in the best works, by a pneumatic exhausting apparatus, which does it very quickly. The composition is then a fine plastic material of the consistency of tough dough, and is ready for the potter's use. In preparing the finer materials for porcelain many other operations are required, all, however, having the same object—viz. the extremely minute division of the substances used.

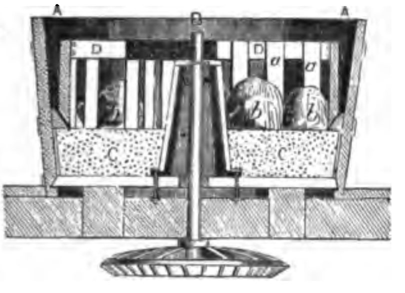


Fig. 2.

The prepared clay is taken to the *throwing-machine*, or *potter's wheel*, which is represented in fig. 3. This consists of a fixed table, A, through which passes the axle, B, and rises a little above its surface, and having on its upper end a disc, C, which revolves with it. The axle is put into rapid motion by turning the fly-wheel, D, either by hand or machinery; and this causes a rapid revolution of the disc, C, upon which is placed the soft mass of clay to be moulded. At E is seen an upright, with a small sliding-bar regulated by a screw; this is the guide for the potter to regulate the height of the vessel he is making. When the lump of clay is revolving, the potter, with his hands or with proper tools, fashions it into any rounded form he desires, gradually working from the base upwards till the vessel in his hands attains the external shape, height, and thickness of wall required. It is then put aside for some time to dry, and when in a state of greatest doughy tenacity it is fixed on a turning-lathe, and by means of sharp steel tools its surface is accurately turned and smoothed. But some articles are formed in moulds, the moulds being made of plaster of Paris. This answers well for fine porcelain intended to be very thin, because the plaster-mould absorbs much of the moisture in the paste, and thus partially dries it, so that it admits of handling, which in a softer state would be very difficult. The paste is used so liquid that it can be poured into the moulds. It is usual, in casting, to have a mould for each part, as seen in figs. 4, 5, 6, which represent the body, neck and lip, and foot of the cream-ewer, fig. 7. The handle is also separately moulded, and attached with the aid of a fluid clay paste, called a slip. For nearly flat articles, such as dinner-plates, a plan is adopted which combines both processes: a mould, usually of plaster, fig. 8, *a*, is placed on the disc of the throwing-wheel, *b*, and a thin layer of the paste is pressed on to it, so as completely to take its form; then to the guide-post, *c*, is attached an arm, *d*, with a small brass plate,

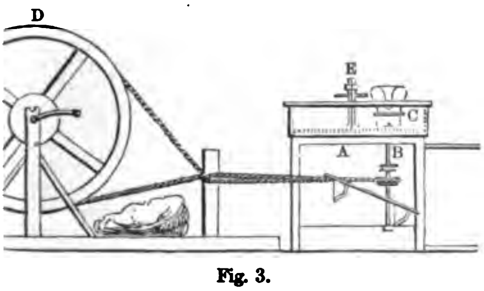


Fig. 3.

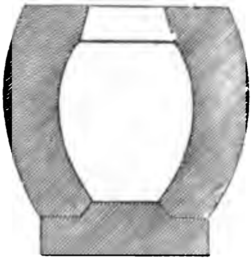


Fig. 4.

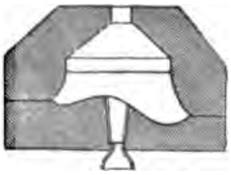


Fig. 5.

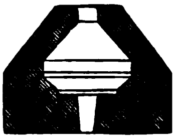


Fig. 6.

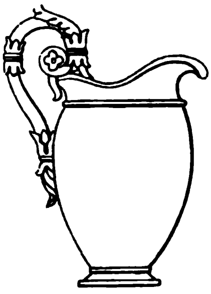


Fig. 7.

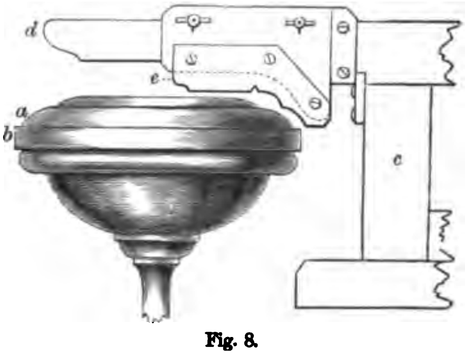


Fig. 8.

e, on its lower side. This plate is cut to the outline of half the plate, or dish; as it revolves, this pares down and shapes the clay to its own outline, and to the thickness to which it is set, there being an arrangement on the arm of the guide-post by which this can be effected. Sometimes, as in the case of deep vessels, moulds are used for the exterior, and the interior is formed by the hand. This process (fig. 9) ensures certainty of size and shape, which is important in making large numbers of similar articles, as tea-cups, &c. The mould is lined with a thin cake of clay, and when placed on the revolving disc it is fashioned inside by hand, and finished off with a wet sponge. Sometimes metal or horn tools are used for producing mouldings and other raised ornaments, or for grooves, when the turning or throwing wheel is used.

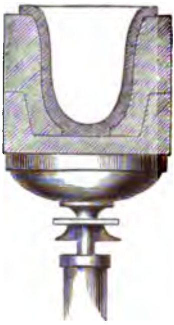


Fig. 9.

Being formed, the articles, of whatever kind, are now taken to the drying-stove, where they are placed on shelves, and remain there some time, exposed to a heat of about 85° F. When quite dry, they are next taken to a workshop near the kiln, and they are here carefully packed in coarse earthenware vessels, called *seggars* (fig. 10), which are so made that they can be piled upon one another to a great height in the kiln, as seen in fig. 11, in which some of the seggars are shown in section, for the purpose of making the arrangement intelligible. As the seggars are generally made large enough to hold a number of articles, which would, when highly heated, adhere if they touched, a number of curiously shaped pieces of burned clay are used for placing between them, so as to make them rest on points; these are called *watches*, *cockspurs*, *triangles*, *stilts*, &c. (fig. 12). In the seggar filled with plates (fig. 13) the plates are seen each resting on *cockspurs*, which prevent them touching. Another object is gained by this in burning flat articles such as plates; these, if placed one upon another, would not be fired equally, but when they are held apart the heat affects all parts alike. The seggars are so piled in the kiln that the centre is hollow, and there are free spaces between them through which the fire can ascend; props, *a*, *a*, *a*, fig. 11, being so placed as to keep them from immediate contact with the sides all round. Thus each seggar forms a small oven, in which one or more pieces of pottery or porcelain are baked, and the seggars prevent any unequal heating of the pieces, and also protect them from smoke. A kiln has generally eight furnaces, and it is usual to raise six piles of seggars between every two furnaces, or rather between their flues, which rise to a considerable height in the kilns. Each pile of seggars is technically called a *bung*, so that there are generally forty-eight or fifty bungs to the charge of a kiln. When all this is arranged the furnaces are lighted, and great care is taken to use the best coal, as it enables the manufacturer to make a more certain calculation as to its effects, and is less liable to smoke and sulphurous vapours, which might injuriously affect the contents of the kiln. The baking or firing usually lasts from forty to forty-two hours. The fire is then allowed to go out, and the kiln to cool very gradually, after which it is opened, and the seggars removed, to be unpacked in a separate workshop.

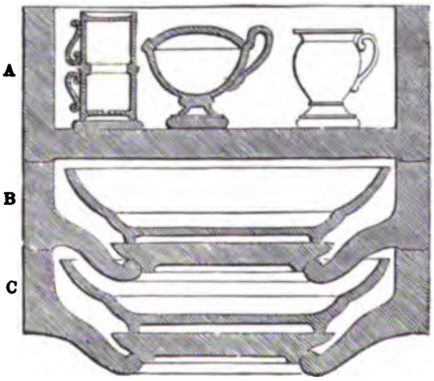


Fig. 10.

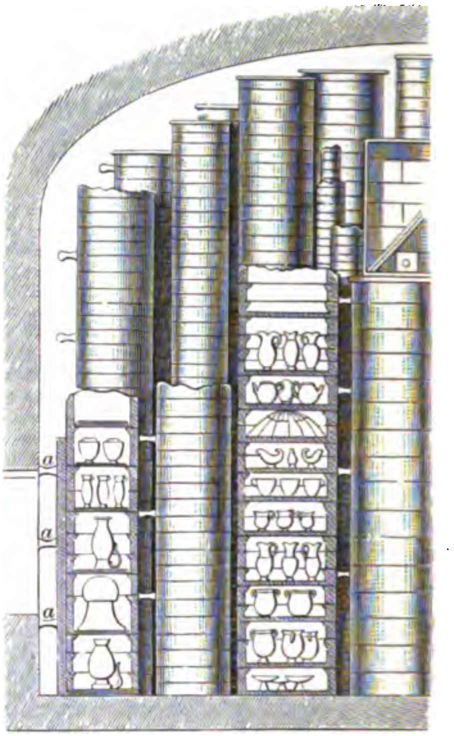


Fig. 11.

The articles are now in the state called biscuit-ware, and are ready for any pattern they may be intended to bear, and the glaze. Here, however, it may be stated that it is possible to glaze refractory pottery, such as stoneware, in the biscuit oven, and thus avoid the necessity for two firings to the ware. The glazing is in this case effected by throwing common salt into the oven when at its highest temperature. The salt is volatilised and the sodium separates from the chlorine, and, combining with the silica it finds in the heated ware, forms a

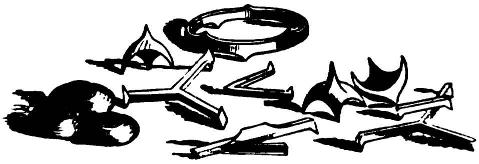


Fig. 12.

true soda glass with it, which makes a uniform transparent glazed layer over all the pottery surfaces which it reaches. In this way all glazed sanitary wares and ordinary stoneware jars and bottles are made at one firing. Common pottery is often figured by printing the design in enamel colours on transfer-paper, and, whilst the printing is still wet, applying it to the biscuit-ware; the ware absorbs the enamel ink, and the paper is removed by water, leaving the pattern on the ware. It is next fired in seggars, or a muffle, to fix the colour, and is then dipped into composition called *glaze*, of which three kinds are used in the Staffordshire potteries. The first, for common pipeclay ware, is composed of Cornish granite, 16 parts; flint, 36 parts; white-lead, 53 parts; and cullet, or broken flint-glass, 4 parts. These materials are triturated with water, with the same care and by similar means to those employed in forming paste, and are reduced with water to the same milk-like liquidity. Each workman has a tub of the glaze before him; and as the articles of biscuit-ware, either with or without decorations, are brought to him, he dips them in the glaze, so as to ensure a uniform coating over them; and by nice management he prevents any large drops or accumulations on one part more than another. The porous biscuit-ware rapidly absorbs the moisture, and dries up the thin film on the surface of the articles, which are again placed in seggars, and carried to the glaze-kiln, where they undergo another firing, which melts the glaze, and converts it into a transparent glass all over the surface, and renders any pattern previously printed upon it very plain. The temperature in the glaze or enamel kiln is only increased very gradually, and is kept up for about fourteen hours, after which it is allowed to cool slowly, and the articles are taken out completed. So far, this description has applied to the manufacture of pottery and porcelain on a large scale, for general purposes; but when it is applied to more costly and artistic works very special arrangements are required; and in the case of remarkably fine pieces, instead of the huge kilns, which hold frequently many thousand pieces, muffle furnaces (fig. 14) are used for each separate article for the biscuit, the glaze, and the coloured and gilded decorations, which, in porcelain, are applied on the glaze, and not on the biscuit.

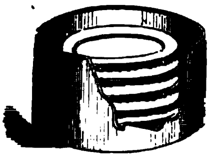


Fig. 13.

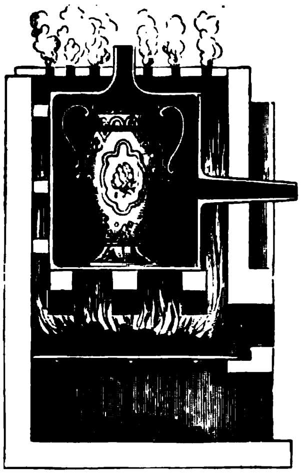


Fig. 14.

In the decoration of painted pottery and porcelain the colours employed are coloured glasses ground to impalpable powders, and mixed with borax or some other fluxing material. For use they are generally made liquid with oil of spike, and they are laid on with hair-pencils, in the same way as oil-colours. The whole process is exactly the same as in painting or staining glass; the glaze on the biscuit-porcelain being true glass, and the enamel colours being exactly the same as those used by the glass decorator. The colours may be made by mixing the materials of which glass is made with the colouring material and the flux, or simply with the already coloured glass and the flux. When the former plan is employed the principal colouring materials made use of are oxide of chromium for green; oxide of iron for red, brown, violet, gray, and yellow; oxide of uranium for orange, yellow, black; oxide of manganese for violet, brown, black, and purple; oxide of cobalt for blue, gray, and black; oxide of antimony for yellow; oxide of titanium for yellow; oxide of copper for green; suboxide of copper for red; sesquioxide of iridium for fine black; protochromate of iron for brown; chromate of lead for yellow; chromate of barytes for yellow; chloride of silver for deepening reds and purples; purple of Cassius for ruby and purple. Several of these colours are much increased in brilliancy by the addition of oxide of zinc, which of itself gives no colour; and the transparent ones are rendered opaque by the addition of oxide of tin.

Other fluxes besides borax are used—as sand, felspar, boracic acid, minium or litharge, salt, saltpetre, potash, and soda. For the gilding of pottery gold-leaf is rubbed down with oil of turpentine; or metallic gold is produced by precipitating the metal from its solution. The finely-divided gold so obtained is washed and dried, and then worked up with one-sixteenth of its weight of oxide of bismuth and oil of turpentine, painted on, fired, and afterwards burnished.

HISTORY.—The most ancient pottery of which we have any trace consists of the rude clay urns, vases, and other vessels found in the tombs of the prehistoric races. These remains exhibit the art of the potter in its most elementary condition, yet they are not devoid of elegance of form, and the decorative instinct of primitive man found appropriate expression on them in bands of incised lines forming lozenges, zigzags, and other geometrical forms, and in impressed wavy cord marks, &c. See LAKE-DWELLINGS, STONE AGE, TROY.

Egyptian.—If we except the races of the far East, it is to the Egyptians among historical nations to whom precedence must be assigned in the art of the potter. We know that at a very remote period people made bricks of sun-dried clay cemented with straw, which were sufficient for the purposes of construction in a country where there is scarcely any rainfall. Vases of baked earthenware were also in use at the earliest period of Egyptian civilisation, and glazed tiles are preserved which belong to the epoch of Rameses III., not long after the exodus of the Israelites from Egypt. That the Egyptians attained considerable skill as potters is attested by the lustrous red ware they made for holding perfumes, wine, honey, and other delicacies; but their most remarkable pottery was their so-called porcelain made of a fine sand or frit covered with a thick siliceous glaze, blue, green, white, purple, or yellow in colour. The blue colour—which is that principally employed—was produced by an oxide of copper which yielded tints of unrivalled beauty and delicacy. This famous porcelain was made as early as the 18th dynasty (about 1600 B.C.), and continued to be produced till the period of the Greek and Roman rule. It was fashioned into vases, sepulchral figures of deities, scarabæi, beasts, &c.; and it must have attained a great reputation, for remains of it are found in most of the ancient countries which had commerce with Egypt. The unglazed Egyptian bottle (fig. 15) illustrates the fact, also attested by early Greek vases, that the vase as well as the statuary figure had its origin in the human form. On these early vases the head, hands, and other members are figured, and the body of the vase is only an exaggerated human trunk.

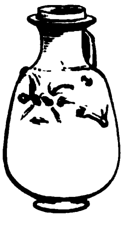


Fig. 15.—Unglazed Egyptian Bottle in the British Museum.

Assyrian.—In the contemporary empires of Assyria and Babylon pottery was also in use at an early period. Sun-dried and kiln-dried bricks were made about 2000 B.C., and like Egyptian bricks these were stamped with the names and titles of the reigning monarchs, and the locality for which they were destined. Glazed bricks of various colours, occasionally enriched with figures of men and animals, were introduced into constructions, and Semiramis is said to have adorned with them the walls of Babylon. In these bricks we have the earliest example of the employment of materials for colouring like those now in use. The glaze, however, is siliceous. Glazed polychromatic bricks were also used in the construction of the walls of the palace of King Darius, the contemporary of the prophet Daniel, at Susa (scriptural Shushan). These bricks were moulded so as to build together into regular geometrical patterns, colossal figures of men, &c. in high relief. The objects most remarkable for size are the large coffins found at Warka, supposed by some to be the 'Ur of the Chaldees.' The Assyrians and Babylonians used terra-cotta for historical and legal purposes, making cylinders, hexagonal prisms, tiles and tablets of it, on which were impressed extensive writings in the cuneiform character. Some of the most remarkable of these tablets contain an account of the campaign of Sennacherib against Judæa and the tributes of Hezekiah; others give a record of the flood, the creation, &c. See BABYLONIA.

Phœnician.—Contemporaneously the Hebrews and Phœnicians practised the art, but of purely Hebrew work few traces remain. Phœnician pottery, however, has been abundantly excavated in Cyprus, and may be taken as a type of the works of both peoples. It is principally of a cream colour and of a brick red body, ornamented in horizontal bands, with lines in umber and red, concentric circles, and other geometrical forms being the most common decoration. They also moulded rude figures of deities and of domestic animals, the latter having apparently been used as toys by children.

Greek.—The most remarkable pottery of antiquity was the Greek, which seems in its earliest development to have had a certain affinity with Phœnician products. The Greeks claimed the invention of the potter's wheel, and the principal cities contested the honour of the art, which is mentioned in Homer and attributed to Corœbus of Athens, Hyperbius of Corinth, or Talos the nephew of Dædalus. The Greek vases which remain to this day, principally recovered from tombs in Greece and in the lands to which its commerce extended, show that within a few centuries the art rose from the rude condition like that shown in prehistoric pottery till it reached a perfection and variety of form and a grace and dignity of decoration not since attained by the efforts of any people. It was the triumph of pure art, for the material of which the body of Greek vases is fabricated is of the commonest type, and the colours the artists had at their disposal were few and simple. The archaic pottery of the Greeks down to about the 7th century B.C. was like the rude earthenware of prehistoric times. Their first improvement consisted in the application of a brown glaze to the surface of the ware, which enabled them to give force to the incised ornament, scratched through the glaze into the differently coloured body. Next the potters discovered black pigment which they could apply over the brown glaze, and thus increase their decorative resources by painting geometrical patterns in black. By degrees the purely geometrical forms of ornament were abandoned, and figures of animals, rising ultimately to the human figure, were painted in black silhouette on the vases, some of the details being touched with white and purple. In the case of the human figure faces and limbs began to be expressed in white and colour on the black figures painted on a red ground. Concurrently, the rough clay body of the vases began to be wholly or partially covered with an engobe or slip of clay of much finer quality and colour, the engobe being applied by dipping the moulded article into a vessel containing the slip. With these developments in material and decorative variety the forms of the vases and the skill of the artist draughtsman show steady and continuous development. Just as the best period in Greek art approached the favourite method of vase decoration underwent a total change. The decorative figures, deities and men, were traced on their red and white clay surfaces; but, instead of the figures being filled up in black, the surrounding space—the body of the vase itself—was blackened, giving a black varnished background with figures the colour of the underlying body. The details of these figures are indicated with fine lines. Sometimes the faces and limbs are filled up in white, and the draperies may be parti-coloured. At this stage Greek pottery reached its greatest loveliness of form and perfection of ornamentation, the drawing being supremely refined, delicate, and spirited. Among the most interesting of the Greek vases which remain to us are certain of the Panathenaic amphoræ—prizes won at the public games in Athens—on one side of which was painted an archaic figure of Athena, and on the other any appropriate design with the inscription: TΩN ΑΘΕΝΕΘΕΝ ΑΘΛΩΝ. In most cases also they contain the name of the archon or chief-magistrate of the city for the year, in this way enabling us to find the precise date of the manufacture. Of these vases ten are in the British Museum, six of which bear the name of the archon, and the Louvre possesses three, which, from the archonic names they bear, can be referred to 323, 321, 313 B.C.

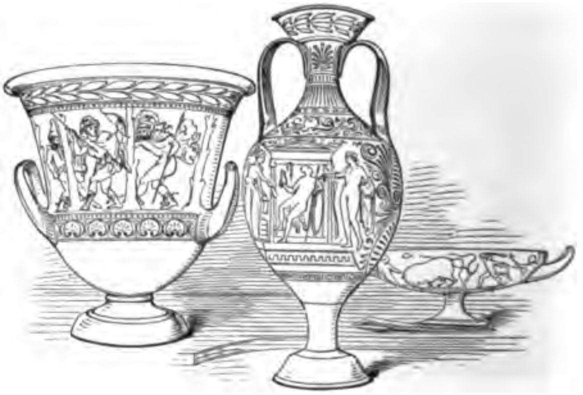


Fig. 16.—Greek Krater, Amphora and Kylix of later style.

respectively. At this period the decadence of Greek art had already set in. The drawing degenerated speedily, figures were multiplied and crowded in confusion, ornament became florid and superabundant, and the proportions of the vases became exaggerated and bad. Subjects themselves were no longer lofty and heroic, but connected with incidents of everyday life, with burlesque drama, and with jugglery.

In the history of Greek art no subject has excited more widespread interest within recent years than the terra-cotta figurines or statuette figures and groups found principally in tombs and about temples of the later period. From 1873 downward a great number of such figures were excavated from tombs at Tanagra in Bœotia; subsequently a very important find was made at Myrina on the coast of Asia Minor, opposite the island of Mitylene, and at Tarentum, Corinth, the Crimea, Cyprus, the Cyrenaica on the African coast, and in other localities quantities of such figurines have been obtained. The Tanagrine figurines were found in tombs which contained no painted vases; but some glass vessels, lamps, and inferior black pottery were associated with them, indicating that the statuettes belong probably to near the Christian era. The terra-cotta of the Asian coast comes down to a period as late as the time of Septimius Severus. The objects from the Tanagra tombs consist principally of single figures and groups of draped females and young girls; subjects drawn from the everyday life of the people, treated with true Attic grace and simplicity, and with marvellous sculpturesque feeling. In the Myrina series, which obviously have a different inspiration, deities and heroes of mythology form the most important element—Aphrodite and Bacchus, Silenus, satyrs, and mænads frequently recurring. The figurines are mostly polychromatic, sober, earthy colours, not fired in, having been used to tint them; but in some the colours are true enamel pigments. Miniature reproductions of known statuary figures and groups also occur among these exquisite works in terra-cotta.

Etruscan.—From the fact that much Greek pottery has been found in Etruscan tombs, this ware came to be popularly known as Etruscan pottery. True Etruscan pottery, however, was rarely painted. The most characteristic ware of that people, with a body black throughout, had on its surface moulded ornaments, the shape and ornamentation showing that it was modelled on oriental metal-work. This black Etruscan ware, which was in use from 500 to 320 B.C., was the source from which subsequently arose the Aretine and so-called Samian ware of Rome.

Roman.—The only important development made in pottery under Roman rule was this Aretine or Samian ware. It is evidently imitated in its decoration from works in metal, in all probability from the chased cups of silver and gold which began to come into use in Italy, and was a continuation of the later moulded wares of Greece and Italy. The Samian ware of the Romans, so called from having originated in the island of Samos, was of a bright red colour throughout, but covered with a lustrous siliceous glaze. The red colour nearly resembles in appearance and texture a coarse sealing-wax; the paste is often remarkably fine. The vases, generally of small dimension, were turned on the lathe; the ornaments were moulded separately, and attached to the vase; patterns were produced by the repetition of the same mould, or by placing the bas-reliefs from various moulds on the vases. This kind of pottery was first made by the Romans at Arezzo, but subsequently, or nearly simultaneously, was produced at Capua and Cumæ in the 1st century. It afterwards extended over all the Roman world, and was made in Gaul and Germany. While under the republic it was at first extremely fine, the manufacture deteriorated under the last of the twelve Cæsars, and the ware is no longer found under the Antonines. The names of several hundred potters are found stamped upon existing specimens of this ware, some of them evidently of Gaulish origin. It was extensively imported into Britain and other remote provinces of the empire. In Britain the Roman conquerors established the manufacture of pottery in many localities, making use of the native clays. The ware was generally of inferior quality, but that of some places is sufficiently distinctive; and the discovery of kilns and fragments enables us to associate certain localities with distinct classes of pottery. Thus, a black ware was made at Castor in Northamptonshire, which was ornamented with reliefs laid on by depositing a fluid clay on the wet body, and moulding it with a tool. Characteristic ware was also made under Roman influence at Upchurch in Kent, and near Crockhill in the New Forest, Hampshire.

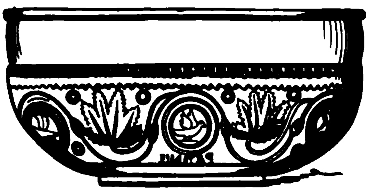


Fig. 17.—Samian Bowl.

Rhodian and Hispano-Moresque.—The knowledge of glazes originally acquired by the Egyptians and Assyrians was continued and transmitted to the Persians, Arabs, and Moors; and through oriental influence it came to be a European possession in mediæval times. Under the Knights of St John of Jerusalem, Persian potters were set to work in the island of Rhodes about the beginning of the 14th century. For about 100 years thereafter a large amount of a brilliant enamelled pottery was made, and sent out through the Mediterranean basin from that island. The pottery was distinctly Persian in form, colour, and ornamentation, and under the name of Rhodian ware existing specimens of it are greatly treasured. About the same time there was planted, under Moorish influence, on the Spanish peninsula and in the Balearic Isles the manufacture of the famous Hispano-Moresque enamelled faience, which is specially remarkable for the brilliant metallic lustre of its glaze. The industry continued to flourish till the final expulsion of the Moors from Spain early in the 17th century, after which it rapidly fell away. From the island of Minorca especially a vast trade in this ware was carried on; and the name 'Majolica,' given by the Italians to their own more famous enamelled pottery, is an indication of the predominant importance of the ware sent out from Majorca in the middle ages.

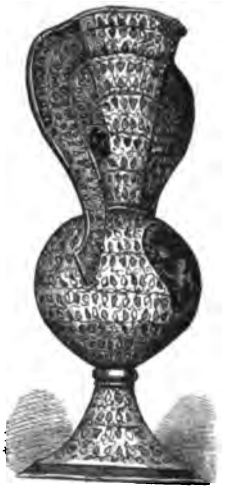


Fig. 18.
Hispano-Moresque Vase.

Italy.—There can be no doubt that the production of brilliant enamelled pottery simultaneously in the East and the West—in Persia, Damascus, and Rhodes on the one side, and in the Spanish peninsula on the other, exercised a powerful influence on the origin and progress of the same art in Italy. But there, under the contemporaneous renaissance of art generally, the decoration of the pottery assumed a distinctively European character, and it attained a much greater freedom, wealth, and variety of decorative resource than was reached by any of its predecessors. The use of the fine white enamel glaze yielded by tin is in Italy first associated with the name of Luca della Robbia (1400–81), the great sculptor, who employed it in coating his terra-cotta relief figures and groups, works which are now among the most prized treasures of art. From his time onwards the application of this tin enamel to earthenware became common in Italy, and it is to such pottery that the name Majolica properly belongs. One of the most famous of the many artists who produced this ware was Giorgio Andreoli, commonly known as Maestro Giorgio, who worked at Gubbio during the first half of the 16th century. His pieces, Gubbio ware, are distinguished by a remarkable iridescence, flashing ruby, golden, and opaline tints of marvellous brilliancy with every variation of light. Among the most famous centres of Majolica production in Italy besides Gubbio were Pesaro, Urbino, Castel Durante, Diruta, Faenza, Forli, and Venice. The artistic value of the products declined with the waning of art in Italy in the 17th century.

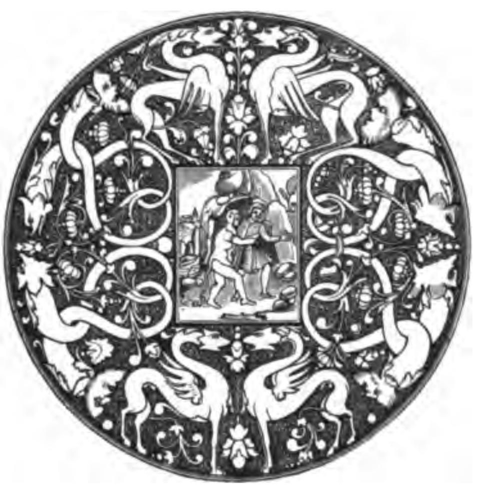


Fig. 19.—Deep Dish, by Giorgio.

France.—From Italy the art of making enamelled faience passed with Catharine de' Medici into France, and the manufacture was established on Italian models in Nevers about 1590, and there it flourished till the end of the 17th century. But previous to that time the celebrated Bernard Palissy in 1555, after unheard-of exertions, had independently discovered an enamel glaze, which he applied to his characteristic rustic dishes, embellished with exquisitely moulded figures, in high relief, of fishes, reptiles, fruits, and other figures. But while Palissy was pursuing his investigations there was being produced in France a limited number of specimens of a ware which has become much more famous than the works of any other pottery, ancient or modern. During the last fifty years only attention has been prominently drawn to a few examples of pottery, very distinctive in form, exceedingly rich in decorative treatment, and highly original in the method by which it had been elaborated. At first it was known as Henri Deux ware, from many of the pieces containing the cypher and emblems of Henry II. and of Diana of Poitiers. Subsequently, owing to the acceptance of a false theory of its origin, it was designated Oirin ware; but, after much investigation and many suggestions, it has been discovered that the pieces were made at St Porchaire (Deux-Sèvres) between 1525 and 1555. Henri Deux ware consists entirely of decorative pieces treated in an architectural manner, the body of the ware being a creamy pipeclay, with inlaid ornamentation in colour, and beautifully modelled masks, trusses, &c., and a transparent glaze. Only sixty-five pieces are known, and when any now change hands it is at an enormous price. In the Hamilton sale (1882) a small cup 4 inches high brought £1218, and a salt-cellar 4 inches high was sold for £840. At the Fountaine sale (1884) a candlestick 12¾ inches high was disposed of for no less than £3675.

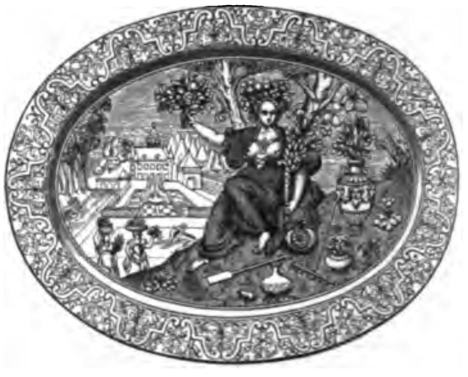


Fig. 20.—Palissy Dish, La belle Jardinière.

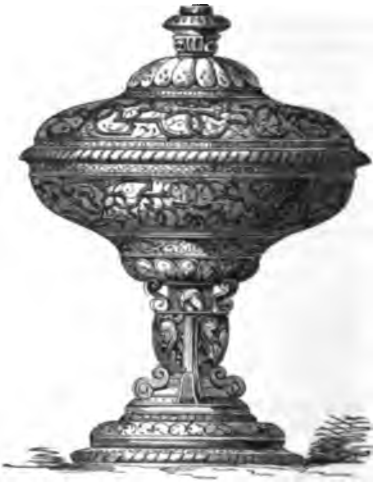
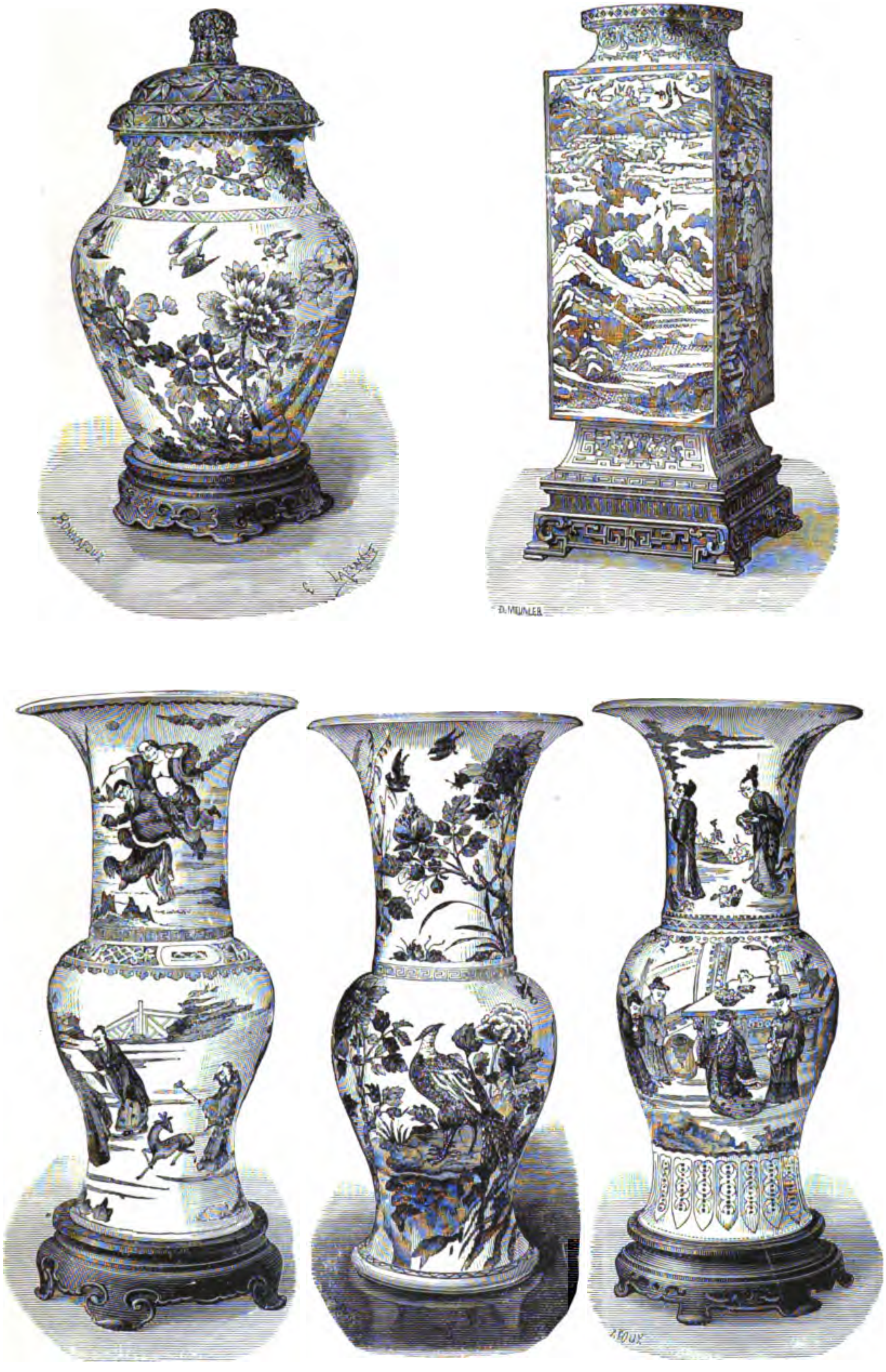


Fig. 21.—Vase of Henry II. Ware.

Holland and Germany.—The celebrated enamelled faience of Holland owes its origin to the attempts of the Dutch to imitate the oriental porcelain with which they were made familiar by their eastern trade and connections. The manufacture dates only from the 17th century, and from the fact that it was principally centred at Delft fine pottery came to be known generally in Britain as Delft



PORCELAIN VASES OF NORTHERN CHINA.

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ware or 'Delft.' To imitate the fine lustrous white of the ordinary porcelain body tin-enamel glaze was employed by the Dutch potters, and their coloured decorations were in blue, and at first entirely oriental in character. Stoneware Bellarmines or Greybeards (q.v.), and the tall beer-jugs of the Germans, usually decorated with moulded ornaments, medallions and inscriptions, &c., although generally spoken of as Grès de Flandres, are really almost exclusively of German origin, and may be traced, according to their colour and quality, to the neighbourhood of Cologne, Coblenz, and to Kreussen in Bavaria, &c. Stoneware vessels of the same nature were also made in England early in the 18th century.

England.—Till the close of the 17th century the ware made in England was of a coarse, common description, and those who could afford the luxury obtained their pottery from the Dutch and other superior makers. The first step towards improvement was effected by John Dwight, M.A., who in 1671 obtained a patent for 'making stoneware, vulgarly called Cologne ware,' and by him the Fulham manufacture of stoneware was originated. A still more marked influence was produced on English pottery about the same time by the two brothers Elers, from Nuremberg, who settled at Burslem, and there produced a ware which they called red Japanese. To these potters we also owe the origin of the process of salt-glazing of stoneware. Finding their secrets were discovered by Astbury, they removed to Lambeth, where they established themselves in 1710. From this time onwards improvements were introduced in the Staffordshire potteries; but the great strides which for a time put English pottery in the foremost rank of the productions of the world were due to the great potter Josiah Wedgwood (1730–95, q.v.). In every department, in body or paste, in methods of decoration, and in the employment of artists of the highest ability, Wedgwood, with untiring application and with unstinted expenditure, aimed after perfection; and his efforts alone raised the manufacture of pottery in England to the position of an industry of national importance. Away from Staffordshire potteries of some importance existed at Lambeth, Bristol, Liverpool, Leeds, Lowestoft, and Swansea; but by degrees the manufacture drew more and more towards Staffordshire, where, in the towns collectively known as 'The Potteries,' embracing Stoke-on-Trent, Etruria, Hanley, Burslem, and some others, it now principally centres. English stoneware especially, but other classes of pottery also, at the present day owes much to the skill and enterprise of Sir Henry Doulton, who has great works at Lambeth, in the Potteries, and in the neighbourhood of Glasgow.

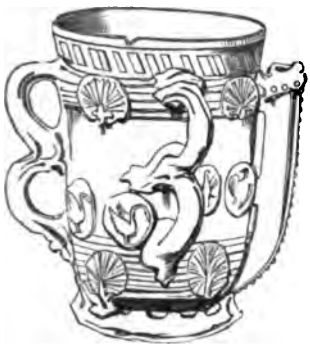


Fig. 22.
Tyg of early Staffordshire Ware.

Peruvian.—In the New World the art of the potter showed an interesting development among the ancient Mexicans and Peruvians before the American continent became known to Europeans. No knowledge of glazes existed among these peoples, but, in the case of the Peruvians especially, a high degree of skill in working clay was developed; and they modelled and modified animal forms with great knowledge and spirit. Their most characteristic pottery was black, but they also made vessels of a fine, warm, yellowish body, formed on the potter's wheel, and having painted decorations analogous in style to those on archaic Greek vases.

PORCELAIN.—The substances with which we have dealt in this brief historical summary up to this point comprise only pottery, as contradistinguished from porcelain. The term porcelain is of Italian origin, derived from *porcellana*, the cowrie shell, owing to the similarity of the white glazed surface of the ware to the substance of that shell. Of porcelain there are two varieties, one being soft or artificial porcelain, the *pâte tendre* of the French, which may be looked on as a chemical compound, and which is wholly fusible at high temperature. The second variety, hard or kaolinic porcelain (the French *pâte dure*), is the true oriental porcelain, composed of two natural mineral substances alone, Kaolin (q.v.), an infusible white clay, and pe-tun-tse, a mixture of felspar and quartz, fusible in its nature, the presence of which gives its semi-fused translucent appearance to the ware.

China.—It is to the Chinese that the world owes the manufacture of porcelain; and in strict chronological sequence, in antiquity of the industry, in skill and resource in working raw materials, and in richness and variety of the finished products the Chinese ought to have the first place. When the Greeks were making their terra-cotta vases the Chinese were manufacturing porcelain; they had mastered the secrets of that most difficult of all ceramic tasks 2000 years before it was accomplished by Europeans. According to their own records, pottery was made in the Chinese empire in the reign of their mythical Emperor Hwang-ti about 2690 B.C. Without assuming the historical accuracy of such a precise date, there is no doubt that true porcelain was made in China under the Han dynasty between 206 and 87 B.C. From that time onward the art developed and improved, and, subject to fluctuations caused by revolutionary troubles, the porcelain manufacture continued to flourish in China till recent times. The most famous centre of the industry was formerly King-te-chin in the province of Kiang-si, where it is known porcelain was made about 580 A.D. In this town alone there were early in the 18th century no fewer than 3000 porcelain furnaces; but the place was ruined by the Tai-ping insurrection. Chinese porcelain exhibits endless variety in form and painted decoration. The mythical dragon, the kylin or mythical lion, the spotted deer, domestic fowls and other birds are favourite subjects on Chinese ware. Of all Chinese porcelain that now most sought after is the old blue ware such as was at first copied and imitated by the Delft manufacturers. Crackle ware, in which the glaze shows signs of separation from the body, is a peculiarity of oriental manufacture. The Chinese appear to possess the secret of causing the cracks in the glaze to be large or minute at will. Ruby glazed ware (the *Sang de bœuf* of the French) and rich chromatic splashed glazes are also highly treasured in Chinese porcelain. The soft sea-green glazed ware known as Celadon glaze

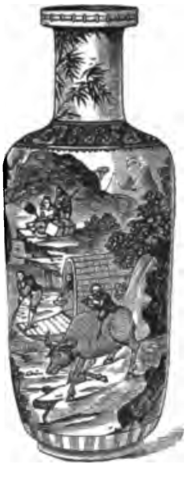


Fig. 23.—Chinese Porcelain Vase.

is assumed to be the earliest form of Chinese porcelain, and genuine ancient pieces are highly valued.

Japan.—A knowledge of Chinese porcelain passed into Japan as early, it is said, as 27 B.C.; and it is known that a corporation of porcelain-makers was established in that country in 720 A.D. In the 13th century a Japanese potter went to China to improve himself in the art of porcelain-making, and after his return he carried on the manufacture in his native country with great success. It is, however, more in the manufacture of pottery than of porcelain that the Japanese exhibit pre-eminent skill. Their most famous manufacture consists of Satsuma ware, so called from having been established in the neighbourhood of Kyōto by the formerly powerful princes of Satsuma. It is of a pale yellowish colour, covered with minute crackles in the glaze, and very richly painted and lavishly gilt. The so-called Satsuma now manufactured is yellower in colour than genuine old pieces, and it is principally made at Awata near Kyōto. The Japanese potters generally display a remarkable power in moulding pottery and finishing its surface so as to imitate other substances, such as woods of various kinds, basket-work, &c. Among their most remarkable products as examples of delicate moulding is Banko ware, which consists of small teapots and other vessels of a brownish and grayish unglazed earthenware, extremely light and thin in body, and very much appreciated among the native population for tea-making. The Japanese excel in the manufacture of egg-shell porcelain, so called on account of the extreme thinness of the body. Among their other porcelain manufactures Kaga ware is the most outstanding, being characterised by painted ornaments in a rich ruby colour, which is generally lavishly gilt. The chrysanthemum is a favourite and frequent flower in their vases, the crane and other birds figure most effectively, and figures of warriors and ladies are frequently employed in the resourceful and varied ornamentation of Japanese ware. The principal centres of the pottery industry in Japan are in the province of Hizen, where at Arita is produced Imari ware; the province of Owari, whence comes Seto ware; Kaga, for ware of that name; and Mino and Kyōto.

Persia.—Chinese porcelain was known in Persia as early as the 12th century, a circumstance not to be wondered at, seeing that country was then and for centuries before the principal highway of commerce between the far East and Europe. Many evidences exist of the acquaintance of the Persians with the ceramic products of China; and at an early date pottery and a species of soft porcelain were made in Persia which both in form and decoration were modelled on Chinese originals. But Persia also had a manufacture of pottery and of enamelled tiles of an original and distinctive character, in which on a fine white enamelled glaze brilliant metallic lustres were employed in a most effective and original manner.

Porcelain in Europe.—In the 13th century the early European traveller, Marco Polo, visited the porcelain-factories of China. In 1487 Lorenzo de' Medici received from the sultan of Egypt a present of Chinese porcelain, and that is the first record we possess of the appearance of the ware in Europe. The Portuguese were the first to import porcelain direct from the East; and subsequently large quantities were brought by the Dutch and by the East India Companies of other nations. No sooner did the ware become known in Europe than strenuous efforts were put forth in many quarters to imitate it. A certain amount of porcelain is alleged to have been made in Venice about 1470; but the earliest European porcelain of which any examples exist is that which was made by Francis de' Medici II., Grand-duke of Tuscany, about 1580. The quantity made appears to have been small, and the attempts at the manufacture ceased with the death of the grand-duke in 1587. Nearly a century later the art was revived at Rouen and at Paris, but it was not till 1693 that a permanent and well-established industry was founded in France at St Cloud. Thereafter it was taken up in other French towns. At Vincennes it was begun in 1745; in 1753 Louis XV. became a partner in that concern. In 1756 the works were transferred to Sèvres, and in 1760 that establishment became entirely national property; and so it has continued amid all fluctuations of government to the present day. Hard porcelain was first made at Sèvres in 1764; but the fame of that establishment rests on its soft porcelain, in which body, glaze, and enamel colours blend together into a singularly smooth and lustrous whole.

But in Europe it was in Germany that the secret of making hard or kaolinic porcelain was first discovered. After years of labour and innumerable trials, which resulted only in the production of a kind of opaque glass or stoneware, Böttger (q.v.), an alchemist who had entered the service of Frederic Augustus II. of Saxony, succeeded in 1709 in making a white hard porcelain at Meissen, near Dresden. The china-clay and china-stone he employed had previously been discovered by Schnorr at Aue. Extraordinary precautions were taken to prevent the process of the manufacture from being revealed; but, notwithstanding the oaths imposed on the workmen and the other means employed for their supervision, the secret was betrayed by one Stöfzel, who fled to Vienna, and there the imperial factory which continues to this day was established in 1718. Subsequently factories under national protection were established at Höchst in 1740, at St Petersburg in 1744, at Berlin in 1750, and at Ludwigsburg in 1758. Works at which soft porcelain was principally made were established at Doccia near Florence in 1735, at Capo di Monte near Naples in 1736, and at Buen Retiro in Spain in 1759; and the products of all these manufactories have attained considerable reputation.

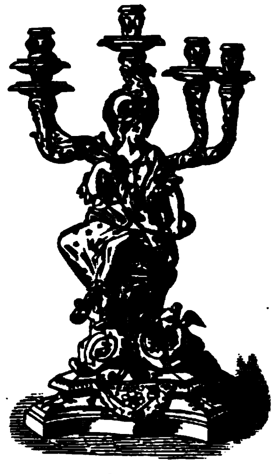


Fig. 24.
Dresden Candelabrum.

In Great Britain manufacturers have at all times devoted themselves principally to the making of a variety of soft porcelain. The works at Chelsea, Bow, and Derby were established about 1745, and in 1751 the manufacture began at Worcester, where it still continues. Hard porcelain-making was begun by Cookworthy at Plymouth in 1768, after he had discovered china-clay in Cornwall. But his works continued only for about three years. Cookworthy's patent rights were then transferred to Richard Champion, who continued the manufacture at Bristol till 1781. In Staffordshire porcelain was first made at Longton Hall near Newcastle in 1752, but it was not till about the close of the 18th century that Staffordshire porcelain became artistically and technically fine in the hands of Thomas Minton, who founded the famous works of Minton & Company, and of Josiah Spode, whose undertaking continues under the firm of Copeland & Company.

In the later part of the 18th century valuable porcelain was also made at Lowestoft, Coalport, Nantgarw, Swansea, and some other centres. The manufacture of Parian or statuary porcelain, which is an unglazed modification of English soft porcelain, was introduced by Copeland and Minton about 1848.

It is a common practice to place on pottery and porcelain distinctive marks, either painted on or stamped into the bottom of the article. These indicate either the manufactory in which the pieces were made, or the workman, and sometimes the decorator, employed on them; and in the case of Chinese and Japanese ware the marks give the dynasty or date of execution. It is only in the case of Sèvres porcelain that the habit of marking a date by letters of the alphabet was practised. In Chinese porcelain date-marks are found indicating that the piece was made as far back as the 10th century; but there is reason to believe that many of these early marks are forged, and at most are only copies of more ancient examples which have now ceased to exist. On some pieces of early majolica the date, place, and name of the artist are given. The great European manufactories have generally marks which indicate the place of making only; but there are other means of arriving approximately at the date. The illustrations (fig. 25) show the marks employed at various important English works; but many of the manufacturers imprinted or impressed their names in full. In connection with these marks and names it should be borne in mind that it is easier to forge marks and names than it is to produce works equal to the originals imitated, the excellence and value of which causes such forgeries to be put in circulation. There is a vast quantity of forged porcelain in existence, and, specially, imitations of the fine old soft porcelain of Sèvres and of other famous *fabriques* are very abundant.

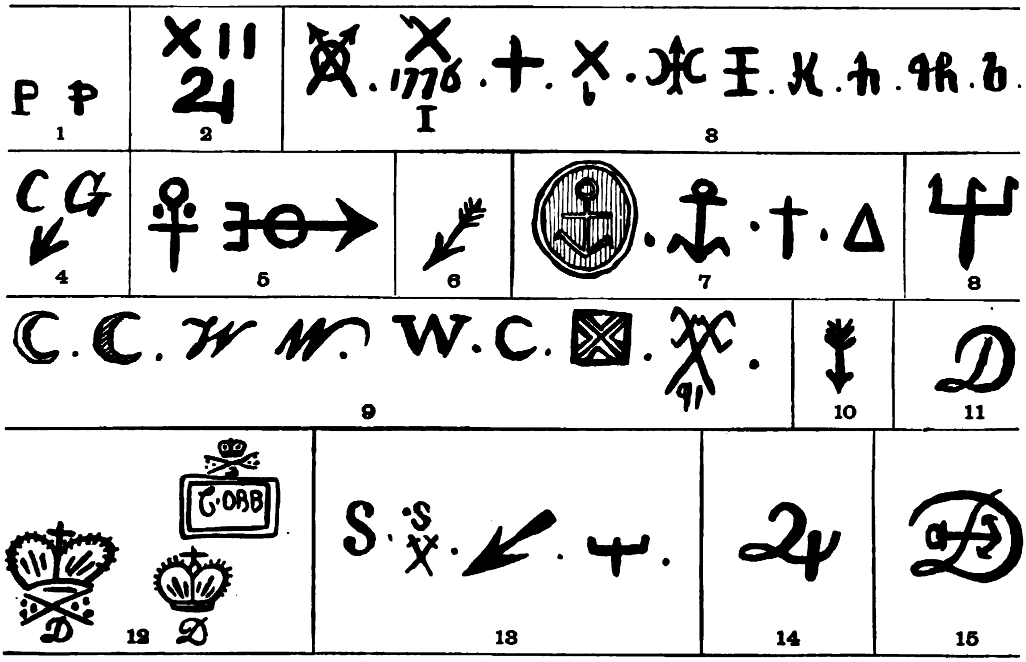


Fig. 25.—Marks on English Ware:

(1) Pennington, Liverpool, 1760–80; (2) Plymouth, about 1760; (3) Richard Champion, Bristol, 1772–90; (4) Charles Green, Leeds, 1790; (5) Bow, 1730–90; (6) Absolon, Yarmouth, about 1790; (7) Chelsea, 1730–84; (8) Swansea, Wales, 1790; (9) Worcester, 1760–80; (10) Yarmouth, about 1790; (11) Derby, 1751–69; (12) Crown, Derby, 1780–1830; (13) Shropshire, 1772–99; (14) Cookworthy, Plymouth, 1760; (15) Derby-Chelsea, 1770.

The literature of pottery and porcelain is exceedingly voluminous. Among standard works of general interest may be mentioned Brongniart, *Traité des Arts Céramiques* (3d ed. 1877); Marryat, *History of Pottery and Porcelain* (2d ed. 1864); Jacquemart, *Histoire de la Céramique* (1873; Eng. trans. by Mrs Palliser, Lond. 1873); Garnier, *Histoire de la Céramique* (Tours, 1882); Davillier, *Les Origines de la Porcelaine en Europe* (1883); South Kensington Museum *Art Handbooks;* Birch, *Ancient Pottery* (new ed. 1873); Rayet and Collignon, *Histoire de la Céramique Grecque* (1888); Jewitt, *Ceramic Art of Great Britain* (new ed. 1883); Solon, *The Art of the Old English Potter* (2d ed. 1885); Meteyard, *Wedgwood and his Works* (1873); Audsley and Bowes, *Keramic Art of Japan* (1881); Garnier, *La Porcelaine Tendre de Sèvres* (1889 *et seq.;* English trans. nearly simultaneously); Bowes, *Japanese Pottery* (1890); Darcel and Delange, *Receuil de Faïences Italiennes* (1867). For marks and monograms: Chaffers, *Marks and Monograms on Pottery and Porcelain* (7th ed. 1886), his smaller *Collector's Handbook* (new ed. 1890); Palliser, *The China Collector's Pocket Companion* (1874); Graesse, *Guide de l'Amateur de Porcelaine et des Poteries* (4th ed. Dresden, 1873).

Potton, a market-town of Bedfordshire, 11 miles E. of Bedford. Pop. 2006.

Pottstown, a borough of Pennsylvania, on the Schuylkill River, at the mouth of Manatawny Creek (both crossed by bridges), 40 miles by rail NW. of Philadelphia. It contains iron-foundries, blast-furnaces, rolling-mills, nail-factories, carworks, &c. Pop. (1880) 5305; (1890) 13,285.

Pottsville, capital of Schuylkill county, Pennsylvania, is built on the side of steep hills, on the Schuylkill River, at the entrance of Norwegian Creek, 93 miles by rail NW. of Philadelphia. It is in the midst of a rich anthracite coal and iron region, and has several iron-furnaces, foundries, rolling-mills, machine-shops, sawmills, &c. Pop. (1880) 13,253; (1890) 14,117.

Pot-wallopers (from *pot*, and *wallop*, 'to boil or bubble'), the popular designation of a class of electors forming the constituency of various English boroughs (e.g. Taunton, Preston) before the Reform Act of 1832, and defined in Sir James Stephen's *Commentaries* as 'such as cook their own diet in a fireplace of their own.' At Taunton in the 18th century 'several inmates or lodgers would, some little time before the election, bring out their pots, and make fires in the street, and boil their victuals in the sight of their neighbours, that their votes be not called in question' (Defoe's *Tour through Great Britain*, 4th ed. 1748).

Pouched Mouse (*Dipodomys*), a genus of small, lean, long-tailed, agile rodents, with cheek-pouches. The best-known species is *D. philippii*, from the waste regions of California, where it seems to find a sparse diet of seeds and roots, and in the dry season no drink but dew.

Pouched Rat (*Pseudostoma* or *Geomys*), a genus of plump, short-tailed, hamster-like rodents, with cheek-pouches which open externally and are used as receptacles for food. One of the best-known species is *P.* or *G. bursarius*, sometimes called 'Gopher.' Like the other species it is a native of North America, and inhabits the territory east of the Rocky Mountains and west of the Mississippi. It is a burrower like the mole, active in the warm weather, hybernating in the cold, sluggish above ground, but very active in its subterranean progress. The cheek-pouches are very large, and are crammed with roots, seeds, &c., but not with earth as the Indians used to maintain. Being voracious gnawers, the pouched rats do much damage to the roots of trees and crops.

Poughkeepsie, capital of Dutchess county, New York, on the east bank of the Hudson River, 73 miles by rail N. of New York City, is finely situated on a tableland, about 200 feet above the river. The Hudson is here crossed by a steam-ferry, and spanned by an important railroad bridge of masonry, steel, and iron (finished in 1888); the structure rests on six piers—four in the channel—and is 3094 feet in length from anchorage to anchorage, or, including the approaching viaducts, nearly 7100 feet. Over three spans are cantilevers, with arms of 160 feet. The city is well built, with fine public and private edifices; Main Street runs back 2 miles from the river. Poughkeepsie is the largest town between New York and Albany; its manufactures include machinery, iron-ware, silk, boots and shoes, clothing, &c., and it has a rolling-mill, a blast-furnace, and several breweries. Two miles to the north is the Hudson River State Hospital for the Insane, which cost $750,000, and the city contains a number of charitable institutions. But Poughkeepsie has most reason to be proud of its educational facilities. Vassar College (q.v.) is just beyond the eastern city limit, and the town possesses also a collegiate institute, a business college, and several high-class seminaries and academies, besides the public schools. Poughkeepsie was settled by the Dutch about 1680; in 1778 it was the state capital, and in 1788 the New York Convention met here to ratify the constitution of the United States. Pop. (1870) 20,080; (1890) 22,206.

Poulpe. See OCTOPUS.

Poultice, an application to diseased or painful parts, for the purpose of promoting suppuration, relieving pain, and stimulating or soothing the skin, according to circumstances. A poultice may be composed of any moist pulpy substance of sufficient consistence to retain the water without dripping or soaking through the flannel or linen covering in which it is generally applied. The making of a poultice well is a matter of some nicety, and unless the proper consistence is given to the mass the application is apt to do more harm than good. The linseed-meal poultice is the most easily made, and most satisfactory of all soothing applications. The meal is stirred gradually into a sufficient quantity of boiling water, placed in the bottom of a small basin or teacup, until a perfectly smooth pulp is formed of the proper consistence, and in quantity sufficient to cover completely, to the thickness of three-quarters of an inch, the whole pained part. The pulp is then spread on flannel, or poured into a flannel bag, and applied as soon as the heat will permit it to be borne. If it is to be applied to a wound, threatening abscess, &c., where a softening effect on the superficial tissues is desired, some oil should be smeared over the surface, and the poultice put directly in contact with the skin. If applied for pain, or some deeper inflammation where heat is chiefly needed, the oil is unnecessary, and the poultice should be enveloped in cotton-wool or in several layers of flannel. It can then be borne hotter, and will retain its heat longer. The bread and milk, or even bread and water or bran poultice, is also very good; as is also the oatmeal-porridge poultice, to which a little butter may be added with advantage. A spoonful or two of yeast may be added, if there are foul discharges, or charcoal may be used alone, or sprinkled on the surface of the poultice before it is applied, or it may be made with a non-irritating antiseptic lotion instead of plain water (e.g. corrosive sublimate, 1 to 2000). Carrot poultices are in great favour with the people in some parts of the country. Hemlock poultices, made of the fresh leaves, or of the dried leaves, with the aid of some powder of the leaves, form a valuable sedative application in painful diseases; and poppy-heads, or even opium, are sometimes infused in the water of which a poultice is made, for the same purpose. A stimulating poultice may be made by sprinkling oil of turpentine, or chloroform, or mustard in moderate quantity on the surface of any ordinary poultice. When considerable irritation of the skin in a short time is desirable, a mustard poultice or sinapism (*sinapi*, 'mustard') is used.

Poultry (Fr. *poule*, 'a hen;' Lat. *pullus*, 'a chicken;' Eng. *pullet*) is the term by which are known the birds brought by man into domestication, and usually embraces the ordinary fowl, ducks, geese, turkeys, and guinea-fowl. From the time when man began to abandon his nomadic manner of life and settle down into settled habitations, poultry in one form or another have been brought into subjection, taking the place of the wild birds which, when he wandered, he was able to snare or kill, but which fled from him when he chose one abode. Only in Asia is the ordinary fowl found in a wild state, chiefly in India. Here is yet to be found the *Gallus ferrugineus*, or *G. bankiva*, which, from its resemblance in every way to the modern fowl and the freedom with which the two breed together, is accepted as the progenitor of nearly all our domesticated varieties. At one time it was thought to be the parent of all, and this was the view of Darwin; but later researches have led to a modification of this opinion; there is no wild breed of fowl to which the Brahma and Cochin type of fowl can be traced. The Jungle-fowl of India, or *G. bankiva*, has plumage and colour not very dissimilar to the game fowl, and this type prevails largely in the great dependency. From the time of the ancients poultry have been bred and kept. Many records found in the writings of early days refer to the fighting qualities of the cock, and in some countries he was bred largely, if not chiefly, for this propensity. Theognis, Aristophanes, Aristotle, Diodorus, Æschylus, Plutarch, Plato, and Pliny all make reference in their writings to the fowl, which seems to have gradually spread over

Europe, being, it is supposed, brought into Britain by the Romans, since whose time it has been an important member of our domesticated animals. The fighting qualities of game fowls have always been specially studied, and Cock-fighting (q.v.) was once a recognised sport in the United Kingdom, followed by all classes of society.

Poultry are valued for two purposes: (1) for their flesh, and (2) for the eggs produced by them. In those varieties which are specially bred for the table the flesh is abundant, fine in texture, excellent in flavour, and easily digested. It enters very largely into the food-supply of the country in an ever-increasing ratio, and is strongly recommended to invalids or persons of weak digestion. Eggs (q.v.) are consumed to an even greater extent, and more generally than can ever be the case with poultry; for they are within the reach of all persons, and are used for every form of cooking, as also largely for manufacturing purposes. The great and ever-increasing demand in Britain for this class of food is seen in the vast imports, which have grown so enormously. In 1864 the value of eggs imported from the continent of Europe was £835,028; in 1870, £1,102,080; 1875, £2,559,860; 1880, £2,235,451; 1885, £2,929,085; and 1890, £3,428,802, besides poultry to the value of about half a million. And in the same period it is estimated that the eggs and poultry received into Great Britain from Ireland, which has always been a large poultry and egg producing country, amounted to one and three-quarter million pounds sterling, so that Britain's poultry and egg consumption, if we take the value of home production as equal to that of Ireland, is nearly seven and a half million pounds annually. A calculation was made in 1890, for the French minister of Agriculture, that the income derived from the sale of eggs and poultry in that country is £13,496,000—viz. £6,140,000 for poultry, and £7,356,000 for eggs. The number of fowls is computed at 45,000,000, representing a value of £4,500,000. It has been said that the daily consumption of eggs in the United States is 44,000,000, which would represent an annual value of more than $200,000,000.

Although the breeds of poultry are not so numerous as are those of pigeons, the development of breeds since the era of poultry-shows has been very great, and we have now some forty distinct varieties, several of which are again subdivided by different colours. There are about twenty varieties of ducks, seven of geese, and six of Turkeys (q.v.) domesticated. Ducks are most prolific layers, and there is always a good demand for their eggs, especially by cooks and confectioners. The breeds of ducks valued for table purposes and for breeding are almost all good layers—the Aylesbury, Pekin, and Cayuga breeds being famous; the eggs of the Rouen breed are rather smaller than those of Aylesburys. Fowls may be divided into four classes—viz. table breeds; laying or non-sitting breeds; general purpose breeds; and fancy or ornamental breeds.

Table Poultry.—Characterised by rapid growth, fine quality of flesh, and great breast development. *Dorkings.*—Old English breed, square bodied, white legs and feet, and five toes; four colours. *French.*—Seven varieties, all marked by large size, rich flesh, chiefly dark-legged. *Game.*—Have great breast muscles and fine flesh; not so large as the breeds already named; nearly half a score colours of game fowl may be found. *Indian Game.*—A very large breed, bred chiefly in Cornwall; beautiful in flesh quality, but darker than dorkings or French, and heavier in bone; can be fed up to a great size. In addition to these may be named Aseels and Malays, which are good as table fowls.

Laying or Non-sitting Poultry.—In these the laying powers have been greatly developed (some varieties producing upwards of 200 eggs per annum), and the maternal instinct has been suspended by disuse. They are chiefly of the Mediterranean family, but not exclusively so. These Mediterranean varieties have large single combs, a lightish body, and include Anconas (speckled), Andalusian (blue), Leghorns or Italians (of which are ten colours), Minorcas (black), and Spanish (black with long white faces). *Hamburghs.*—Under this term are two families, the Yorkshire and Lancashire Pheasant Fowls (spangled and black), as also the Redcaps, and the Dutch (pencilled), all very beautiful, and the most prolific layers we have. *Houdans.*—Another French breed, with a crest, pale legs, and five toes. *Polish or Polled.*—Have a very large crest, are good layers, but are delicate; of these there are six colours. *Scotch Greys.*—A cuckoo-plumaged fowl, with pale legs, good flesh, and suitable for cold climates.

General Purpose Poultry.—Breeds which are not specially good in any one quality, but well balanced and good all round; chiefly of the Chinese type—i.e. heavy in leg and bone, large in size, and with high tails. *Brahmas*—A Chinese fowl modified in Europe and America; two colours. *Cochins.*—The breed which made such a furore in the 'Fifties;' very handsome, but poor as a layer and moderate in flesh; five colours. *Langshans.*—Like the Cochin, of Chinese origin; an excellent layer of eggs with buff-tinted shells, and a capital table fowl; one variety, black in plumage. *Plymouth Rocks.*—A variety of American making, cuckoo in plumage, and excellent in economic qualities. *Wyandottes.*—Also of American origin; equal as a layer and for the table; four colours. All these make excellent mothers, as do most of those in the table-poultry section, and are very hardy.

Fancy or Ornamental Poultry.—These include the breeds which are either bred alone for their beauty or peculiarity of plumage, or by reason of diminutive size are of no service for economic purposes. They embrace the Game Bantams (six varieties), Bantams (thirteen varieties, but constantly being added to, many from China and Japan), Japanese Long-tailed, Silkies, Sultans, Frizzled, Naked Necks, Rumpless, &c.

That poultry can be made profitable is undoubted, but hitherto all attempts to establish poultry-farms as such have ended in failure. Considerable profit is often made by those who breed and exhibit pure-bred poultry, whilst the advantage of having fresh eggs and home-fed poultry is sufficient inducement to many who have the opportunities of keeping a few fowls, apart from the pleasure derived from them. Poultry can be kept under many conditions, and have been found to thrive in the most unlikely places, but all their wants must be artificially supplied. To maintain them in health they should have a house dry above and below, with 16 square feet of floor space for every half-dozen fowls of the medium-sized varieties, an outside shelter in which is placed a dust bath, this being the way in which their skin and feathers are cleansed, and an open run without. If they can be given full liberty it is all the better, for which reason movable houses placed out in fields or parks are the best; but often it is impossible to do this, and then not less than 6 square feet of ground should be allowed to each fowl if the run is laid in gravel or sand, or 100 square feet per bird if in grass, or it will all be eaten off and the ground left bare. Absolute cleanliness is essential for them in houses, nests, and runs, and the ground should be changed every two or three years, or it is liable to become foul from the richness of their manure. Fowls naturally eat grain, slugs, worms, &c., and, if the latter are not obtainable in the ground by them, some substitute must be provided. For laying birds it is found that soft food is very beneficial, and it should be given in the morning, with hard corn in the later part of the day. Sitting hens should be provided for apart from other stock, as they require to be in a quiet place. The time of incubation is twenty-one days. When the brood has made its appearance the hen and chickens should be placed out in a coop, and the latter fed every two hours for the first fortnight, every three hours for the next two weeks, and after that four times a day until they reach maturity. Artificial incubation and brooding are very largely adopted by poultry-breeders, and have been brought to a remarkable state of perfection, the machines now sold working with great regularity and precision (see INCUBATION). The advantage of incubators is that they can be used at any period of the year, and are not dependent upon the weather, as is the case with hens. The Hearson and Westmeria incubators are the best, and the Westmeria brooder has proved remarkably successful for all kinds of poultry. This plan of working is largely employed in France and America. Poultry are polygamous, and from four to ten hens should be placed with each cock bird, according to breed and the season of the year.

Poultry-farming.—Many attempts have been made to establish poultry-farms, but they have always ended in failure, and it has come to be regarded as an axiom that poultry will not pay. The reasons for this failure have been twofold: first, that the amount of space necessary to keep the fowls in health when in large numbers, and the consequent increase in labour, were too heavy charges against the enterprise; and second, the placing of a large number of birds together, under conditions which were unhealthy, induced disease, and so ruined the scheme. The great mistake has been made in attempting poultry-farming as a separate industry, rather than as part of a larger enterprise. Where it can be grafted upon other work, an addition to the business of farming or fruit-growing, it can be, and has been, made successful in several notable instances. In these there is no separate charge for land; the labour is not on account of it alone; a large portion of the food needed by the fowls is obtained by themselves from the ground, and such as is given is at the first cost; the produce can generally be sold with what other is going to market, and especially if dairying or fruit-growing be also entered into, those who purchase milk or butter or fruit being generally willing to buy the eggs and chickens; and, finally, the land is enriched by the manure of the fowls, whilst its employment for other purposes will prevent its becoming foul, the great danger when only poultry are kept on the land, for disease is speedily induced by foul ground. The force of events during recent years has compelled many British farmers to take up what were at one time regarded as minor pursuits, and branches of farming which in themselves are not sufficient to give a living—for which reason they were neglected for larger things—have received attention. Or, as it has been expressed, 'commercial poultry will only pay as an accessory to something else, whether it be a farm or a household—to eat scraps which would otherwise be wasted . . . and to give to the land, in the shape of manure, properties which cannot otherwise be obtained except by a heavy outlay.' When we look to France, where poultry are bred to such an enormous extent, we find that poultry-farms as such have no existence, but that fowls are kept by every farmer and cottager. The same remarks apply to Italy, Denmark, and Ireland, from all of which countries England receives large supplies of eggs and poultry. In the wine districts of France fowls are permitted to wander amongst the vines all the year round, except just when the fruit is forming, and they do a most serviceable work in cleaning and manuring the ground. The poultry houses are placed in the vineyards, and in many cases are made sufficiently narrow to pass between the rows of plants.

In France, in the Surrey and Sussex districts of England, and also at Aylesbury, where so many ducks are fattened every year, systems of fattening are extensively carried on, but as a rule, in France especially, those who rear the birds do not fatten. Fattening is a business by itself, birds being purchased from the breeders when about eight weeks old. They are put into pens and fattened for a period varying from three to ten weeks, either by hand or with machines. Some of the latter are very elaborate, but as a rule they are simple. The head of the fowl is held in the left hand, and a brass nozzle, attached to a piece of india-rubber tubing, and connected with a cylinder, is inserted into the mouth of the bird. In this cylinder is a supply of liquid food, made of buckwheat or some other meal, milk, and a little fat, and it is so arranged that when a pedal is pressed by the foot a portion of the food, varying according to the stage of fattening—for it is increased in quantity each day until the process is completed—is injected through the tube and nozzle into the bird's crop. By this means the fattening is carefully and skilfully conducted, and there can be no doubt of the result, as every one who has tasted a well-fattened French fowl will be able to testify. In the La Bresse, Le Mans, and La Sarthe districts of France the number of fowls fattened every year is enormous, and the best specimens realise very high prices. The flesh is beautifully tender and white, and much more abundant than would be possible on an unfattened fowl. In Surrey and Sussex the method adopted is somewhat different, in that the birds are either fed by hand or with heavy crank cramming-machines, powerful enough to force semi-liquid food into the crop of the fowl. Here the process does not last more than three weeks. When the birds are killed they are immediately plucked, and placed, before they become quite cold, on shaping boards, so made as to give them the best appearance. In Ireland there is very little fattening carried on, and consequently the poultry from that country are poor and sell at about the lowest price on the English market.

Where poultry are kept in large numbers the best method of housing is by means of movable or portable dwellings, for these can be transferred about from place to place, giving the fowls fresh ground and distributing their manure, which is very valuable indeed, over the land. Under no circumstances should more than fifty be kept in one flock; and it will be found in practice that they will not wander far from their home, or mix with each other, even if the houses be placed in adjoining fields. The ordinary methods of management are applicable here. There can be no question that the increase in the size of farms, which has taken place within the last half of the 19th century, has done much to discourage poultry-keeping, and the opposite tendency ought to have a reactive effect (see PEASANT PROPRIETORS). Much might be done in the way of encouraging poultry-keeping by cottagers, who could maintain them with the minimum of cost and the maximum of results. A very important factor in successful poultry-keeping is the selection of right breeds, and it is essential that the produce should be marketed as speedily as possible. An egg two days old is worth twice as much as when two weeks laid, a fact which should always be borne in mind, but is too often forgotten. In the great cities and densely populated districts there is a constant demand for fresh eggs, and at high prices. To secure the best returns all eggs and poultry should be sent to market clean, well packed, and in the best possible condition. The supply of the commoner varieties of poultry produce is very large, and the prices obtained are consequently small, but there is no limit to the demand for high-class qualities at remunerative figures.

See L. Wright, *The Illustrated Book of Poultry* (new ed. 1885); Tegetmeier, *Poultry Book* (new ed. 1872); *Poultry: their Characteristics, &c.* (Dean & Son); S. Beale, *Profitable Poultry-keeping* (1883); *Poultry-keeping as an Industry for Farmers and Cottagers* ('Fanciers' Gazette'); I. K. Felch, *Poultry Culture* (Chicago, 1886).

Pounce, powdered rosin, or some gum-resin such as mastic, sandarach, or copal, and also the powder of cuttle-fish bones. It is used for sprinkling over freshly-written writing to prevent blotting; fine sand is often substituted on the Continent for pounce. Blotting-paper has superseded the use of pounce in Great Britain.

Pound (Sax. *pund*, Ger. *pfund*, Lat. *pondus*, 'weight'), long the unit of weight in the western and central states of Europe, differing, however, in value in all of them. The symbol 'lb.' for it is equally general, and is derived from the Latin word *libra*. The old English pound, which is said to have been the standard of weight from the time of William the Conqueror till that of Henry VII., was derived from the weight of 7680 grains of wheat, all taken from the middle of the ear, and well dried. For the difference between the present avoirdupois and troy pound, see AVOIRDUPOIS, WEIGHTS AND MEASURES. In the British Pharmacopœia of 1864 the troy ounce was given up, and the pound avoirdupois and the ounce avoirdupois were adopted. See also LIVRE, MARK.

The pound weight of silver, a common money standard among the ancient Romans, was introduced by them into the countries they conquered, and thus the term 'pound' became a designation of a certain amount of coined money. Thus, nowadays, the English pound is considered as something (a coin or otherwise) equivalent to 20 shillings, but originally it denoted the pound of silver which was coined into 20 shillings. From Edward II.'s time the coins were more and more diminished in size, that monarch coining 25 shillings from a pound of silver; while from the same weight of bullion his various successors coined 30, 45, 48, 96, 144, 288, in the time of Elizabeth 60, and under George I. 66 shillings to the pound of silver, and this rate still continues, the term 'pound' being severed from its original meaning, and signifying 20 shillings of the present coinage. The sovereign of gold was first struck under Henry VII.; its value rose to as much as 30 shillings; under Charles II. it was fixed at 21 shillings, and the sovereign was superseded by the Guinea (q.v.) till 1817 (see MONEY, MINT). The pound Scots, originally of the same value as the English one, sank in value after 1355 till in 1600 it was but one-twelfth of the value of the English pound, and was accordingly worth 1s. 8d.; it was divided into twenty shillings, each worth an English penny. The Treaty of Union provided that the money thereafter used should be of the same standard and fineness throughout the United Kingdom.

Pound, in English law, means an enclosure, of which there was generally one in every parish or manor, in which stray cattle were put and detained until the damage done by them was paid for. Whenever a stranger's or neighbour's cattle trespass on another's lands the latter can seize them, and take them to the pound, or impound them, as it is called, *damage feasant*, and can keep them there till the expenses are repaid. There was a distinction between pound overt, or common pound, and pound covert, or close pound; in the former case the owner of the beasts could go and feed and water his cattle while impounded, and it was his duty to do so; but not in the latter case. Now it is compulsory for the impounder in all cases to supply the cattle with food, otherwise he incurs a penalty; and if impounded cattle are not sufficiently fed a stranger who feeds them may not only trespass on lands to do so, but can recover the costs from the owner of the beasts. Goods distrained, if liable to be stolen or damaged, should be deposited in pound covert. At Madresfield, near Malvern, a public pound was repaired so recently as 1888; but practically they are quite obsolete, since the law now permits a person distraining for rent to secure the distress on the premises (see DISTRESS). In the United States estrays are generally liable to be sold for the benefit of the poor of the place where they are found, or for some other public use.

Poundal, a name sometimes used for the absolute foot pound second unit of force, which will produce in one pound a velocity of one foot per second, after acting for one second.

Pounds, JOHN. See RAGGED SCHOOLS.

Poushkin. See PUSHKIN.

Poussin, NICOLAS, a painter of great celebrity, was born at Les Andelys in Normandy in June 1594, went at the age of eighteen to Paris, and studied under Ferdinand Elle, the Fleming, Lallemand, and others, but chiefly improved himself by drawing from casts, and drawings and prints after Raphael and Giulio Romano, in the collection of M. Courtois, who accorded him access to them. After a long and hard struggle he attained the object of his desire—the means of visiting Rome. He was thirty years of age when he arrived there, and a considerable period elapsed after that before he obtained much employment. At length, however, he received several important commissions from the Cardinal Barberini, which he executed so successfully that he afterwards rapidly acquired fame and fortune. After an absence of sixteen years he returned to Paris with M. de Chanteloup, and was introduced by Cardinal Richelieu to Louis XIII., who appointed him his painter in ordinary, with apartments in the Tuileries and a small salary. But in 1643, annoyed by intrigues against him, he returned to Rome; and there, after producing a large quantity of admirable work, he died on 19th November 1665. His style is a combination of classical ideals and Renaissance tendencies; his colours have changed so as to interfere with the harmony of his pictures, whose noble designs may be admirably studied in the numerous engravings of them. The finest collection of his works is in the Louvre; but some of the best are in the National Gallery, at Dulwich, and in English private collections.—His nephew, Gaspar Dughet (1613–1675), assumed his uncle's name, and as GASPAR POUSSIN became famous as a landscapist, his renderings of the Roman Campagna being especially noted. He worked also in tempera and fresco. The National Gallery possesses his 'Sacrifice of Abraham.'

See works on Nicolas Poussin by St Germain, Bouchitté (1858), and Poillon (2d ed. 1875), with an article by Lady Dilke (E. F. S. Pattison) in *L'Art* (1882).

Pout. See BIB. The name Horned Pout and Bullpout are given in America to the siluroid *Amiurus*, also called Catfish (q.v.).

Poverty Bay. See GISBORNE.

Powan, another name for the Gwyniad (q.v.). See COREGONUS.

Powell, Baden, physicist and theologian, was born in London in 1796, was educated at Oriel College, Oxford, in 1821 became vicar of Plumstead, and in 1824 was made F.R.S. From 1827 till his death, 11th June 1860, he was Savilian professor of Geometry at Oxford. He published a history of natural philosophy (1834), treatises on the calculus (1830), optics (1833), and the undulatory theory of light (1841); but he is best known by his contribution on the evidences of Christianity to the *Essays and Reviews* (q.v.), and by other theological works, regarded at the time as dangerously 'liberal' in tendency. These include *Essays on the Plurality of Worlds* (1856), *Christianity without Judaism* (1857), *Natural and Divine Truth* (1857), and *The Order of Nature* (1859).

Powell, John Wesley, an American geologist and anthropologist, was born at Mount Morris, New York, 24th March 1834, and served through the civil war, in which he lost his right arm and rose to the rank of major. He was afterwards professor of Geology in the Wesleyan and Normal universities, Illinois; in 1868 spent three months of hardship and peril in exploring the cañon of the Colorado; and in 1870 a survey of that river and its tributaries was placed by congress under his direction. While so engaged he devoted special attention to ethnological researches, and in 1879 he was made director of the new Bureau of Ethnology; in 1881 he was appointed also director of the United States Geological Survey. Major Powell in 1886 received the degree of Ph.D. from Heidelberg and that of LL.D. from Harvard, and in 1887 was president of the American Association for the Advancement of Science; in 1879, as vice-president, he had delivered an address on 'Mythologic Philosophy.' Besides the *Exploration of the Colorado River in 1869–72* (1875), *Lands of the Arid Region of the United States* (1879), &c., his works include *Contributions to North American Ethnology*, and *Outlines of the Philosophy of the North American Indians* (Reports of Bur. of Eth.).

Powell, Mary. See Milton.

Power is a legal term, to some extent identical in meaning with such terms as liberty, faculty, &c. A public officer is empowered to do certain acts which are not permitted to private persons. An individual, not under disability, has power to bind himself by contract, and to dispose of his property: if he chooses to settle his property he may effect the purposes of the settlement by conferring powers on himself and others; he may, for example, reserve to himself a power of revocation; he may give power to a person who takes a life interest to charge the inheritance with portions for daughters, &c. Powers of appointment are commonly used in English settlements to enable parents to appoint or distribute settled property among their children. Such powers must be exercised in good faith, and with the forms prescribed by the settler who confers them. A power of attorney is a deed whereby one person appoints another to do some act on his behalf or to represent him generally. A, for example, may make B his attorney, to manage his estate and receive the rents during A's absence abroad. Forms of such powers are given in Davidson, Prideaux, and other books of precedents; the difficult legal questions which arise in regard to powers over settled property are discussed in the treatises of Sugden and Farwell.

Power. For the Mechanical Powers, see Mechanics; and for various motive powers, see Air-engine, Gas-engine, Steam, Pneumatic Despatch, Fuel; see also Horse-power, Transmission of Power. For the 'Great Powers' of the world, see Balance of Power.

Powers, Hiram, American sculptor, was born a farmer's son at Woodstock, Vermont, July 29, 1805. While still a boy he went to Cincinnati, Ohio, where he became an apprentice to a clockmaker, and about the same time formed the acquaintance of a German sculptor, who taught him to model in clay. Subsequently he was employed for seven years making wax figures and fitting them with machinery for the Cincinnati museum. In 1835 he went to Washington, where he executed the busts of several distinguished persons. Two years later he was enabled to proceed to Italy to study his art, and he resided in Florence till his death on 27th June 1873. There he produced his statue of 'Eve,' which excited the admiration of Thorwaldsen, and in 1843 the still more popular 'Greek Slave,' of which six copies in marble, with cast copies innumerable, were produced. Of his 'Fisher Boy' (1846) three copies were ordered. Among his other works the chief were 'Proserpine,' 'Il Penseroso,' 'California,' 'America,' and busts of Washington for the state of Louisiana, of Calhoun for South Carolina, and Daniel Webster for Boston, as well as those of J. Q. Adams, Andrew Jackson, Marshall, Van Buren, and other distinguished Americans.

Powhatan. See Pocahontas.

Powis Castle. See Welshpool.

Poynings' Act. See Ireland, Vol. VI. p. 204.

Poynter, Edward John, painter, was born in Paris, 20th March 1836, the son of Ambrose Poynter, architect, and great-grandson of Thomas Banks, sculptor, R.A. He was educated at Westminster, Brighton College, and Ipswich grammar-school. Very delicate health caused him to be sent to Madeira for the winter of 1852–53, and from this visit arose the earnest desire to become an artist. The winter of 1853–54 was spent in Rome, and here he made the acquaintance of Frederick Leighton, then a young man painting his picture of 'Cimabue,' who allowed Poynter to work in his studio, drawing from the models and drapery from which he was studying for his picture. In 1856 he went to study in Paris, and in 1860 settled finally in London. He now made many designs for stained glass, and drawings on wood for *Once a Week* and other periodicals, and for Dalziel's projected illustrated Bible. This led him to study Egyptian art; and in 1864 he began his large 'Israel in Egypt' (1867). His water-colours are numerous, and he was elected to the Royal Water Colour Society in 1883. In 1868 he was made an A.R.A., in 1876 an R.A. In 1871 he was appointed Slade professor, and in 1876 Director for Art and Principal of the training-schools at South Kensington—appointments which in 1881 he resigned as interfering too seriously with his time for painting. Among the most important of his works are 'The Catapult' (1868); 'The Prodigal Son' (1869); 'The Ibis Girl' (1871); 'The Festival' and 'The Golden Age' (1875); 'Zenobia' (1876); 'A Visit to Æsculapius' (1880, now at South Kensington); 'The Ides of March' (1883); 'Outward Bound' (1886); 'A Corner of the Market Place' (1887); 'Under the Sea Wall' (1888); 'A Corner in the Villa' (1889); 'The Visit of the Queen of Sheba to Solomon' (1890); and 'Perseus and Andromeda' (1872), 'The Dragon of Wantley' (1873), 'Atalanta's Race' (1876), 'Nausicaa and her Maidens' (1879), all painted for the Earl of Wharncliffe, and now at Wortley Hall. In 1869–70 Mr Poynter did the cartoons for a large mosaic of St George in the central lobby in the Houses of Parliament. In 1882–84 he painted designs for the decoration of the dome of St Paul's, and cartoons (full size) for one portion of the dome. Of portraits may be mentioned those of Lord Ripon (1886), Sir Gerald Graham (1886), and the Earl of Harewood (1888). In 1894 he became director of the National Gallery.

Pozzo di Borgo, CARLO ANDREA, COUNT, was born near Ajaccio in Corsica, 8th March 1764, and was educated at the university of Pisa. He practised as an advocate in Ajaccio, and in 1790 joined the party of Paoli (q.v.). He had hitherto been the friend of Napoleon Bonaparte; but this step of siding with Paoli turned the friendship into hate, which on Pozzo di Borgo's side became the ruling passion of his life. Paoli made him president of the Corsican council of state in 1794, and subsequently secretary of state; but in 1796 he was obliged to seek safety from the Bonapartes in London. Two years later he went to Vienna and effected an alliance of Austria and Russia against France. In 1803 he entered the Russian service as a councillor of state, and was employed in many important diplomatic missions. After the battle of Jena he laboured to unite Napoleon's enemies against him, and again in 1809 and 1812. He also effected the seduction of Bernadotte, crown-prince of Sweden, from the Napoleonic cause; and after the allies had driven Napoleon across the Rhine, Pozzo di Borgo drew up the famous declaration, 'that the allies made war not on France, but on Napoleon.' It was he who urged the allies to march on Paris. He represented Russia at Paris and the Congress of Vienna, at the Congress of Verona, and in London, but retired from public life in 1839, and settled in Paris, where he died, 15th February 1842. See *Notice Biographique* by Vuhrer (Paris, 1842).

Pozzuoli, a city of Southern Italy, on the Bay of Naples, 7 miles W. of Naples, with which it is connected by tramway, a city particularly interesting from its numerous memorials of classic ages. Its cathedral was the Temple of Augustus. The Temple of Serapis or Serapeum had a rectangular colonnade of twenty-four pillars, surrounding a round temple with sixteen pillars. Some have alleged that the outer enclosure surrounded a market-place. Some of the pillars still standing are much eaten into by the lithodomus mollusc (see BORING ANIMALS), showing that this volcanic coast was for a considerable time submerged to a depth of 13 feet beneath the sea, and subsequently upheaved again. Part of the ruins are still under the sea-level. There are the remains of an amphitheatre in which Nero fought as a gladiator, and which could seat 30,000 spectators; in it wild beasts refused to injure St Januarius and his companions, thrown to them by persecutors. There are also remains of temples to Diana and Neptune, and of the ancient harbour of Puteoli. Behind the town is the Solfatara (anciently called *Forum Vulcani*, as being the entrance to Vulcan's forge), a half-extinct volcano, from which issue currents of hot sulphureous gases, inhaled by sufferers with chest complaints, and springs of saline water, used as a remedy for cutaneous diseases. In the neighbourhood are Avernus (q.v.); the royal (Italian) hunting-lodge Astoni; Lake Lucrinus, celebrated for its oysters; the ruins of Baiæ (q.v.) and Cumæ (q.v.); and the Lake of Agnano, with the Grotta del Cane (q.v.). Of a very different interest are the military engineering works, the Stabilimento Armstrong, a little to the west of Pozzuoli; this is a branch of the famous Armstrong works at Elswick, near Newcastle, established here (1888–90) with the support of the Italian government. Pop. 11,967. The ancient *Puteoli* was made a Roman colony in 194 B.C. Towards the end of the republican period it became virtually the port of Rome, and during the empire was the first emporium of commerce in Italy. Puteoli was destroyed by Alaric, Genseric, and Totila, and, though rebuilt by the Byzantine Greeks, it was sacked by the Saracens (10th century) and the Turks (1550), and ruined by earthquakes (1198 and 1538). St Paul landed there.—For the volcanic earth found here and elsewhere, and called *Pozzuolana* or *Puzzolana*, see CEMENTS.

Practice, in Arithmetic, is the name given to a method, or rather a system of expedients, for shortening or avoiding the operation of compound multiplication. The nature of the expedients will be best understood by an example: Suppose that the price of 64,875 articles at £2 17s. 6d. is required. It is obvious that the price, at £1, would be £64,875; therefore, at £2, it is £129,750; at 10s. it is the half of that at £1, viz. £32,437, 10s.; at 5s., the half of this last sum, or £16,218, 15s.; and at 2s. 6d., the half of this, or £8109, 7s. 6d. The sum of these partial prices gives the whole price.

Praed, WINTHROP MACKWORTH (1802–39), was born 26th July 1802, at 35 John Street, Bedford Row, London. His name Winthrop came from American connections; Mackworth had been the surname of his father, who was a serjeant-at-law. After some training at a private school he went to Eton. Here he was more famous for literature than athletics, and was one of the most brilliant contributors to the well known *Etonian*. From Eton he passed in 1821 to Trinity College, Cambridge, distinguishing himself rapidly in Greek and Latin verse, and cultivating the lighter letters with increased success in Charles Knight's *Quarterly Magazine*, where he had for co-mates De Quincey, Macaulay, Moultrie, H. N. Coleridge, and others. In 1825, having won many college honours, he became tutor to the son of the Marquis of Ailesbury, intending to qualify for the bar, to which four years later he was called. In November 1830 he entered parliament for St Germains. He subsequently became member for Great Yarmouth, and later for Aylesbury, which he represented at his death on 15th July 1839. From 1834 to 1835 he was secretary to the Board of Control.

But for his short life Praed might possibly have been successful as an orator and politician. As it is, he derives his existing reputation from the finished and facile verses which he wrote almost from his childhood. He is the Coryphæus of the little band of rhymers whom criticism, according to its taste and fancy, either dignifies or stigmatises as writers of *vers de société*—a term in its stricter sense applied to those pieces which treat only of the sayings and doings of the fashionable world. The majority of Praed's efforts belong exclusively to this class; and in this line his note is so individual, his rhythm so brilliant, and his wit so bright, that it has hitherto been found more easy to imitate than to excel him. A typical example of this side of his talent is the poem called *A Letter of Advice*. But he is also admirable in a kind of metrical *genre*-painting—e.g. *The Vicar*, which, in the opinion of many, reaches a higher poetical elevation; while in *The Red Fisherman*, *Sir Nicholas*, and one or two other pieces, he not unskilfully emulates the manner of Macaulay and Hood. His characteristics as a verse-writer are point, elegance, and vivacity; it is his defect that these excellent gifts are but seldom relieved by any graver note. His collected verses, popular in America long before they were gathered together in England, appeared in 1864 in two volumes, with a memoir by the Rev. Derwent Coleridge; in 1887 followed his prose essays; and in 1888 his nephew, Sir George Young, edited his political poems. The best modern study of Praed is to be found in Saintsbury's *Essays in English Literature* (1890).

Præfect, a common name applicable to various Roman functionaries. The most important was the *Præfectus urbi*, or warden of the city, whose office existed at an early period of Roman history, but was revived under Augustus, with new and greatly altered and extended authority, including the whole powers necessary for the maintenance of peace and order in the city, and an extensive jurisdiction civil and criminal. The *Præfectus prætorio* was the commander of the troops that guarded the emperor's person.

Præfloration. See ÆSTIVATION.

Præfoliation. See VERNATION.

Præmonstratensians. See PREMONSTRATENSIANS.

Præmunire, the name given, in English law, to a species of offence of the nature of a contempt against the sovereign and his government, and punishable with forfeiture and imprisonment. The name is derived from the first words (*præmunire* or *præmonere facias*) of a writ originally introduced for the purpose of repressing papal encroachments on the power of the crown. The attacks of the popes on the rights of private patrons, by bestowing bishoprics, abbacies, &c. on favourites, often aliens, and the pope's insisting on deciding in his curia cases that ought to have been tried in the king's courts, were especially unpopular in England, and were the immediate cause of various statutes of præmunire. Severe penalties were imposed on those who gave or sought to enforce obedience to the papal encroachments. The Statute of Provisors (1350) was an early act of this sort. See ENGLAND (CHURCH OF), Vol. IV. p. 357. The first act called Præmunire was passed in 1353; but the name of Præmunire is specially used of an act of 1393, in which Richard II. re-enacted and strengthened the statute of Edward III. Under Elizabeth it was made a breach of the Statute of Præmunire to refuse the oath of supremacy. By later statutes a number of offences of a miscellaneous description were rendered liable to the penalties of a præmunire, as (by 6 Anne, chap. 7) the asserting that any person, other than according to the Acts of Settlement and Union, has any right to the throne of these kingdoms. The knowingly and wilfully solemnising, assisting, or being present at any marriage forbidden by the Royal Marriage Act is declared by 12 Geo. III. chap. 11 to infer a præmunire.

Prænesté. See PALESTRINA.

Prætor was, among the ancient Romans, the title given to the consuls as leaders of the armies of the state; but it was specially employed to designate a magistrate whose powers were scarcely inferior to those of a consul. The prætorship, in this specific sense of the term, was first instituted in 366 B.C., as a compensation to the patricians for being obliged to share with the plebeians the honours of consulship. It was virtually a third consulship; the prætor was entitled *collega consulibus*; he was elected by the same auspices and at the same comitia. For nearly thirty years patricians alone were eligible for the office; but in 337 B.C. the plebeians made good their right to it also. The prætor's functions were chiefly judicial. Though he sometimes commanded armies, and, in the absence of the consuls, exercised consular authority within the city, yet his principal business was the administration of justice both in matters civil and criminal; and to the edicts of successive prætors the Roman law owes much of its development and improvement. Originally there was only one prætor; but as the city and state increased, and their relations with other nations became more complicated, others were added. In 246 B.C. a second prætor was appointed, to settle disputes that might arise between Romans and foreigners temporarily resident at Rome, for trading or other purposes, hence called *prætor peregrinus* ('foreign prætor'), to distinguish him from the original *prætor urbanus* ('city prætor'). In 227 two new prætors were appointed, to administer affairs in Sicily and Sardinia; and in 197 two more for the Spanish provinces, or six in all. Sulla increased the number to eight, and Julius Cæsar to sixteen. Augustus reduced the number to twelve; but at a later period we read of eighteen, if not more. The city prætorship was reckoned the highest; and after a person had filled this office he sometimes received the administration of a province with the title of *proprætor* or *proconsul*.

Prætorian Guard (Lat. *Prætoriæ Cohortes* and *Prætoriani*), a body of soldiers organised for the purpose of protecting the person and maintaining the power of the emperors. We read of a *prætoria cohors*, or select guard of the most valiant soldiers, attached to the person of Scipio Africanus, but it is to Augustus that the institution of them as a separate force was owing. He formed nine or ten cohorts, each consisting of a thousand men (horse and foot), but kept only three of them in Rome, the rest being dispersed in cities not far off. Tiberius, however, assembled the nine cohorts at the capital in a permanent camp, and Vitellius increased their number to sixteen. The Prætorians served at first for twelve, and afterwards for sixteen years; they received double pay; the privates were held equal in rank to the centurions in the regular army, and on their retirement each received 20,000 sesterces. They soon acquired a dangerous power, which they exercised in the most unscrupulous manner, deposing and elevating emperors at their pleasure. Aspirants for the imperial dignity found it advisable, and even necessary, to bribe them largely; while those who acquired that dignity without their assistance were accustomed on their accession to purchase their favour by liberal donations. The Prætorians, however, had no political or ambitious views; they were simply an insolent and rapacious soldiery, fond of substantial gratifications, and careless how they got them. After the death of Pertinax (193 A.D.) they actually sold 'the purple' for a sum of money to Didius Julianus; but in the same year their peculiar organisation was entirely broken up by Severus, who formed new cohorts altogether out of the best legions serving on the frontiers, which he increased to four times the number of the old. After several other changes Constantine (312) dispersed them among his regular legions.

Pragmatic Sanction (sometimes *Pragmatic Rescript*), a solemn ordinance or decree of the head of a kingdom relating either to church or state affairs. The term originated in the Byzantine empire, and signified a public and solemn decree by a prince (*pragmatikos*, 'business-like,' later, 'versed in affairs,' 'official'), as distinguished from the simple rescript, which was a declaration of law in answer to a question propounded by an individual. This name is given to several important treaties, of which the principal are (1) that of St Louis in 1269 and (2) that of Charles VII. in 1437, in both of which the rights of the Gallican Church (q.v.) were asserted; (3) the instrument which settled the empire of Germany in the House of Austria (1439); (4) the ordinance by which Charles VI., emperor of Germany, having no male issue, settled his dominions on his daughter, the Archduchess Maria Theresa; (5) the settlement of the succession of the kingdom of Naples, which was ceded by Charles III. of Spain, in 1759, to his third son and his descendants.

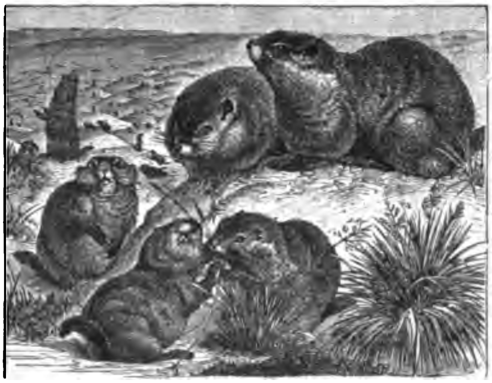
Prague (Ger. *Prag*, Czech *Praha*), the capital of Bohemia, and the third largest town of Austria-Hungary, is situated at the base and on the slope of the hills which skirt both sides of the isleted Moldau, 217 miles by rail NNW. of Vienna and 118 SSE. of Dresden. It offers a highly picturesque appearance from the beauty of its site, and the numerous lofty towers (more than seventy in number) which rise above the many noble palaces, public buildings, and bridges of the city. The fortifications have been gradually demolished since 1866. The royal Burg, on the Hradschin (240 feet), the ancient residence of the Dukes of Bohemia, dates mainly now from the 16th and 17th centuries, and has 440 rooms. The neighbouring cathedral of St Vitus (1344) is still unfinished, though building was resumed in 1867. Here are the splendid royal mausoleum (1589) and the shrine (1736) of St John of Nepomuk (q.v.), containing 1½ ton of silver. Of forty-seven other Catholic churches the chief are the domed Jesuit church of St Nicolas, with its lavish decorations, and the Teyn church (1407), the old Hussite church, with the grave of Tycho Brahé, and its marble statues of the Slavonic martyrs, Cyril and Methodius. Of five bridges and two railway viaducts the most striking is the Karlsbrücke (1357–1503), 543 yards long, with gate-towers at either end, and statues of John of Nepomuk and other saints. It was greatly damaged by flood in September 1890, but has since been restored. Other noteworthy objects are the town-hall (1381–1884), the Pulverturm (1475), the new Czech Theatre (1883), the old Jewish graveyard, the Theresa Institution for Ladies, the vast Czerni Palace (now used as barracks), the Picture-gallery, and the Premonstratensian monastery of Strahow. Prague has, besides, numerous public gardens and walks in the suburbs, with several royal and noble parks open to the public in the vicinity of the city. The suburb of Karolinenthal, which is traversed by the great viaduct of the railway, and is of modern growth, has some fine buildings, numerous gardens, barracks, and manufacturing establishments; and somewhat farther north is the great botanical garden, with the neighbouring public walks on the Moldau. The university, founded in 1348, had 10,000 students at the beginning of the 15th century; but subsequently it had a long period of decay. It received a new constitution in 1881, having now two co-ordinate sides or sections, one German and one Czech, with respectively 156 and 140 teachers, and 1470 and 2361 students. It possesses a library of 195,000 volumes and 3800 manuscripts, a fine observatory, museums of zoology and anatomy, a botanical garden, &c. The manufactures include machinery, chemicals, leather, cotton, linen, gloves, beer, spirits, &c. Prague is the great centre of the commerce of Bohemia, and the seat of an important transit trade. Pop. with suburbs (1880) 293,822; (1889) 304,000; of the town proper (1890) 184,109, of whom 81 per cent. were Czechs, 2 per cent. Protestants, and 10 per cent. Jews.

History.—Prague was founded, according to popular tradition, in 722 by the Duchess Libussa, but really by German settlers about 1100. In the 14th century its munificently endowed university brought foreigners to it from every part; but in 1424 Prague was conquered and almost destroyed by the Hussites, who had made a successful stand against the Emperor Sigismund's army. In the Thirty Years' War it suffered severely, and in 1620 the battle was fought at the Weissenberg, near the city, in which the Elector-Palatine, Frederick V. (q.v.), was completely defeated, and compelled to renounce his assumed crown. Swedes and Imperialists successively gained possession of the town during the war; and a century later it again fell into the hands of different victors, having been compelled in 1744 to capitulate to Frederick the Great, who here on 6th May 1757 defeated 60,000 Austrians under Prince Charles of Lorraine. Until the downfall of Napoleon the city continued to suffer more or less directly from the troubles in which the House of Austria was involved. Since then, however, it has made rapid strides, and enjoyed prosperity and quiet, except in 1848, when the meeting of the Slavonic Congress within its walls called forth such strongly marked democratic demonstrations on the part of the supporters of Panslavism (q.v.) that the Austrian government dissolved the conclave, and restored quiet by the summary method of causing the old and new town to be bombarded for two days. In 1866 Prague was occupied bloodlessly by the Prussians, who here on 23d August concluded a treaty with Austria. The jealousy subsisting between the Czech and the German population was strongly accentuated on the occasion of the Exhibition of 1891. See *Statistisches Handbuch der Hauptstadt Prag* (3 vols. 1882–86).

Praia Grande. See RIO DE JANEIRO.

Prairie (Fr., 'meadow') was the name given by the early French explorers of the northern portion of the Mississippi Valley, North America, to the vast fertile and treeless plains which extend from Western Ohio and Southern Michigan across the states of Indiana, Illinois, Missouri, Arkansas, Iowa, Kansas, Nebraska, and North and South Dakota, including the southern portions of Wisconsin and Minnesota. The prairie region also extends northward into Canadian territory. These great plains or savannas are sometimes flat, but oftener rolling like the long swells of the ocean, and rise in gradual elevation from 300 to 1500 feet above the sea. See AMERICA, Vol. I. p. 215.

Prairie Dog (*Cynomys Ludovicianus*) is a small rodent closely allied to the European Marmot (q.v.); these animals have received their vernacular name on account of the barking sound which they utter. They live associated together in colonies consisting of numerous burrows excavated by the animals themselves; their range is entirely restricted to the parks and plains of the Rocky Mountain plateau region in North America, and there appear to be two distinct varieties. They have been popularly supposed to share their habitations, and to live in friendly relations, with rattlesnakes and owls. As regards the rattlesnake, it is more than probable that its occurrence in the burrows of the rodent is to be explained by a desire to make a meal of its neighbours, while the owl may have a similar purpose in view; it is also possible in both cases that the burrows may be



Prairie Dog (*Cynomys Ludovicianus*).

merely utilised as a temporary hiding-place. The Prairie Marmot is rather larger than a large rat, and is of a brownish-gray colour, the under surface grayish white.

Prairie Hen. See GROUSE.

Prâkrit is the collective name of those languages or dialects which are immediately derived from, or stand in an immediate relation to, Sanskrit (q.v.). See also INDIA, Vol. VI. p. 102.

Prase, a rarish green variety of Quartz (q.v.).

Pratique is, strictly, a limited quarantine. A ship is said to have performed pratique when her captain has convinced the authorities of a port that his ship is free from contagious disease; and he is thereupon permitted to open trade and communication with the shore.

Prato (often called *Prato in Toscana*), a walled town of Italy, by rail 10½ miles SE. of Pistoia and 11 NW. of Florence. It has a citadel and a cathedral with frescoes by Filippo Lippi, though the see has been united with that of Pistoia since 1653. There are manufactures of straw-plait, cloth, and paper and brass works. Pop. 15,510.

Prawn, a name applied indiscriminately to crustaceans belonging to the genera Palæmon, Pandalus, and Hippolyte. They are nearly allied to shrimps and lobsters, are mostly but not exclusively marine, and vary in size from a couple of inches to over a foot in some tropical forms. There are many species; thus, *Palæmon squilla*, *Pandalus annulicornis*, and *Hippolyte spinus* are common in the Firth of Forth, while others abound elsewhere. Many of them are semi-transparent, and exhibit very fine colours; they are also very active creatures, and most interesting inmates of an aquarium, but are excessively voracious, and apt to make great havoc among its other inhabitants. They are common on the British coasts, although not so abundant as shrimps, and are generally taken in the vicinity of rocks at a little distance from the shore. They may be caught in putting nets or in osier baskets, like those used for trapping lobsters. They are esteemed for eating even more highly than the shrimp. For illustration, see CRUSTACEA.

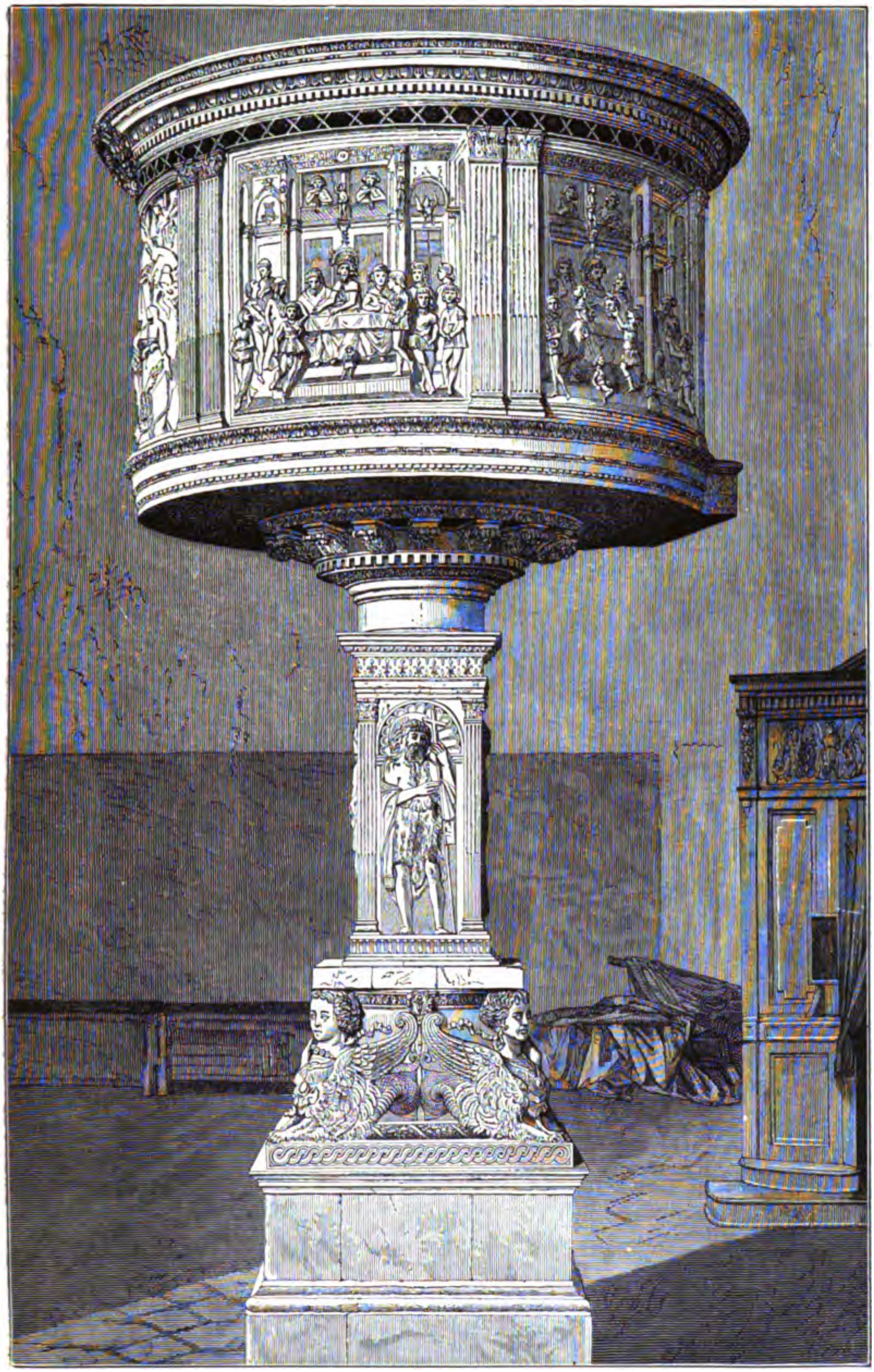
Praxinoscope. See ZOETROPE.

Praxit'eles, one of the greatest sculptors of ancient Greece, of whose life little is known, except that he was a citizen of Athens, and lived in the 4th century B.C. His principal works—nearly all of which have perished—were statues of Aphrodite (at Cos, Cnidus, Thespiæ, and elsewhere, of which that of Cnidus was the most famous), Eros (at Thespiæ), Dionysus (at Elis, Athens, Megara, and other places), Apollo (the best representing Apollo as the Python-slayer), and Hermes carrying Dionysus (found at Olympia in 1877). Feminine beauty and Bacchic pleasures were his favourite subjects; and in his treatment of these he displayed unrivalled sweetness, grace, and naturalness. His gods and goddesses were not very divine, but they were ideal figures of the fairest earthly loveliness.

Prayer is a universally acknowledged part of the worship due to God; not merely petition, but according to the New Testament models and Christian usage, praise, adoration, confession of sin, and thankful acknowledgment of mercies received. It is a simple and natural expression of dependence, which seems almost necessarily to follow from a belief in the existence of a god. Accordingly we find it both where the object of worship is one Supreme Being and in systems of polytheism. According to the Christian system, however, prayer is not the mere spontaneous approach of man to God in the endeavour to appease his wrath, to win his favour, or to obtain from him any blessing; but the right to approach him in prayer, and the warrant to expect advantage in doing so, rest on the revelation of his own will. Nor is any truth more indisputably taught in the Bible, or more frequently brought into view, both in the Old and in the New Testament, than that God is the hearer of prayer.

But a difficulty presents itself in respect to what may be called the theory of prayer. How can prayer be supposed to influence the divine mind or will? How can a belief in its power be reconciled with any view of the divine decrees, from the most absolute doctrine of predestination to the most modified scheme which recognises the Creator as supreme in the universe? Such questions bring up the same difficulty which attends all other questions of the relations between the human will and the divine, the freedom of man and the sovereignty of God. But whatever seeming inconsistencies may be implied in speculation concerning them, the necessity of prayer and the power of prayer are acknowledged equally by men of the most opposite views; and generally with an acknowledgment of the inability of the human mind to solve some of the problems which are thus presented to it. The extreme predestinarian includes prayer among the means decreed of God along with the end to which it contributes. And whilst prayer is regarded by all Christians as of great value in its reflex influence on the feelings of the worshipper, this is scarcely ever stated as its whole value. It is held by Christians in general that the only true way of access to God is through the mediation of Jesus Christ; and that prayer can be truly made, in faith and for things agreeable to God's will, only by the help of the Holy Spirit. The Protestant churches all hold that prayer is to be made to God alone; but in the Roman Catholic Church, and to some extent in the oriental churches, prayer of a kind is made also to saints, the Virgin Mary, and angels. But as the worship (*douleia*) of the saints differs from that (*latreia*) offered to God, so the invocation of saints and angels is not for the purpose of obtaining mercy or grace from them directly, but in order to ask their prayers or intercession with God on our behalf. For this practice Catholics rely not on the direct authority of Scripture, but on the unwritten word of God conveyed by tradition from very early times. The inscriptions in the catacombs prove that the church of the first centuries invoked the saints; and the famous fathers of the 4th century expressly insist on such invocation. Protestants hold that prayer ought to be conducted in a language known to the worshippers. The Church of Rome has, on the contrary, maintained the general use of the Latin language, even though that language is unknown to most of the worshippers.

Forms of prayer for public use grew up in the earliest times, naturally and inevitably: the Lord's Prayer being doubtless regarded as a warrant and a model. Apparently the most primitive collection is that in the eighth book of the pseudo-Clementine *Apostolic Constitutions* (q.v.). The prayers in connection with the celebration of the eucharist in the Greek and Roman communions are dealt with at LITURGY. The most important post-Reformation collection of prayers, that of the Anglican Church, is dealt with in the next article. But most of the leading reformers prepared prayer-books. Luther's date from 1523 and 1526, Calvin's from 1538 (from Strasburg) and 1541 (from Geneva), John Knox's for the Church of Scotland (based on that of Geneva) from 1554. The growth of Puritan feeling in Britain led the Nonconformists, Presbyterians, and others to underrate the advantages of set forms of prayer, and to exalt the value of what is assumed



PULPIT IN THE CATHEDRAL AT PRATO.

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to be the spontaneous utterance of the heart. And ultimately it became usual to regard liturgical forms as essentially Episcopalian and un-Presbyterian, though the forms of church government are irrelevant to the question as to the best mode of guiding congregational prayer. Since 1857 a section of the Church of Scotland has made tentative efforts towards securing the use of printed forms of public prayer, without wholly excluding extempore prayer. See Lee (Robert). In 1888 the Assembly sanctioned a book of prayer for the use of soldiers, sailors, and others; and the *Euchologion*, prepared by the Church Service Society, has passed through several editions. In the United States liturgical forms of prayer have been almost wholly disused by all the churches save the Episcopal, Lutheran, German and Dutch Reformed, and Moravian churches. But since the middle of the 19th century there has been a manifest tendency to aim at increased dignity in Presbyterian prayer, and to bridge over the gulf that used to separate Presbyterians from the ancient church in the forms of public approach to the mercy-seat of God. Professor Shields's *Presbyterian Book of Common Prayer* is simply the Anglican prayer-book with the alterations proposed by the Presbyterians at the Savoy Conference. See Savoy Palace, Prayer-book.

Prayer for the Dead, in the Roman Catholic, Greek, and other oriental churches, is offered with the intention and expectation of obtaining for the souls of the deceased an alleviation of their supposed sufferings after death on account of venial sins, or of the penalty of mortal sins, remitted but not fully atoned for during life. The practice of praying for the dead is usually associated with the doctrine of Purgatory (q.v.) or with the belief in a progressive intermediate state (see Hell). It being once supposed that relations subsist between the two worlds, that their members may mutually assist each other, it is almost a necessary consequence of the doctrine of purgatory that the living ought to pray for the relief of their suffering brethren beyond the grave. It seems certain that some such doctrine existed in most of the ancient religions. Its existence among the Jews is attested by the well-known assurance in 2 Maccabees, chap. xii., that 'it is a holy and wholesome thought to pray for the dead, that they may be loosed from their sins.' Catholics contend that the doctrine as well as the practice is equally recognisable in the early Christian church. They rely on the parable of Lazarus and the rich man (Luke, xvi. 19–31), as establishing the intercommunion of this earth with the world beyond the grave; and on Matt. xii. 32, as proving the remissibility of sin or of punishment after death; as well as on 1 Cor. xv. 29, as attesting the actual practice among the first Christians of performing or undergoing certain ministrations in behalf of the dead. The Fathers of the 2d, 3d, and still more of the 4th and following centuries frequently allude to such prayers, as Clement of Alexandria, Tertullian, St Cyprian, and especially St John Chrysostom, Cyril of Jerusalem, and St Augustine. The liturgies, too, of all the rites without exception contain prayers for the dead; and the sepulchral inscriptions from the catacombs, which reach in their range from the 1st to the 5th century, contain frequent prayers in even greater variety. In the services of the mediæval and later church prayers for the dead form a prominent and striking element (see Requiem). The Protestant churches without exception repudiated the practice. In the burial service of Edward VI.'s First Common Prayer-book some prayers for the deceased were retained; but they were expunged from the Second Book; and no trace is to be found in that sanctioned under Elizabeth. Still it is not expressly prohibited, and it is cherished as a private and pious aspiration by not a few within the modern Church of England, as, in Coleridge's phrase, 'something between prayer and wish—an act of natural piety sublimed by Christian hope.'

On the doctrine of prayer, see Bickersteth, *Treatise on Prayer* (1856); Canon Liddon, *Some Elements of Religion* (1872); Newman Hall, *Prayer: its Reasonableness and Efficacy* (1875); Jellett, *The Efficacy of Prayer* (Donellan Lecture, 1877); the treatises on Apologetics, and manuals of Theology. On prayer for the dead, see Plumptre, *The Spirits in Prison* (1884); Luckock, *After Death* (1879), and *The Intermediate State* (1890). For modern scientific objections, see Romanes, *Christian Prayer and General Laws* (1874); Tyndall's British Association lecture (repub. 1874); and a series of articles in connection with Tyndall's 'Prayer Test' in *Contemp. Rev.*, vols. xx.–xxii., by Tyndall, Galton, and others, with answers by M'Cosh, the Duke of Argyll, and others. For other questions connected with prayer, see the articles Ave Maria, Paternoster, Kneeling, Rosary, Saint, Faith-healing.

Prayer, Book of Common. By this name are known the service-book of the Church of England and the corresponding formularies of other Episcopal churches which have either been derived from the Church of England or largely influenced by it, such as the Episcopal Church of the United States of America, the Church of Ireland, and the Episcopal Church in Scotland. The full title of the English Book of Common Prayer (viz. 'The Book of Common Prayer, and Administration of the Sacraments, and other Rites and Ceremonies of the Church, according to the use of the Church of England: together with the Psalter, or Psalms of David, pointed as they are to be sung or said in Churches; and the Form or Manner of Making, Ordaining, and Consecrating of Bishops, Priests, and Deacons') declares the varied character of its contents, and indicates that the volume includes many services besides those (viz. Morning and Evening Prayer) to which the term 'Common Prayer' is strictly applied in the technical language of liturgiologists. Thus it will be seen that this compendious service-book embraces elements coresponding to parts not only of the Breviary (q.v.), but also of the Missal (q.v.), the Pontifical (q.v.), and the Manual of the mediæval English Church, from which they were chiefly derived.

It is not our province here to consider generally the influences which operated to bring about the Reformation in England. It must suffice to observe that in regard to liturgical changes the main objects aimed at by the English Reformers were (1) to rid the services of features which were regarded as the outcome of superstition and ignorance (e.g. the invocation of saints, unhistorical and absurd legends read among the 'lessons,' &c.); (2) to introduce a more continuous and more extensive reading of Holy Scripture in the public services; and (3) to present all the services of the church in a language 'understanded of the people.' The publication in 1890 (from a MS. in the British Museum) of the draft, revised by Cranmer, of a reformed Latin breviary shows us how much the mind of the most influential of the English reformers had been influenced by the corresponding labours of Cardinal Quignon (see Breviary). The first and second of the objects above referred to were aimed at in this projected work of Cranmer, which was probably abandoned because the bolder design of giving the people all the services of the church in their native tongue had begun to be contemplated. Parts of the preface of Quignon's breviary were transferred, with some modifications, to the preface of the First Prayer-book, and still appear in the prefatory remarks entitled, in the present prayer-book, 'Concerning the Service of the Church.'

The first vernacular service put forth by authority for public use was the Litany (1544), differing in but few particulars from the form still to be found in the prayer-book. On the death of Henry VIII. liturgical reformation was less impeded, the advisers of the young king being favourable to change. The administration of the cup to the laity having been sanctioned by convocation and enjoined by parliament (1 Edward VI. chap. 1), a form for communion 'in both kinds,' in the English tongue, to be *added to* the Latin mass, was issued in 1548. But this form served only a temporary purpose, for in the following year (1549) was published and authorised the complete prayer-book in English, known as the First Prayer-book of Edward VI. In this book, with singular ability, attaining at times the level of genius, Cranmer and his coadjutors translated and adapted the breviary services of Matins, Lauds, and Prime, so as to construct the 'Morning Prayer' of the Book of Common Prayer; while, in a similar manner, Vespers and Compline were brought into the form of the 'Evening Prayer.' The English services were shortened chiefly by the great reduction of the number of psalms to be 'sung or said' daily. The lectionary was so arranged that the greater portion of the Old Testament was read through systematically in the course of the year, while the whole of the New Testament (with the exception of the Apocalypse) was read through thrice. The old English missals formed the basis of the English communion service, but therewith were combined the new features which had appeared in the 'Order of the Communion' (1548). The other services, as those for baptism, matrimony, burial, &c., were similarly framed, with much discrimination, from the corresponding mediæval services. The ecclesiastical books of the Eastern Church were not wholly unknown to the Reformers, as is testified to by their adoption of the so-called 'Prayer of St Chrysostom,' and by the unquestionable fact that the Athanasian Creed was translated by them from a Greek and not a Latin text. Occasionally the revisers did not scruple to adopt features from more modern sources (e.g. the *Pia Deliberatio* of the reforming Archbishop Hermann of Cologne). The liturgical revision of 1549 was conducted in a spirit at once conservative and critical, and is marked by a singular combination of independence with reverence for the past.

Owing partly to home influences and partly to the influence of foreign reformers (many of whom were then resident in England, including Bucer, regius professor of Divinity at Cambridge, and Peter Martyr, regius professor of Divinity at Oxford), Cranmer and his associates ceased to be content with the doctrinal colouring of the First Prayer-book; and in 1552 there appeared a revised book (the Second Prayer-book of Edward VI.), marked by many changes mainly favourable to more Protestant views. As a characteristic example may be cited the change made in the words used at the communion in delivering the consecrated elements. In 1549 the words ran 'The body of our Lord Jesus Christ, which was given for thee, preserve thy body and soul unto everlasting life,' 'The blood of our Lord Jesus Christ,' &c. In 1552 these words were expunged, and for them were substituted 'Take and eat this in remembrance that Christ died for thee, and feed on him in thy heart by faith, with thanksgiving,' 'Drink this in remembrance,' &c. In a similar spirit the 'Invocation' of the Holy Ghost on the elements—'that they be unto us the body and blood of thy most dearly beloved Son'—was removed (together with use of the sign of the cross) from the prayer of consecration. From the baptismal service the exorcism, trine immersion, anointing, and the use of the chrisom (or white robe) were omitted. From the burial service prayers for the dead were removed. The vestments of priests and deacons were reduced to the surplice, and those of the bishop to a rochette, for all ministrations. Among changes then made, though of little or no doctrinal significance, may be mentioned the addition of the sentences, introductory address, general confession, and absolution to morning and evening prayer, and of the decalogue and responses to the communion service.

On the accession of Queen Elizabeth the personal ecclesiastical sentiments of that masterful monarch made themselves sensibly felt. In the newly-revised prayer-book of 1559 (Elizabeth's Prayer-book) very few changes were made, but they pointed in one direction. The vestments and ornaments of the prayer-book of 1549 were again enjoined; in the litany the words 'From the tyranny of the bishop of Rome and all his detestable enormities, good Lord, deliver us' were omitted; in the communion service the words of Edward's two books at the delivery of the elements were combined in the form still in use; the declaration concerning kneeling (the so-called 'Black Rubric') appended to the communion service of Edward VI.'s Second Prayer-book was omitted.

During Elizabeth's reign the Puritan and Calvinist party within the church increased in strength, and the hopes of its members were raised high on the accession of James I., educated as he had been in Scotland under Presbyterian influence. Not many days after the king's accession he was presented by the Puritans with a petition, called, from the great number of signatures attached to it, the Millenary Petition. This craved for the removal of 'offences' from the prayer-book. The petitioners further suggested a conference, and to this suggestion the king acceded, the outcome being the Hampton Court Conference (January 14, 16, and 18, 1604), so called from its place of meeting. The issue of this conference was deeply disappointing to the Puritan party. The alterations made were comparatively few and unimportant: certain chapters of the Apocrypha (Tobit, v. vi. and vii., and Dan. xiv.) were removed from the lectionary; the words 'or remission of sins' were added as explanatory of the word 'absolution' at morning prayer; a prayer for the queen and royal family, together with some special thanksgivings, as 'for rain,' 'for fair weather,' &c., were inserted. The only changes of much significance were (1) the addition to the catechism of the part treating of the sacraments (attributed to the pen of Overall, Dean of St Paul's, and certainly not favourable to the views of the Puritans), and (2) the insistence on baptism being administered by the 'lawful minister,' as the church's order; while the *validity* of baptism administered by any person using water and the prescribed form of words is still implied in the text of the service. It is worth observing that, while to the three earlier revisions and the last revision (1662) were given parliamentary authority (2 and 3 Edw. VI. chap. 1; 5 and 6 Edw. VI. chap. 1; 1 Eliz. chap. 2; 14 Carol. II. chap. 4), James considered that the authority of the crown was sufficient to introduce changes, which he was careful to style 'explanations,' as though they were not additions.

The Book of Common Prayer 'for the use of the Church of Scotland' (1637), commonly known as 'Laud's Prayer-book,' was a revision of the English prayer-book, in the construction of which Wedderburn, Bishop of Dunblane, and Maxwell, Bishop of Ross, were chiefly concerned, their Engli [illegible] being Laud, Wren, and Juxo [illegible] remarkable for its revertin [illegible] service to some of the ch [illegible] First Prayer-book of E [illegible] vocation [illegible] ful d [illegible] at th [illegible] ply m [illegible] some of the difficulties that have since been raised in respect to the Athanasian Creed. The prose psalter of this prayer-book was taken from the authorised version of the Bible. The word 'presbyter' was used instead of 'priest.' The calendar records the names of certain Scottish saints—e.g. Columba, Ninian, Serf, Queen Margaret, &c.

The attempt to force this prayer-book upon the Scottish people in an arbitrary manner, emphasised, as it was, by the riot in St Giles' Cathedral, Edinburgh, on the occasion of its first being read (23d July 1637), and the national uprising that followed are parts of civil history. It should be added that the Scottish prayer-book, which had seemed to be strangled at its birth, was twenty-four years afterwards among the most potent influences affecting the revision which has brought the English prayer-book to its present shape.

During the years of the Great Rebellion it was enacted by an ordinance of parliament (January 3, 1645) that the 'Westminster Directory for the Public Worship of God' should take the place of the prayer-book; and a subsequent ordinance of the same year (August 23) made the use of the prayer-book in public 'or in any private place or family' punishable by a fine of £5 for the first offence, £10 for the second, and a year's imprisonment for the third. This harsh measure went a long way to provoke the reaction of the Act of Uniformity (1662).

On the restoration of the monarchy, in the vain hope of satisfying contending ecclesiastical parties a royal commission was issued (March 25, 1661) to twelve bishops and twelve Presbyterian divines (with nine coadjutors on each side to fill the places of members of the commission who might be absent) 'to advise upon and review the Book of Common Prayer, comparing the same with the most ancient liturgies which have been used in the church in the primitive and present times . . . and, if occasion be, to make such reasonable and necessary alterations, corrections, and amendments as shall be agreed upon for the giving satisfaction to tender consciences,' &c.

The meetings of the commission were held in the Savoy Palace in the Strand, London, and hence the name the 'Savoy Conference,' by which they are commonly designated. Among the best known of the divines of the Episcopal side were [illegible] Cosin, Sanderson, and Brian Walton, with [illegible] Pearson, Gunning, and Heylin. Among the Presbyterians the most eminent were Baxter, Calamy, Bates, Manton, and Reynolds. One of the most notable episodes in the history of the conference was the presentation by Baxter of a liturgy composed by himself in the space of a few days, which the Presbyterian commissioners desired should be authorised and placed on a footing of equality with the Book of Common Prayer. The conference, as was to be expected from the temper of the times, ended in the discomfiture of the Puritan party, very few of whose suggestions were adopted. Subsequently royal letters were addressed to Convocation directing the revision of the Book of Common Prayer. This revision brought the book to its present state, with the exception of changes in the lectionary, to be noticed below. The result of the revision was authorised by the Convocations of Canterbury and York, and [illegible] (19th May 1662) by parliament [illegible] p. 4).

[illegible] re noteworth [illegible] may be me [illegible] son in the a [illegible]

givings; and the reintroduction in a modified form of the commemoration of the departed in the communion service. While the general framework of the prayer-book was preserved intact, very many minute changes were made, more particularly in the rubrics. Speaking generally, the changes, when they possess any distinctive doctrinal [illegible], were marked by the dominant [illegible] church party. Two entire [illegible] added: (1) a service [illegible] made desirable by the [illegible] the Great Rebellion, [illegible] for the baptism [illegible] tions; and (2) a form [illegible] to be used at [illegible] majesty's navy [illegible] prayer-book [illegible] conformity with [illegible] of parliament [illegible] the great [illegible] *Sealed Books* [illegible] deposited in [illegible] the Courts [illegible] each cathedral [illegible]

In the year [illegible]

[illegible]

all consecrations, ordinations, and synods the form in the English prayer-book is required to be used. The Scottish Communion Office is based on the corresponding service in Laud's prayer-book, but many important changes have been made. Among the most noteworthy are (1) the transposition of the place of the prayer of consecration in relation to the prayer for 'the whole state of Christ's Church;' (2) the omission of the words 'militant here in earth;' (3) the alteration in the order of the parts of the prayer of consecration, so that it runs, (*a*) words of institution, (*b*) oblation, (*c*) invocation; (4) the substitution, in the invocation, of the words, 'that they may become the body and blood,' &c., for 'that they may be unto us the body,' &c. This last change is for its abruptness without parallel or precedent.

For the materials from which the prayer-book has been mainly constructed, consult Maskell's *Monumenta Ritualia Ecclesiæ Anglicanæ* (2d ed. 1882), and *The Ancient Liturgy of the Church of England* (3d ed. 1882); *Missale ad usum Sarum* (Burntisland ed. 1861–67); *Breviarium ad usum Sarum*, edited by F. Procter and C. Wordsworth (1879–86); *Breviarium Romanum Quignonianum*, edited by J. W. Legg (1888). The successive changes made in the English Prayer-book and the Scottish Prayer-book (1637) are admirably exhibited in parallel columns in Keeling's *Liturgiæ Britannicæ* (2d ed. 1851); they may also be studied in J. Parker's *The First Prayer-book of Edward VI., compared with the successive Revisions of the Book of Common Prayer* (1877). For the history of the prayer-book and a commentary on its contents, see Procter's *History of the Book of Common Prayer, with a Rationale of its Offices* (18th ed. 1889); J. H. Blunt's *Annotated Book of Common Prayer* (revised ed. 1884); Cardwell's *History of Conferences . . . connected with the Revision of the Book of Common Prayer* (2d ed. 1841). Parker's *Introduction to the History of the successive Revisions of the Book of Common Prayer* (1877) is invaluable. Cranmer's attempts at a revision of the Breviary is exhibited in *Edward VI. and the Book of Common Prayer* (1890), by F. A. Gasquet and E. Bishop. Much curious information on the mediæval liturgies of England, more particularly that of York, will be found in the *Lay Folk's Mass Book*, edited for the Early English Text Society by T. F. Simmons (1879). Among commentaries on particular parts of the prayer-book, Scudamore's *Notitia Eucharistica* (2d ed. 1876) and Bulley's *Variations in the Communion and Baptismal Offices* (1842) are of much value. The *Facsimile of the original Manuscript of the Book of Common Prayer attached to the Act of Uniformity, 1662*, was produced in photo-lithograph in 1890. On the history of the Scottish and American Communion Offices, see the writer's *Annotated Scottish Communion Office, &c.* (1884), and the *Historical Sketch* appended to Professor S. Hart's edition of *Seabury's Communion Office* (1874).

Prayer Beads, a name given to the polished seeds of a West Indian leguminous plant, *Abrus precatorius* or Wild Liquorice, formerly much used for stringing into rosaries, necklaces, &c.

Praying Wheel, an instrument for offering prayers by mechanical means, used exclusively by the Lamaist Buddhists, on the assumption that the efficacy of prayer consists in the multiplicity of its repetition. These instruments are of various shapes and sizes, from small cylinders turned by the hand to huge ones driven by water or wind. Long strips of paper with a written or printed formula, which translated reads 'The Jewel in the Lotus, Amen,' repeated hundreds or even thousands of times, are wrapped round these cylinders, and as the cylinders revolve the paper rolls uncoil, and so the prayer is said.

Preaching, or systematic instruction in religion given by word of mouth, has been almost from the beginning of the Christian church the principal means of disseminating its doctrines, and already its application to the poor is given by our Lord himself as one of the significant signs of the new economy. It is thus distinctively Christian, although it is true that it traces its ancestry to part of the function of the ancient Israelitish prophets, who were instructors of the people as to their duties in the present, as well as foretellers of the future. The teaching of Christ himself, so far as recorded, mostly took the form of the parable, and throughout we find its characteristic marks to be simplicity and variety, some common fact in nature or human experience being taken as the basis of the sermon, and spiritualised in a free and natural manner. But, as Vinet says, Jesus himself instituted little, though he inspired much. The discourses given in the Acts also differ widely from modern sermons, their main object being to bring the person and history of Christ plainly before their hearers. The facts of His life, death, and resurrection are everywhere put forward as the roots of Christian faith and practice, and doctrine is ever interpreted without complexity, as practically connected with His person. Justin Martyr (*Ap. maj.* chap. 67) and Tertullian (*Apol.* chap. 39) describe the exhortations that followed the reading of Scripture in their time; but Origen was the earliest preacher in the modern sense of the word, although he employed largely the allegorical method of interpreting Scripture, happily now almost extinct. In the early church the bishop was long responsible for the preaching, although presbyters and deacons came to be employed, as Origen was before his ordination, and Constantine frequently. Monks were not allowed to preach until the special preaching-orders were organised in the middle ages, nor yet women, although the Montanist heretics permitted them. Sermons were usually delivered on Sundays, as part of the regular religious service, and approbation was expressed by stamping of feet and clapping of hands, a practice which Chrysostom condemned. After the 9th century preaching appears to have declined, and indeed it never seems to have flourished much at Rome. The mediæval sermon gradually took the form of a short address after mass; but, with the rise of the Franciscan and Dominican orders, we find a great revival of preaching, in form popular, racy, the anecdotes told and spiritualised perforce (*Exempla*) often anything but edifying in themselves. Among the most famous of the mediæval preachers were Antony of Padua, Bernard of Clairvaux, Bonaventura, Berthold the Franciscan of Regensburg, John of Monte Corvino, Savonarola, John Tauler of Strasburg, and Francis Coster (1531–1619). The Reformers were preachers to a man, and the swift progress of the new doctrines was in great measure due to the power with which they were given forth from the pulpit. As sacramentarianism lost hold of men's consciences, the higher appeared the value of the new method of learning by what means to draw near to God. Wyclif and his Poor Priests, and after him the Lollards, established an evangelical tradition of the supremacy of the pulpit as a means of grace, which we find at its greatest strength in Puritanism. Seventeenth-century preaching was very scriptural, and put prominent in the foreground the cardinal evangelical facts of the fall of man, the doom of sin, the redemption of Christ, the sanctifying work of the Holy Spirit. Its strength lay in the reality and vigour with which it realised these truths; its weakness was a tendency to be over-abstract, and to become theological rather than religious. In the unspiritual barrenness of the 18th century preaching became mainly ethical and apologetic—preaching about Christianity rather than preaching Christ; but, as Dr Johnson says, men at last got tired of hearing the apostles tried once a week for the crime of forgery, and turned for relief to listen to the earnest direct harangues of a Wesley and a Whitefield.

The whole century could show no preachers to be compared with Latimer, Donne, Hall, Andrewes, Jeremy Taylor, Howe, Baxter, as well as Fuller, Sanderson, South, Barrow, and Tillotson: still less with their magnificently eloquent French contemporaries Saurin, Bourdaloue, Bossuet, Fénelon, Massillon, La Rue, and Fléchier. But in the 19th century the pulpit recovered all its power, despite a stock platitude of the modern press to the contrary, with such an illustrious roll of preachers as Chalmers, Edward Irving, Robert Hall, F. W. Robertson, Henry Melville, Maurice, Hook, Newman, Mozley, Wilberforce, Martineau, Archer Butler, Arnold, Spurgeon, Caird, Guthrie, Beecher, Talmage, Moody, Magee, Liddon, Knox Little, Farrar, Maclaren, Parker, and Philips Brooks. In France again we find the names of Lacordaire, Monod, Bersier, and Pressensé; in Germany the Reformation preaching has been choked by Rationalism, but within the century reached its finest flower in Schleiermacher, in whose sympathetic heart there met in strange harmony Pietistic and Rationalist traditions alike. Spener the Pietist, Zollikofer, and Reinhard were earlier German preachers of high rank.

The modern Church of England has been driven, through the activity of its dissenting rivals, to recognise its neglect of preaching by opening the naves of its cathedrals for special evening services, and now actively employs the pulpit in every parish as a principal engine of its warfare against evil, still recognising it, however, in the words of Dr Hook, as 'a means of instruction, more than a direct means of grace.'

The chief difficulties of the preacher are that he has to speak always to the same hearers—Wesley said even in a year he would preach both them and himself asleep; his audience is of very varying degrees of education and intelligence; his theme is so familiar that it is difficult to compass the grace of novelty—indeed the wonder is rather, as Borrow said, that so many are so good as they are, seeing that the demand in the British Isles alone extends to about 100,000 sermons a week. The foundations of the preacher's success may be said to be his personality, his sincerity, piety, and enthusiasm, his respect and love for his hearers, knowledge of their conditions of life, wider knowledge of human nature and experience of the world, together with gravity, courage, and intellectual and moral honesty. If to these be added exegetical learning, natural eloquence and fire, with the power of forgetting self in the message to be delivered as an ambassador for Christ, and finally unction—which, as Vinet says, there is no artificial means of gaining—a preacher of the very highest order is formed. The greatest snare to the young preacher is a not unnatural self-consciousness, and still more the assumption of affectations of voice or action, from which he would quickly shake himself free if he could see how really ridiculous he appears to the pews. The best tonic for his self-consciousness is to be reminded that he himself is but an accident in the vast Christian scheme for the propagation of the gospel, and that the greatest of the apostles was himself content to be nothing so Christ was preached. Happily men without some approximation to a vocation now choose the clerical profession less frequently than formerly, for it is more difficult now to be a Charles Honeyman than it was in our great satirist's days. The sovereign law of preaching is to be genuine and natural, for, as Faust says, 'no heart will take fire if the spark does not come first from the speaker's heart.' In nothing is this bane of unreality to be more guarded against than in the pulpit tone—the high falsetto, the impressive roll, the insinuating whisper, or even whine, are one and all to be abhorred, as suggesting to the ear merely simulated emotions. The best method is to begin from a conversational level, to employ a completely unaffected language and style, and to aim throughout at clearness, all unfair use of the text and unauthorised spiritualising being inadmissible. Plain sensible thoughts in sensible English will always be listened to with patience, if not too long, for the modern hearer endures with difficulty more than thirty to forty minutes, where his fathers expected something at least twice as long. The judicious preacher will seasonably lighten his discourse with illustrations, terse proverbs, and anecdotes, for, as Fuller says, 'while reasons are the pillars, similes are the windows of every structure.' The same over-witty old divine adds a caution which it can scarcely be said he himself never forgot, 'The preacher avoids such stories whose mention may suggest bad thoughts to the auditors, and will not use a *light* comparison to make thereof a grave application, for fear his *poison* go farther than his antidote.' But, while avoiding the grotesque, the preacher must not forget Quintilian's fatal judgment of mediocrity—'his excellence was that he had no fault, and his fault that he had no excellence.' Jeremy Taylor was a master in the art of illustration, some of his examples being among the most exquisite passages in English prose. The preacher may find his inspiration in the legitimate use of the sermons and other writings of others, no less than in his own experience of life. Even so original a man as Robertson of Brighton says, 'I cannot copy, nor can I work out a seed of thought, developing it myself. I cannot light my own fire; but whenever I get my fire lighted from another life I can carry the living flame as my own into other subjects, which have been illuminated in the flame.' Even the preacher's old sermons are full of advantage to him, if judiciously employed to enrich, rather than merely fill out, the new. For is it not true that 'the good parishioner inquireth not whether the sermon be new or old, but, like good venison, if it be savoury, falls to to profit by it?' There is an honest use that may be made of the thoughts of others and even of one's self, when these are vivified anew by the judgment and thought of the present occasion. Rank plagiarism is entirely to be reprobated, but there is an honest middle course which will not vex the conscience of the preacher himself, nor exercise the most careful listener. What is taken from all books is borrowed from none, and the preacher may do with sermons what Dr Johnson tells us Watts did with materials gathered from a wider range—'every kind of information was, by the piety of his mind, converted into theology.'

The early preachers, as Chrysostom and Augustine, spoke extempore, and indeed the practice of reading sermons from a manuscript does not seem to have been practised before the Reformation, when Burnet tells us the book of Homilies was compiled on account of the fewness of qualified preachers and the urgent necessity to get the people instructed. Still, reading long remained unpopular, and 'the present supine and slothful way of preaching' was actually forbidden by statute to the university preachers at Cambridge in 1674. Leighton disliked it as detracting from the weight and authority of preaching—'I know,' he says, 'that weakness of the memory is pleaded in excuse for this custom; but better minds would make better memories. Such an excuse is unworthy of a father addressing his children. Like Elihu, he should be refreshed by speaking.' Reading gained ground in the 18th century, and sermons were bought, borrowed, or stolen by preachers less honest than Sir Roger de Coverley's chaplain. The advantage of reading is that it usually ensures a better ordered discourse and saves the preacher from what to many is a grievous slavery; but Dr James Martineau puts its defence on yet higher grounds as the best means of maintaining the high level of thought and feeling at which the sermon was composed. And it is true that many, perhaps most, extempore preachers forget their argument, and never progress, but eddy round and round, as Coleridge said, in verbiage, vain repetitions, and feeble and garrulous fluency. But against this there is the obvious disadvantage in the loss of power and reality that must needs follow the rewarming of premeditated emotion. The recitation of sermons by heart is scarcely better, if not indeed still more likely to destroy spontaneity and naturalness of expression, not to speak of the risk of some accident depriving the helpless reciter of his memory, as once happened to South, whereupon he left the pulpit abruptly with the words, 'Lord be merciful to our infirmities.' The method of extempore preaching is in every respect the best, provided the speaker's standard of excellence is one sufficiently high, and he is not one of those vain men who make a boast of going into the pulpit without premeditation. Provided the sermon has been carefully thought out beforehand, and the preacher has some measure of faculty in speech, this method of preaching will be found the most effective, the thoughts being previously methodised, the words and sentences left to the moment. For it is both the most natural manner and it allows speaker and hearers alike to be lifted simultaneously on the same waves of thought and emotion. For, unhappily, there are few men capable of reading a sermon with the same fire and glow as Chalmers. But the speaker must be cool and self-possessed—'a great deal of talent is lost to the world for want of a little courage,' says Sydney Smith—and this quality he must possess in a quite unusual degree if he essays the task of preaching to crowds in the open air. The great French preachers, again, recited their sermons, apparently finding it easier than Englishmen do to revive premeditated emotion. Massillon said that his best sermon was the one he knew best; Bourdaloue, whose memory was apt to give way in presence of any distraction, used to preach with his eyes closed.

'Most men,' said Leighton, 'begin to preach too soon, and leave off too late;' and still worse for the quality of the sermon is the too frequent necessity for the production of two or more every week. Bishop Andrewes said, 'He who preaches twice will prate once;' and Robert Hall used to say, 'A man who concentrates his ideas, and thinks out his subject properly, can write one; a diffuse, shallow man may manage two, and a fool might very likely write half a dozen.' Those under the necessity of producing two might well be permitted to make the second a diet of catechising, as Hooker did at Bishopsbourne; or an address specially directed to children—an admirable new feature of modern preaching; or the second might be frankly allowed to be taken from some great divine, or at least to be merely one of those simpler extemporaneous sermons Hooker describes, 'which spend their life in their birth, and may have public audience but once.' Over-tasked preachers will find help in those collections of skeleton sermons, of which Simeon's *Horæ Homileticæ* (21 vols. 1783–1836) and Spurgeon's *Sermon Notes* (4 vols. 1884–88) are well-known examples.

As for the form of the sermon, it is usual for it to be divided into an *introduction* or exordium, the *proposition*, the *proof*, and finally the *conclusion* or peroration. Simeon and his school announced the divisions at the outset; Newman notices them only as he passes from one to the other. As for the logical divisions or *heads*, in which the Puritan preachers were so prolific—Baxter once having as many as 120—the more modern usage is to emphasise these but lightly and to have as few as possible. These are of course all important in the structure of the sermon, for, as Quintilian says, 'Qui rectè diviserit, nunquam poterit in rerum ordine errare.' George Herbert, in *The Country Parson*, warns against 'crumbling a text up into small parts;' and Bishop Leighton introduced into Scotland the method of preaching without heads—'skimming the text,' as it seemed to the zealots of his day. The introduction should be of the shortest, and may take the form of an exegetical connection of text with context—as in Liddon almost always, or an analogy, or an anecdote. The proposition should be clearly set forth, and the proof should follow in logical order, although the heads need not be named. The conclusion, peroration, or application should be an earnest, pointed appeal, warranted by the arguments that have preceded it. 'Hic, si unquam, totos eloquentiæ fontes aperire fas est,' says Quintilian. Indeed, fire and passion we cannot have too much of, if only it is justified by masculine feeling, keeping pace with the march of the argument, yet allowing the speaker to become the clearer the more he glows. Hume said John Brown of Haddington preached as if Jesus Christ was at his elbow, and James Melville tells us that Knox ere he had done with his sermon 'was like to ding the pulpit in blads, and fly out of it.' Or if a tender closing appeal best fits the subject the speaker must remember that he is a man and not allow himself to be dissolved in tears, unless he needs must, when nature will save him from being ridiculous. Bishop Heber converted the closing words of his sermon into a prayer.

In the expository discourse, technically known in Scotland as 'a lecture,' the preacher takes a series of texts or a whole passage, and opens up its meaning, the central truth being clearly set forth, and the minor truths in their relation to it.

Many of the older preachers of the evangelical persuasion never closed a single sermon without a hasty course round the whole range of cardinal doctrines in the scheme of salvation, however wide some of these might lie from the subject proper of the text. This might be well for itinerating preachers like Whitefield and Wesley, who would most probably never address the same hearers again; but is manifestly absurd in the case of a parish clergyman whose duty is to instruct the saints as well as rouse the unconverted, and who speaks to the same people twice a week. Those preachers whose sermons invariably deal with the initiatory stages of Christian experience sometimes arrogantly claim for themselves a monopoly of 'preaching Christ.' No phrase has been more abused than this of St Paul's, which has been twisted to mean a monotonous iteration of the necessary conditions of the starting-point only of a Christian experience, as if the pupils of a school were to stand still at their primer because one had not yet learned to spell. But indeed there is too little variety in our teaching—'We hold a few texts,' says Archer Butler, 'so near our eyes that they hide the rest of the Bible.' Still less profitable were those weekly tirades against the Socinians, the Scarlet Woman, or Prelacy, forced into the conclusion of every sermon by many a painful old Presbyterian divine. Even hell lost its terrors when made a weekly show, and the majestic personality of the devil, once familiar, became contemptible. But the pains of hell have furnished the fuel for many a noble sermon, even without such a special accessory as Fuller tells us belonged to Mr Perkins, who 'would pronounce the word *damn* with such an emphasis as left a doleful echo in his auditors' ears for a good while after.' The autobiographical style is a persistent snare to young converts in their preaching, forgetting how diverse are human character and conditions, how complex is Christian experience, and how large and varied was Christ's own conception of the kingdom of heaven. The most alarming danger to the pulpit in the present day is, however, a maudlin hysterical style of treating religious truths, natural enough in a society debauched with the over-excitement and fever of an age of competition, but ultimately fatal to the dignity and authority of a venerable institution, the real foundations of which must be mastery over emotion and firmness of intellectual fibre, as well as comprehensive grasp of the truths revealed by Jesus Christ.

See Dr J. M. Neale, *Mediæval Preachers and Preaching* (1857); Rev. S. Baring-Gould, *Post-mediæval Preachers* (1865); Rothe, *Geschichte d. Predigt vom Anfang bis auf Schleiermacher* (Bremen, 1881); the Rev. G. J. Davies, *Papers on Preaching* (3d ed. 1883); Professor Mahaffy, *Decay of Modern Preaching* (1882); Professor John Ker's fragmentary *Lectures* (1887); the treatises on Homiletics by Vinet (1858), Kidder (1864), Hoppin (1869), and Blaikie (1873); also the excellent series of Yale lectures by Beecher, Philips Brooks, Dale, and others.

Pre-Adamites. See ADAM.

Prebend. See CATHEDRAL.

Precedence, the order in which individuals are entitled to follow one another in a state procession or on other public occasions. In England the order of precedence depends partly on the statute of 1539, partly on subsequent statutes, royal letters-patent, and ancient usages. Among questions of precedence depending on usage there are some which can hardly be considered so settled as to be matter of right, and are in a great degree left to the discretion of the crown, which generally refers any disputed question to the officers of arms. In Scotland the Lyon Court has the direct jurisdiction in all questions of precedence.

It is a general rule of precedence that persons of the same rank follow according to the order of the creation of that rank; and in the precedence of the English peerage it has been fixed that the younger sons of each preceding rank take place immediately after the eldest son of the next succeeding rank. Married women and widows take the same rank among each other as their husbands, except such rank be professional or official, and it is an invariable rule that no office gives rank to the wife or children of the holder of it. Unmarried women take the same rank with their eldest brother; the wife of the eldest son, of any degree, however, preceding the sisters of her husband and all other ladies in the same degree with them. Marriage with an inferior does not take away the precedence which a woman enjoys by birth or creation; with this exception, that the wife of a peer always takes her rank from her husband. The following tables exhibit the precedence of different ranks as recognised by law in England.

TABLE OF PRECEDENCE AMONG MEN.

The Sovereign.
The Prince of Wales.
Sons of the Sovereign.
Grandsons of the Sovereign.
Brothers of the Sovereign.
Uncles of the Sovereign.
The Sovereign's brothers' or sisters' sons.
Archbishop of Canterbury, Primate of all England.
Lord High Chancellor, or Lord Keeper, being a Baron.
Archbishop of York, Primate of England.

Lord High Treasurer. Lord President of the Privy-council. Lord Privy Seal. Lord Great Chamberlain.	Being of the degree of Barons.
Lord High Constable. Earl Marshal. Lord High Admiral. Lord Steward of H.M. Household. Lord Chamberlain of H.M. Household.	Above all of their degree; if Dukes, above all Dukes, &c.

Dukes.
Eldest sons of Dukes of the Blood Royal.
Marquises.
Dukes' eldest sons.
Earls.
Younger sons of Royal Dukes.
Marquises' eldest sons.
Dukes' younger sons.
Viscounts.
Earls' eldest sons.
Marquises' younger sons.
Bishops of London, Durham, and Winchester.
All other English Bishops according to seniority of Consecration.
Secretaries of State, if Barons.
Barons.
Speaker of the House of Commons.
Commissioners of the Great Seal.
Treasurer of H.M. Household.
Comptroller of H.M. Household.
Master of the Horse.
Vice-chamberlain of H.M. Household.
Secretaries of State, under degree of Baron.
Viscounts' eldest sons.
Earls' younger sons.
Barons' eldest sons.
Knights of the Garter.
Privy-councillors.
Chancellor of the Order of the Garter.
Chancellor of the Exchequer.
Chancellor of the Duchy of Lancaster.
Lord Chief-justice.
Master of the Rolls.
Lords Justices of Appeal.
Judges of the High Court of Justice.
Bannerets made by the Sovereign under the royal standard in open war.
Viscounts' younger sons.
Barons' younger sons.
Baronets.
Bannerets not made by the Sovereign in person.
Knights Grand Crosses of the Bath.
K. Grand Commanders of Star of India.
K. Grand Crosses of St Michael and St George.
K. Grand Commanders of Order of Indian Empire.
Knights Commanders of the Bath.
Knights Commanders of the Star of India.
K. Commanders of Michael and George.
Knights Bachelors.
Judges of County Courts.
Companions of the Bath.
Companions of the Star of India.
Cavalieri and Companions of Michael and George.
Companions of Order of Indian Empire.
Companions of the Distinguished Service Order.
Eldest sons of the younger sons of Peers.
Baronets' eldest sons.
Eldest sons of Knights of the Garter.
Bannerets' eldest sons.
Eldest sons of Knights, according to their fathers' precedence.
Eldest sons of Knights Bachelors.
Baronets' younger sons.
Knights' younger sons.
Esquires.
Gentlemen.

TABLE OF PRECEDENCE AMONG WOMEN.

The Queen.
The Princess of Wales.
Princesses, daughters of the Sovereign.
Princesses and Duchesses, wives of the Sovereign's sons.
Granddaughters of the Sovereign.
Wives of the Sovereign's grandsons.
The Sovereign's sisters.
Wives of the Sovereign's brothers.
The Sovereign's aunts.
Wives of the Sovereign's uncles.
The Sovereign's nieces.
Duchesses.
Wives of eldest sons of Royal Dukes.
Daughters of Dukes of the Blood Royal.
Marchionesses.
Wives of the eldest sons of Dukes.
Daughters of Dukes.
Countesses.
Wives of younger sons of Royal Dukes.
Wives of the eldest sons of Marquises.
Daughters of Marquises.
Wives of the younger sons of Dukes.
Viscountesses.
Wives of the eldest sons of Earls.
Daughters of Earls.
Wives of the younger sons of Marquises.
Baronesses.
Wives of the eldest sons of Viscounts.
Daughters of Viscounts.
Wives of the younger sons of Earls.
Wives of the eldest sons of Barons.
Daughters of Barons.
Maids of Honour.
Wives of Knights of the Garter.
Wives of Bannerets.
Wives of the younger sons of Viscounts.
Wives of the younger sons of Barons.
Wives of Baronets.
Wives of Knights Grand Crosses of the Order of the Bath.
Wives of K.G.C.S.I.
Wives of K.G.C. Michael and George.
Wives of K.G.C. Order of Indian Empire.
Wives of Knights Commanders of the Bath.
Wives of K.C.S.I.
Wives of K.C. Michael and George.
Wives of K.C. of Order of Indian Empire.
Wives of Knights Bachelors.
Wives of Companions of the Bath.
Wives of Companions of the Star of India.
Wives of Cavalieri and Companions of St Michael and St George.
Wives of Companions of the Order of the Indian Empire.
Wives of Companions of the Distinguished Service Order.
Wives of eldest sons of Peers' younger sons.
Daughters of the younger sons of Peers.
Wives of the eldest sons of Baronets.
Daughters of Baronets.
Wives of the eldest sons of Knights.
Daughters of Knights.
Wives of the younger sons of Baronets.
Wives of the younger sons of Knights.
Wives of Esquires and Gentlemen.

At the coronation of Charles I. the rule of precedency of the nobility of England was introduced in Scotland; and it was arranged that peers of England (or their sons, &c.), of a given degree, should within England take precedence of peers of Scotland of the same degree; and that in Scotland this precedence should be reversed. But by the acts of Union with Scotland and Ireland the precedence in any given degree of the peerage has been established as follows: (1) Peers of England; (2) Peers of Scotland; (3) Peers of Great Britain; (4) Peers of Ireland; (5) Peers of the United Kingdom, and Peers of Ireland created subsequently to the Irish Union. A similar order is understood to obtain in regard to baronets, though in Ireland it seems lately to have become the practice to allow all baronets to rank according to the respective dates of their patents.

The following is the table of precedence in Scotland, as recorded in the Lyon Office. It is founded partly on usage and partly on the statutes of 1623 and 1661.

The Sovereign.
Lord High Commissioner during sitting of General Assembly.
The Prince of Wales.
Younger sons of the Sovereign.
Grandsons of the Sovereign, including sons of daughters.
Brothers of the Sovereign.
Uncles of the Sovereign.
Nephews of the Sovereign, including sons of sisters.
Lord Provost of Edinburgh within the city.
Hereditary High Constable.
Master of the Household.
Lord Chancellor, or Lord Keeper, if Baron.
Dukes.
Eldest sons of Dukes of the Blood Royal.
Marquises.
Eldest sons of Dukes.
Earls.
Younger sons of Royal Dukes.
Eldest sons of Marquises.
Younger sons of Dukes.
Viscounts.
Eldest sons of Earls.
Younger sons of Marquises.
Barons.
Keeper of the Great Seal.
Keeper of the Privy Seal.
Eldest sons of Viscounts.
Younger sons of Earls.
Eldest sons of Barons.
Knights of the Garter.
Privy-councillors.
Lord Justice-general.
Lord Clerk-register.
Lord Advocate.
Lord Justice-clerk.
Lords of Session (by date of appointment).
Knights Bannerets.
Younger sons of Viscounts.
Younger sons of Barons.
Knights Marischal.
Baronets.
Knights of the Thistle.
Grand Cross of the Bath.
Grand Cross of the Star of India.
Grand Cross of St Michael and St George.
Knights Commanders of the Bath.
Knights Commanders of the Star of India.
Knights Commanders of St Michael and St George.
Lord Lyon King-of-Arms.
Ushers.
Knights Bachelors.
Companions of the Bath.
Companions of the Star of India.
Companions of St Michael and St George.
Eldest sons of younger sons of Peers.
Eldest sons of Bannerets.
Eldest sons of Knights of the Garter.
Eldest sons of Baronets.
Eldest sons of Knights.
Younger sons of Baronets.
Younger sons of Knights.
Dean of Faculty.
Solicitor-general.
Esquires, including Heralds.
Gentlemen, including Pursuivants-at-Arms.

It seems to be held in England that the precedence of Scottish officers of state, judges, &c., as recognised before the Union, does not now extend beyond Scotland. There are rules for precedence for the members of the different professions, recognised among themselves, but which give no general social precedence. No rank, for instance, in the army, however high in itself, entitles its holder to precedence. Doctors in the universities are ranked thus: (1) Divinity, (2) Law, (3) Medicine. Official rank may often place its possessor, upon occasion of public ceremonials, in a position far above others of higher dignity than himself, but this, of course, confers no rank in the general order of civil precedence; on the other hand, men of official rank, who have higher personal precedence, are placed according to the latter; the wives and children of all those who derive their places on the scale from official rank have no consequent privilege. One of the leading principles of the law of precedence is that it emanates solely from father or husband, and cannot be acquired through a female unless in the case of a peeress in her own right.

Precentor (sometimes *Cantor*), the officer who directs the singing in a cathedral or parish church. See CHOIRS AND CHORAL SINGING.

Preceptors, COLLEGE OF. See EDUCATION, Vol. IV. p. 219.

Preceptory, the name given to certain houses of the Knights Templars (q.v.), the superiors of which were called Knights Preceptor. Other houses of the order were called 'commanderies.'

Precession, the name given to a slow motion of the earth, under the action of the sun and moon, which causes the poles of the heavens (which must remain always vertically above the poles of the earth) to describe circles on the sphere of the heavens about the poles of the ecliptic as centres. As the places of stars on celestial charts are marked with reference to the celestial poles, this motion of these poles causes all such charts to become less and less accurate with the lapse of time. A correction for precession has therefore to be applied to such charts in order to find the true places of stars at any epoch other than that for which they are constructed. This motion of the earth also causes the Equinoxes (q.v.) to recede slowly along the ecliptic, so that the sun comes to them, in his annual course, a little *earlier* each year. Hence the name, '*Precession* of the Equinoxes.'

The physical cause of this motion is the attraction of the sun and moon for the protuberant part of the earth around the Equator (see EARTH). This causes the earth slowly to turn on itself, as a spinning top *gyrates* when its speed slackens before it falls. As this disturbing force on the earth is small relatively to its mass, this turning takes place at the mean rate of only 50″·1 per annum. It requires, therefore, 25,868 years for the equinoxes to describe a complete circle on the ecliptic. For a very interesting case of the effect of precession, see POLE-STAR. In actual observation the effects of precession are complicated with those of Nutation (q.v.) and of change of inclination of the ecliptic. The subject is pretty fully discussed in a popular manner in Herschel's *Treatise on Astronomy*. For the suggested influence of precession, along with the increased eccentricity of the earth's orbit, or great climatic changes on the earth, see PLEISTOCENE, p. 236.

Précieuses. See RAMBOUILLET.

Precious Stones. See STONES (PRECIOUS).

Precipitate Ointment is of two kinds, the *red* and the *white*. The former contains red oxide of mercury, the latter ammoniated mercury, or white precipitate. In both cases great care is necessary that the mercury preparations are in a very fine state of division, and are intimately mixed with the ointment base. Both ointments are highly stimulating, and are of service in cutaneous eruptions. The *red* ointment is also employed in chronic conjunctival ophthalmia.

Precipitation, in Chemistry, is an operation in which decomposition occurs in a fluid, either through the action of the air, or of a gas, or of a chemical agent in solution; and is accompanied by the deposition of a solid substance that was either previously held in solution or that has been formed by chemical action.

Precognition. See CRIMINAL LAW (SCOTS).

Predella (Ital.), the step or ledge sometimes seen at the back of an altar; also the frieze or band of pictures along the bottom of an altar-piece.

Predestination, the eternal decree of God, whereby 'the elect' are foreordained to salvation. The correlative decree, whereby others are held to be foreordained to perdition, is commonly distinguished by the other term—Reprobation. The theory of predestination had its origin in the attempts of theological system to define the relations of the human and the divine will, and to reconcile the phenomena of human freedom with the belief in divine omnipotence. God's absolute will is represented by it as determining the eternal destiny of man, not according to the foreknown character of those whose fate is so determined, but according to God's own mere choice. They who are thus foreordained to eternal life are led to believe and live by the 'irresistible grace' of the Holy Spirit. In human salvation, therefore, God's will is everything, man's nothing. The principal scripture passage is Rom. viii. 29; 30. It was in the discussions between Pelagius and Augustine that the predestinarian view of the divine 'decree' was first fully evolved; and since their time opinion in the church has run in two great currents—the one perpetuating the influence of Pelagius, who regarded that decree as subordinated to the divine foreknowledge of human character; the other that of Augustine, who maintained the absolutism of that decree, and its independence of all prior human conditions. Pelagius recognised a possibility of good in human nature; Augustine denied any such possibility apart from the influences of divine grace. The one held that the choice of salvation lay in man's will; the other that man's will had no active freedom or power of choice since the fall. In 529 the system of Augustine was established by the Council of Arausio (Orange) as the rule of orthodoxy in the Western Church; but the reaction against the strictly logical nature of his dogma has been perpetually manifested by representatives of the more humane, though perhaps less logical doctrine of Pelagius, in every period of the church. Gottschalk, a German monk of the 9th century, carried the doctrine to its most extreme development. The Thomists (see AQUINAS), as predestinarians, opposed the Scotists, though Thomists insisted that God willed the salvation of all and has provided the means. The reformers Luther, Zwingli, and Calvin were Augustinians, though the Lutheran doctrine as formulated by Melanchthon is plainly different from that of Calvin and the Reformed Church. Some Jesuits are Congruists or modified Thomists; others admit that predestination to grace, but deny that predestination to glory, is irrespective of merit. Jansenism was a revival of Augustinianism. Arminius and the Synod of Dort mark a new period of the controversy. With such opposite representatives as Laud and Hales, a large part of the Church of England 'bade John Calvin good-night.' The followers of Wesley and Whitefield differed on this great doctrine. Even the Presbyterian churches, or large sections of them, have modified their high predestinarian doctrine in at least the statement of it. The common Augustinian doctrine of the Calvinistic symbolical books is called 'infralapsarianism;' moderate Calvinists or 'sub-lapsarians' hold that the fall of man (*lapsus*) was foreseen but not decreed by God (thus trying to avoid ascribing to God the origin of sin); while extreme predestinarians or 'supra-lapsarians' affirm that God not only foresaw and permitted, but decreed the fall of man, overruling it for good. Jonathan Edwards (q.v.) is a modern representative of rigid Calvinism. Catholics hold that the question is one rather of metaphysics than of faith.

See the article WILL and works there quoted, and the articles on Augustine, Pelagius, Calvin, Jansen, &c.; the theological handbooks of dogmatics; Luthardt, *Vom Freien Willen* (1863); Forbes, *Predestination and Free-will* (1878); Canon Mozley, *Treatise on the Augustinian Doctrine of Predestination* (1878).

Predicables. This is a term in the scholastic logic connected with the scheme of classification. There were five designations employed in classifying objects on a systematic plan: *genus*, *species*, *difference* (differentia), *property* (proprium), and *accident* (accidens). The first two—Genus and Species—name the higher and lower classes of the things classified; a Genus comprehends several Species. The other three designations—Difference, Property, Accident—express the attributes that the classification turns upon. The Difference is what distinguishes one species from the other species of the same genus; as, for example, the peculiarities wherein the cat differs from the tiger, lion, and other species of the genus *felis*. The Property expresses a distinction that is not ultimate, but a consequence of some other peculiarity. Thus, 'the use of tools' is a property of man, and not a difference, for it flows from other assignable attributes of his bodily and mental organisation, or from the specific differences that characterise him. The Accident is something not bound up with the nature of the species, but chancing to be present in it. Thus, the high value of gold is an Accident; gold would still be gold though it were plenty and cheap. See SPECIES, CATEGORIES.

Pre-emption. In the United States, under the Pre-emption Act of 1841, an actual settler on the public lands enjoys the right, in preference to any one else, of purchasing at a fixed price the land on which he has settled, to the extent of not more than 160 acres. In the case of 'offered' lands the settler must file his 'declaratory statement' within thirty days after entry, and within a year proof must be made of settlement and cultivation, and the land thereupon paid for, at $1·25 per acre if outside the limits of a railroad grant, or $2·50 if within such limits. If the tract settled on is 'unoffered,' an approved plan of the township must first be received at the district land office; the statement must then be filed within three months, and final proof and payment be made within thirty months thereafter. Title to land is thus obtained much sooner (possibly within six months) than under the homestead laws (see HOMESTEAD); but a homestead settler may at any time after six months purchase the land under the pre-emption laws; as, on the other hand, the holder of a pre-emption claim may convert it into a homestead.

Pre-established Harmony. See LEIBNITZ.

Pre-existence, DOCTRINE OF. The notion that human souls were in existence before the generation of the bodies with which they are united in this world was anciently, and is still, widely spread throughout the East. The Greek philosophers, too, especially those who held the doctrine of transmigration, as the Pythagoreans, Empedocles, and even Plato—if with him transmigration is not simply a symbolical myth—were familiar with the conception. Plato taught that all human souls had existed from the very beginning, still and silent, in the realm of potentiality, and Origen introduced the theory into Christian theology. The dogma of the assumption of the divine and human nature in Christ offers a grave difficulty in the relations between the two natures in pre-existence. Yet the belief continued to survive, and we find it in Scotus Erigena, in the younger Fichte, in Glanvil and Henry More, and in one of the profoundest works of modern theology —Müller's *Christian Doctrine of Sin*—where it forms a basis for the doctrine of hereditary sin. Among the early Christians the assumption of such pre-existence was connected with the belief that God had created the souls of men before the world, and that these were united with human bodies at generation or at birth. Another view long prevalent in the Western Church was that of Traducianism, according to which children received soul as well as body from their parents through natural generation. The third theory, which ultimately became that of the orthodox, was Creationism, according to which each soul is created successively. Direct intellectual interest in the doctrine of pre-existence has nearly altogether ceased in modern times, yet the dream has again and again haunted individual thinkers. Almost every one is familiar in dreams, and even in a waking state, with a haunting sense of a want of reality in the common objects around, and a vague consciousness that everything one sees or hears has happened before, when we seem, in the words of Tennyson,

> To lapse far back in a confused dream
> To states of mystical similitude.

There is a striking expression of this experience in Sir Walter Scott's *Diary*, under February 17, 1828, and there is an interesting allusion to the same subject in a well-known passage in *Guy Mannering*. And Wordsworth has given supreme poetical expression to it in his famous ode—*Intimations of Immortality from Recollections of Early Childhood* (the germ of which will be found in a less known poem of Vaughan the Silurist):

> Our birth is but a sleep and a forgetting.
> The soul that rises with us—our life's star,
>   Hath had elsewhere its setting,
>   And cometh from afar,
> Not in entire forgetfulness,
> And not in utter nakedness,
> But trailing clouds of glory do we come
>   From God, who is our home.

Prefect (Fr. *préfet*, from Lat. *præfectus*; see PRÆFECT), the administrative head of a modern French department (see FRANCE, Vol. IV. p. 775), whose duties correspond with those of the old *Intendant* before the Revolution.

Pregnancy. The first symptom which calls attention to the occurrence of pregnancy is usually absence of the menstrual flow. This may, of course, be suppressed by many other causes; and, exceptionally, may persist during the first few months of pregnancy. 'Quickening,' or the sensations experienced in consequence of the movements of the fœtus, is usually noticed in the fourth month. Of the changes which take place elsewhere than in the generative organs the first and most noticeable is sickness, usually occurring in the early morning, and not persisting beyond the first three months. 'Longings,' or cravings for special, and sometimes very curious articles of diet, are not unusual. The heart becomes enlarged in order to provide the increased blood-supply necessary for the nutrition of the fœtus. There is often an increased liability to toothache, fainting, and other disturbances of health; and not unfrequently the disposition is altered, and an unnatural fretfulness or irritability manifests itself. In some cases, on the other hand, the health is exceptionally good. The duration of pregnancy is, in the great majority of cases, about 275 days; but, as variations of a week or ten days in either direction are common, it is impossible to predict the exact date of delivery. Well-authenticated cases have occurred where it has been prolonged to nearly 300 days. It may, of course, come to an end at any time prior to its proper term (see FŒTUS). There is a curious condition called *spurious pregnancy*, which may so closely simulate true pregnancy in all its main features as entirely to deceive the patient as well as others. It is generally associated with Hysteria (q.v.) or some allied mental disturbance (see MARY I., and SOUTHCOTT). A careful examination enables a medical man to detect the mistake; but it may be difficult to persuade the patient and her friends of it. As a work of reference for others than specialists, Chavasse's *Advice to a Wife on the Management of her Health* (1842; new ed. 1889) may be recommended.

CONCEALMENT OF PREGNANCY is a criminal offence, or rather it is taken to be the main proof of the offence of concealing the birth of a child in certain circumstances. See BIRTH.

Prehnite, a hydrous silicate of alumina and lime, the alumina usually partly replaced by ferric oxide. It is a widely diffused mineral, and, although first discovered at the Cape of Good Hope, has been found in great beauty in some places on the continent of Europe and in Scotland. Prehnite exhibits a great variety of forms, being found in crystals in fan-shaped and cockscomb-like groups, granular, reniform, fibrous, &c. It is sometimes colourless, but more generally greenish, and sometimes yellowish. It occurs, as a product of the alteration of various silicates, in veins and cavities in crystalline igneous rocks, such as diorite, porphyrite, &c. Less commonly it is met with under similar conditions in granitoid and schistose rocks, and occasionally in lodes associated with copper.

Prejevalski, NICHOLAS, Russian traveller, was born in the government of Smolensk on 31st March 1839. He entered the army (1855), and took part in quelling the Polish insurrection of 1861. Having joined the general staff in 1867, he was moved to Siberia. There he began to satisfy his longing for travel by exploring the Usuri region, south of the Amur. This, however, was a small thing in comparison with his subsequent labours in geographical exploration. The three years 1871–73 he spent in travelling from Peking through southern Mongolia (region of the Ordus) to the Ala-shan, Koko-nor, and the upper waters of the Yang-tsze-Kiang. Four years later he made the first of the journeys undertaken with the hope of reaching Lhassa in Tibet, the goal of all his subsequent efforts. He rediscovered Lob-nor on the borders of East Turkestan and China, but failed three times in the same year to penetrate into Tibet. Two years afterwards he once more set out, and, after crossing the difficult highland region between East Turkestan and Tibet, had reached a point some 160 miles north of Lhassa, when the Tibetan authorities turned him back. He then went east, and explored the upper course of the Hoang-ho for about 200 miles, and finally reached Kiachta after a journey of nearly 15,000 miles. In the winter of 1883–84 he once more crossed the Desert of Gobi, and got as far as the upper Yang-tsze-Kiang, but, not being able to cross it or travel down it, was obliged to return. He died at Karakol, on the east side of Lake Issyk-kul in West Turkestan, just starting on his fifth expedition, on 1st November 1888. Prejevalski brought back from these journeys most valuable collections of animals and plants, now all preserved at St Petersburg; amongst other things that he discovered were the wild camel and the wild horse, the ancestors of the domesticated varieties. His accounts of his journeys were published in the *Proceedings* of the St Petersburg Geographical Society, in *Petermann's Mitteilungen*, and other journals, as well as in two independent Russian works (1875 and 1883). See *Nature*, 8th November 1888, and *Proc. Roy. Geog. Soc.*, 1879 *et seq.* The name also appears in the forms Prjevalski, Prchevalsky, and Prschevalsky.

Prelate (Lat. *prælatus*, 'one set over'), in Church law, is the name given to the holders of those higher dignities in the church, to which, of their own right, is attached a proper jurisdiction, not derived by delegation from any superior official. In this sense the name comprises not only prelates of the first class, as bishops, but also the heads of religious orders, abbots or priors of religious houses, and other similar ecclesiastical dignitaries. In the pope's court and household many of the officials, although not possessing episcopal or quasi-episcopal jurisdiction, have the insignia and title of prelate; and these honours are frequently bestowed on clergy whose duties keep them far from Rome.

Prelude (Lat. *præ*, 'before,' and *ludo*, 'I play'), the introductory movement of a musical work (see INTRODUCTION). The first movement of a suite was usually a prelude; and the term is especially associated with the pieces prefaced by Bach to his celebrated clavichord and organ fugues. It has also been applied, without special significance, by Chopin to his collection of short pieces, op. 28. Its form is indeterminate, but the piece is always in the same key as that succeeding it.

Premature Interment. See BURIAL.

Premature Labour. See ABORTION, FŒTUS, BIRTH.

Premier. See TREASURY, CABINET.

Pre-millenarians. See MILLENNIUM.

Premonstratensians (called also NORBERTINES), an order of regular canons, founded by St Norbert, a canon of Cleves, in 1119, at a place in the forest of Coucy, pointed out in a vision, and thence called Prémontré (Lat. *Pratum Monstratum*, 'the meadow pointed out'). Their habit was white, hence in England they were commonly called the White Canons. Norbert organised his new order, which was substantially a branch of the Canons Regular of St Augustine, as well with a view to the sanctification of the members as to their usefulness in effecting the reformation of the age. Himself a man of remarkable piety and austerity of life, his rule is a return to the primitive fervour of the monastic institute; and the great work which he proposed for his brotherhood, in addition to the daily choral services of the church, was the practical instruction of the people, and the direction of consciences in the confessional. It was taken up with ardour, and spread rapidly in France and the Low Countries, and afterwards—on Norbert's being chosen, in 1127, Archbishop of Magdeburg—in Germany; the abbot of the mother-house at Coucy, however, retaining the rank of general and of superior of the entire order. In 1512 all the abbeys in England and Wales were placed under the Abbot of Welbeck. There, just before the dissolution, were thirty-five houses; in Scotland there were six, one of them Dryburgh. It does not seem at any time to have made much progress, or at least to have established many houses, in Italy or Spain. In the same spirit of reformation Norbert established an order of nuns, which attained to equal success. Hélyot states that at one time there were as many as a thousand Premonstratensian abbeys, besides provostships and priories, and 500 houses of nuns, mostly in France, Germany, and the northern kingdoms. Lecuy, the last abbot of Prémontré, died so late as 1834. The abbeys were proscribed at the Revolution, and even in Germany, Belgium, and Austria there remain only miserable fragments of their former splendour. Small communities have been revived at Crowle and Spalding in Lincolnshire and at Storrington in Sussex.

Prentice Pillar. See ROSLIN.

Prenzlau, or PRENZLOW, an agricultural town of Prussia, stands at the northern end of Lake Ucker, 67 miles by rail NNE. of Berlin. It has a beautiful Gothic church (1325–40). Pop. (1890) 18,019.

Pre-Raphaelitism. English art of the 18th century had in its genesis one national peculiarity. There being no demand for it from church or state, it had to find its patrons (i.e. its means of existence) in the wants of the people. Hogarth, the first distinctly national subject-painter, found his themes in the social manners of his day, which were valued by the true instinct of the common people. Portrait-painters of national origin there had been before his time, but these, good and bad alike, had been followers of foreign masters introduced by the court and supported by its patronage. That art other than architecture was not necessarily an exotic in England is proved convincingly by the many beautiful examples of monumental portraiture produced by native workmen before the Wars of the Roses. The bronze effigies of Henry III. and Queen Eleanor in Westminster Abbey were executed by William Torel, citizen of London, in 1291–92, and those of Richard II. and Queen Anne of Bohemia by Nicholas Broker and Godfrey Prest, coppersmiths and citizens of London, in 1395–97. Austin of London furnishes an excellent and later example of this in his monumental tomb in the Beauchamp Chapel, Warwick. Those wars, followed as they were by the Reformation and in quick succession by the parliamentary troubles, smothered native art and necessitated the calling in of foreign aid; for it must be remembered that under the happiest conditions a native artist cannot be produced in less time than a full generation.

Hogarth having once arisen with full daylight of an independent inspiration, it was no longer possible for the mannered reproductions of the imitators of Kneller and Lely to satisfy the spirit of an age now awakened from its long sleep. Hogarth at first gained a footing by portraiture, and when later he devoted himself to subject-pictures he found a poor support by the sale of his engravings to the strictly middle classes. Amongst the wealthy there were two incentives to interest in art, one of these being found in ancestral dignity, the other in that love of sport so indelibly stamped upon English character. Sir Joshua Reynolds and Gainsborough arose, inspiring portraiture with their own precious grace and loveliness; animal-painters now well-nigh forgotten (such as Stubbs and his fellows) satisfied the latter; and Wilson as a landscape-painter made a heroic effort to graft upon the sportsman's instinct a larger love of nature. It has always been regarded as fortunate that at this time the reigning monarch, George III., declared his interest in the higher aims of art, an interest which expressed itself first in the establishment of the Royal Academy, and later in the patronage of Benjamin West for subjects of an exalted character. Although it is just that many of the works of this painter have since suffered a reversal of judgment, his picture of the 'Death of General Wolfe' will always remain a noble illustration of English history, largely justifying the king's favour. The great war for supremacy which at that time absorbed the nation's life, together with the almost ruinous debt then contracted, made further royal patronage impossible. It is easy now for any thoughtful person to trace how the high standard originally set was largely instrumental in sustaining the character of the art that followed. Its effects may be seen in the noble nature of the best works of Romney, Copley, Raeburn, Opie, Girtin, Blake, Lawrence, Stothard, Constable, Wilkie, Haydon, De Wint, Crome, Turner, Leslie, and not less in the decorative designs of houses by the Adams brothers, in Wedgwood ware, in gold and silver work, and in furniture.

It is rarely that any cause for rejoicing may be found in the disastrous war of the beginning of the 19th century, but undeniably it did great things for the strengthening of English character, and this was the case in no direction more surely than in that of art. When in the peace of 1814 the Continent was thrown open, it is noted by three great painters, Haydon, Leslie, and Constable, that England stands supreme in painting among the nations, and this verdict was endorsed by the judgment of many able foreigners. The selection of Sir Thomas Lawrence to paint the members of the Holy Alliance is a convincing proof of this opinion, and the recognition of Constable by France in 1820 is further evidence to the same effect. But alongside of virtuous influences there had been at work a deadly academic dogma which the few far-seeing of that generation recognised as threatening destruction to the still struggling English school, an influence which had already completely destroyed decorative design. To glance at the members' lists of exhibitions of that day and to recognise how many then held great are now perfectly unknown, brings this to the proof. These painters were creatures of orthodox rule, line, and system, seeing whose influence Constable in 1821 prophesied 'in thirty years English art will cease to exist.' Following up this forecast of the great landscape-painter, Leslie thirty years later finds the fulfilment of Constable's prediction in the death of Turner.

It remained for the young generation to find out what lay at the root of the decay and also its remedy. How to get free from the prejudice which blinds the eye to established errors is the preliminary problem to effecting all reformation. The attempt made in Germany in the beginning of the century to cultivate what was called 'Early Christian Art,' was participated in by W. Dyce, D. Maclise, and a few other artists in England. But for youthful seekers after a perfect method these efforts, even where they expressed much of English individuality, were not unboundedly promising, because they lacked the full inspiration of nature. One of the earnest young students of the day was William Holman Hunt, who, already feeling his way as a practical painter, was led by circumstances to study in exceptional degree the works of the greatest old masters, and he perceived that in every school progress ended when the pupils derived their manner through dogmas evolved from artists' systems rather than from principles of design taught by nature herself. He determined therefore, for his own part, to disregard all the arbitrary rules in vogue in existing schools, and to seek his own road in art by that patient study of nature on which the great masters had founded their sweetness and strength of style. Without any idea of 'forming a school,' but for his own development alone, he began to study with exceptional care and frankness those features of nature which were generally slurred over as unworthy attention; and to this purpose he found most timely encouragement in the enthusiastic outburst of Ruskin's appeal to nature in all vital questions of art criticism, as expressed by him in *Modern Painters*.

At this period an increasing intimacy was cemented between W. Holman Hunt, aged nineteen, and John Everett Millais, who was already at the age of seventeen the precociously efficient medal student of the Royal Academy and an emulator of the pseudo-classical Etty. This youthful friendship led to frequent consultations over the needs of the growing generation of artists, and Millais declared his confidence in the closer study of nature, which he determined to adopt as soon as work to which he was committed should be completed.

Dante Gabriel Rossetti was at this time also fascinated by the newly-revived principle of patient striving after nature, but he had not yet become a practical painter, and there was no certainty that he would do so. He had, before his intimacy with Holman Hunt, begun the study of art under Ford Madox Brown, a painter who had distinguished himself by some of the most admirable contributions to the Westminster Hall competition, works which Rossetti had the independent good sense to admire. In the year 1848 (when Holman Hunt was engaged on a picture of Rienzi, of which he had already completed the painting of the landscape from nature, and other complicated preparatory work) D. G. Rossetti placed himself with Holman Hunt in his studio in Cleveland Street, where he followed a course of study specially devised for him by the older student to enable him to cope with the difficulties of a picture undertaken in pure experiment, in which finally he triumphed; this picture is now well known as 'The Girlhood of the Virgin.'

Millais, on his part, forthwith took for his first subject to be treated on the new principles a design from Keats's *Isabella*. This was originally intended for one of a series of etchings which the three, now formed into a band called the Pre-Raphaelite Brotherhood, had undertaken to publish. It is the justly famous picture now in the Liverpool Art Gallery.

The three artists, as representing the Pre-Raphaelite body, appeared in the exhibition season of 1849, Millais with 'Lorenzo and Isabella,' Holman Hunt with 'Rienzi,' Rossetti with 'The Girlhood of the Virgin,' and excited the most flattering attention; but by the following year a storm of enmity of the most bitter kind was raised against them. Their pictures this second year were 'Christian Priests Escaping from Druid Persecution,' by Holman Hunt; 'Christ in the House of his Parents,' by Millais; Rossetti's picture of the 'Annunciation' he exhibited (as he had done with his picture of the previous year) at another exhibition than the Academy. Many journals now joined the onslaught upon the three young artists, but undeniably the most damaging attack was one made by Charles Dickens in *Household Words*. (From this date to his life's end Rossetti discontinued public exhibition.) With this attack the bitter feeling against the young men so increased that in the following year (1851) one influential journal advocated that their pictures should be removed from the walls of the Royal Academy a few weeks after the opening of the exhibition. Thus, in the third year of its joint existence, the new school was threatened on all hands by powerful opponents, when there appeared in the *Times* three letters from Ruskin denouncing the spirit of jealousy and injustice with which the young men had been assailed. He pointed out the merits of the works and the great influence for good which the revival was likely to exercise upon the English school. Later followed a succession of pictures from the hands of the three young painters, works the titles of which have become familiar throughout England.

Among the works of Holman Hunt are 'Rienzi' (1849), 'Christian Priests Escaping from Druid Persecution' (1850), 'Two Gentlemen of Verona' (1851), 'Claudio and Isabella' (1853), 'Strayed Sheep' (1853), 'Light of the World' (1854), 'Scapegoat' (1856), 'Finding of Christ in the Temple' (1860), 'Isabella and the Pot of Basil' (1867), 'Christ the Carpenter' (1874), 'The Triumph of the Innocents' (1885). Amongst those of J. E. Millais are 'Isabella' (1849), 'Christ in the House of His Parents'

(1850), 'Ferdinand lured by Ariel' (1850), 'The Huguenot' (1852), 'Ophelia' (1852), 'The Order of Release' (1853), 'L'Enfant du Régiment' (1855), 'Vale of Rest' (1859), 'Autumn Leaves' (1865), 'Chill October' (1870), 'A Flood' (1870). Amongst those of D. G. Rossetti are 'The Girlhood of Mary Virgin' (1849), 'The Triptych. Llandaff Cathedral' (1856), 'Giotto painting the Portrait of Dante' (1859), 'Mary Magdalene at the Door of Simon the Pharisee' (1861), 'Beata Beatrix' (1865), 'The Blessed Damosel' (1877), 'La Donna della Finestra' (1879), 'The Day Dream' (1880), 'Dante's Dream' (1881), 'Found,' 'Proserpine' (1882). Many of these pictures exist in replica. For a list of Holman Hunt's collected works, see catalogue of Fine Art Society (1886); for J. E. Millais, Fine Art Society (1884), and Grosvenor Gallery (1886); for D. G. Rossetti, Royal Academy (1883).

Two of Rossetti's noble pictures have since his death become the property of the nation. These are the 'Annunciation' and 'Beata Beatrix.' Rossetti makes reference to many of his pictures in his sonnets. The title Pre-Raphaelite was adopted not without some sarcastic spirit intending to reflect upon the use of the name of the prince of painters by artists of the day to justify their own flimsy and un-Raphaelesque art; but it had also a more serious justification in the conviction that Raphael's latest style, having been adopted, as that of an emulator, from the system built up with slow effort by Michelangelo and Leonardo da Vinci, did not at last altogether escape those marks of decadence entirely unknown in the works of his immediate forerunners. This defect the seekers after the second Renaissance traced to the remoteness of Raphael from those influences of the training of humility which the study of nature had directly or indirectly given in full measure to Michelangelo and Leonardo da Vinci. The first pictures of the new school had upon them, together with the initials of the painters, the letters P.R.B., meaning Pre-Raphaelite Brotherhood; when public hostility became highly injurious (the meaning of the letters having been revealed, contrary to the original intention) this practice was abandoned.

Besides the three working founders, some few friends were enrolled as hopeful converts, with the idea that they would assist the movement. These were James Collinson and Thomas Woolner among artists, W. M. Rossetti, brother of the painter, and F. G. Stephens, who have followed other professions than art. There can now be little question that the Pre-Raphaelite school has exercised a powerful influence upon modern art; whether it has done so to the extent hoped for by its promoters lies with the future to reveal. One ambition which it had from the beginning was the restoration of decorative art; this has been much retarded by the hindrances of opposing forces; still, a great movement, clearly traceable to the revival, has taken place. There is no question that many established painters of the time were beneficially affected by the new impulse, but still more was this the case for the men who followed them. Unfortunately for the school, its recognition came too late for it to profit by the temporary patronage of art extended by government in the decoration of the Houses of Parliament, for which all the commissions were bestowed before the Pre-Raphaelite school could claim attention; their work, therefore, has been confined to the limits of private patronage, which for the poetic and ambitious art they aimed at is too limited a sphere. Works of national importance are the only entirely appropriate field for the highest efforts.

[In fulfilling the part of chronicler of Pre-Raphaelitism it has been inevitable that the writer should avow the degree of responsibility which he himself had in the movement, the more so, as statements of different tenor have appeared, and although the present article bearing the author's name may to some persons appear egotistical.—W. H. H.]

Prerogative, ROYAL. See DIVINE RIGHT, PARLIAMENT, SOVEREIGN, PARDON, REPRIEVE.

Prerogative Court, in England, was the court wherein all wills were proved and administrations taken out. It was so called because it belonged to the prerogative of the archbishop to take charge of these matters, which formerly fell under ecclesiastical superintendence. Hence there was a Prerogative Court for the province of Canterbury and another for the province of York. This jurisdiction was entirely taken away in 1858 from the ecclesiastics, and transferred to a new court called the Probate Court (q.v.).

Presburg (Ger. *Pressburg*, Hung. *Pozsony*), a town of Hungary, stands on the left bank of the Danube, 40 miles by rail E. by S. of Vienna and close to the Austrian frontier. It is backed by the spurs of the Little Carpathians, and is a pleasant town. Its principal buildings are the cathedral, a Gothic edifice of the 13th century (restored in the middle of the 19th), in which the kings of Hungary used to be crowned; the church of the Franciscans (1290–97); the town-house (1288), with a natural history collection; the parliament house, in which the Hungarian representatives used to meet until 1848; and some private houses. The royal castle (1645) was destroyed by fire in 1811, and is now a ruin. There is an academy of jurisprudence and philosophy. The chief objects of manufacture are beer, dynamite, wire, starch, spirits, confectionery, biscuits, &c.; and there is considerable trade in corn, sheep, cattle, swine, and wine.

Presburg grew to be a prominent town during the 11th and 12th centuries, and was frequently chosen for conferences and meetings between the rulers of Austria and Hungary. From 1541 (when the Turks seized Buda) down to 1784 it was the capital of Hungary. The town was taken by Bethlen Gabor in 1619, by the Austrians in 1621, and was bombarded by Davoût in 1809. Here on 26th December 1805 Napoleon concluded a treaty with the emperor after the battle of Austerlitz. Pop. (1881) 48,326; (1890) 52,444.

Presbyopia (Gr., 'old sight'), a change in the power of vision, not usually noticed till about forty-five years of age, when near objects come to be less distinctly seen than those at a distance. See EYE, Vol. IV. p. 512.

Presbyterianism. The name Presbyter is from the Greek *presbyteros*, 'elder.' The elders formed one division of the great council of the Jews, with the priests and scribes (Mark, xiv. 43); and every synagogue had its body of ruling elders (Luke, vii. 3, viii. 41). From these the name and some portion of the duties were transferred to the Christian church. We have no record of the first appointment of elders, but we find them as recognised rulers in the church of Jerusalem so early as the year 44 (Acts, xi. 30). The duties entrusted to them are these: (1) They had charge of the collections for the poor which were sent by the hands of Barnabas and Saul (Acts, xi. 30). (2) They are specially named as taking part in the council which was held at Jerusalem about the year 51 (Acts, xv. 2), and at the meeting of the church there when Paul reported his success among the Gentiles (Acts, xxi. 18). (3) They took part in the ordination of Timothy (1 Tim. iv. 14). (4) They were the pastors and bishops of the congregations. Thus the apostle Paul, addressing the elders of Ephesus, says, 'Take heed . . . to all the flock over which the Holy Ghost hath made you overseers (bishops) to feed the church of God' (Acts, xx. 28). And writing to Timothy, he says, 'Let the elders that rule well be counted worthy of double honour, especially they who labour in word and doctrine' (1 Tim. v. 17). Elders also are found in all the churches. We have seen them in the mother-church of Jerusalem; and when Paul and Barnabas went forth on their first missionary journey, about the year 46, they ordained elders in every church (Acts, xiv. 23). Accordingly we find them in Ephesus about the year 60 (Acts, xx. 17), and in the same city a few years later (1 Tim. v. 17, with chap. i. 3), and in Crete. Titus is commanded 'to ordain elders in every city' (Tit. i. 5). These are the scripture facts on which the system of Presbyterianism as a government by elders is based. It does not recognise the bishop as the superior of the presbyter, for they were originally two names of the same persons. Thus in Titus, i. 5, 7, the apostle writes, 'Ordain elders in every city . . . for a bishop must be blameless,' and in Acts xx. those who in verse 17 are termed elders in verse 28 are termed bishops. On the original identity of the bishop and presbyter Bishop Lightfoot says, 'It is a fact now generally recognised by theologians of all shades of opinion, that in the language of the New Testament the same officer in the church is called indifferently bishop (*episcopos*) and presbyter.' There are two instances in which the term 'bishop' occurs apart from his being described as 'elder,' just as there are many examples of the elder being mentioned without his being termed bishop (Phil. i. 1; 1 Tim. iii. 2). In the writings of Clement of Rome, about the end of the 1st century, there is the same identity between the elder and the bishop; but from this period onwards the distinction between the two begins to appear, though Jerome in the 4th century writes: 'Among the ancients bishop and presbyter are the same, for the one is a term of dignity, the other of age' (see BISHOP).

Presbyterianism lingered in certain countries for centuries, as in Scotland till the year 431, when Palladius was appointed bishop, and in Bavaria till the year 740. Traces of Presbyterianism are found among the Waldensians; and with the Reformation, when earnest attempts were everywhere made to restore to the church primitive doctrine and form, Presbyterianism again asserted itself. In Germany and France, and on the Continent generally, in consequence of its peculiar relationship to the state, its free development was prevented. It was Calvin in Geneva who, though not the originator, gave Presbyterianism the form which, with modifications, it has ever since retained. It occupies a middle position between diocesan Episcopacy and Congregationalism, and may be styled ecclesiastical republicanism. The congregation elects its own minister and elders, and by deacons or managers regulates all its financial affairs. The session, consisting of the minister and elders, has the spiritual oversight of the congregation. The ministers, with one or more elders from each congregation, constitute the presbytery (formerly sometimes called *classis*) of a defined district, having a general superintendence of the congregations; to it appeal may be made from congregations or sessions. Some churches still retain as part of the regular organisation the synod, consisting of a number of presbyteries in a province, and a court of appeal from presbyteries; other churches dispense with this intermediate court. The General Assembly or General Synod is the highest court of the church, and consists of all the presbyteries of the church or their representatives.

Presbyterianism, variously modified, is the form of church government subsisting in many Protestant churches, but is most perfectly developed in Britain (including Ireland) and its colonies and America. In Britain it prevails chiefly in Scotland, although during the Civil War in the 17th century it was for a very short time in the ascendant in England also. The *consistorial* system of the continent of Europe (see CONSISTORY) cannot, in any of its modifications, be regarded as essentially Presbyterian, although in some respects it approaches to Presbyterianism. The French consistorial system is more nearly Presbyterian than the German. In other churches, also, Presbyterianism is modified by the relations of the church to the state. At the General Presbyterian Council held at London in 1889, 81 churches were represented from all parts of the world, having 23,077 ministers, 117,345 elders, 3,886,680 communicants, and 2,846,517 Sunday scholars.

England.—The principles of the Puritans (q.v.) were essentially Presbyterian, although many of them were so much occupied with questions of doctrine and discipline, and with resistance to power exercised, as they believed, contrary to the word of God, that they paid little heed to the development of their principles in church government. Yet in 1572 a presbytery was formed at Wandsworth, in Surrey, by ministers of London and its neighbourhood, separating from the Church of England; and other presbyteries were soon formed, notwithstanding the extreme hostility of Queen Elizabeth. When the Westminster Assembly met in 1643 the Puritans of England were generally inclined to adopt Presbyterianism as their system of church government, although some still preferred a modified Episcopacy, and some had adopted the principles of Independency or Congregationalism. The Presbyterians were, however, the strongest party at the beginning of the Civil War, although the Independents gained the ascendency afterwards. The establishment of Presbyterian church government in the Church of England was voted by parliament (the Long Parliament), 13th October 1647; but it was never really established. The influence of the Independents prevented it. London and its neighbourhood were, meanwhile, formed into twelve presbyteries, constituting the Provincial Synod of London, which continued to hold regular half-yearly meetings till 1655, the meetings of presbyteries being continued till a later date; but the whole Presbyterian system was overturned by Cromwell's Committee of Triers, appointed for the examining and approving of all persons elected or nominated to any ecclesiastical office. Cromwell's policy aimed at bringing all ecclesiastical matters under the immediate control of the civil power. The Restoration was followed by the fruitless Savoy Conference (q.v.), and soon after by the Act of Uniformity, which came into force on 24th August 1662; and on that day about 2000 ministers in England and Wales resigned their benefices, or submitted to be ejected from them, for conscience' sake. The first Nonconformists were mostly Presbyterians, but a small minority of Independents among them prevented the institution of a regular Presbyterian system, and the consequence was that the Nonconformists of England became in general practically Independent. Antinomianism and Arminianism soon appeared among them, and were followed by Socinianism or Unitarianism to such an extent that the name *Presbyterian* became synonymous in England with *Socinian* or *Unitarian;* old endowments, legacies of Presbyterians, being in many instances enjoyed by Unitarians. Meanwhile, there sprang up in England a few congregations connected with the Church of Scotland, and with what was formerly known as the 'Secession Church,' now the United Presbyterian Church. The number of such afterwards very much increased. At the time of the formation of the Free Church of Scotland (q.v.) the greater number of the English Presbyterian churches connected with the Church of Scotland sympathised with the cause of the Free Church, and took the name of the Presbyterian Church in England. In 1876 a union, which had been long desired, was consummated between the synod more intimately related to the Free Church of Scotland and the congregations belonging to the United Presbyterian Church. The name assumed by the united church is the Presbyterian Church of England. At the time of the union the Presbyterian Church in England had about 150 churches, and the United Presbyterian Church more than 100. At the same date the Church of Scotland in England had about twenty congregations.

Scotland.—The Presbyterian Churches of Scotland are separately treated in the articles SCOTLAND (CHURCH HISTORY), FREE CHURCH OF SCOTLAND, UNITED PRESBYTERIAN CHURCH, and CAMERONIANS.

Ireland.—The Irish Presbyterian Church originated in the settlement of Ulster by Scottish colonists during the reign of James I. After various struggles a Presbyterian church was founded by the formation of a presbytery at Carrickfergus in 1642. The Presbyterian population of Ulster was greatly increased in number by immigration from Scotland about the middle of the 17th century; and, notwithstanding many difficulties, from the opposition of prelates and of the civil power, the church continued to increase. It is a curious fact that the Presbyterian ministers received a pension from government, under Charles II., in 1672, which *Regium Donum* (q.v.), however, was not regularly paid until the reign of William, when it was augmented, although only to the paltry amount in all of £1200 a year. It was afterwards repeatedly augmented, till it reached the amount of £70 for each minister. A seminary for the education of ministers was erected at Killaleagh; and in 1710 the synod of the Presbyterian Church resolved to institute the preaching of the gospel to the Irish in their own language. During this period of its history the Irish Presbyterian Church experienced the utmost opposition from the High Church party. Afterwards dissensions sprang up within it, and these with reference to the most important doctrines. A body opposed to the doctrine of the Westminster Confession of Faith was organised as the Presbytery of Antrim. But the doctrine of the Westminster Confession was more and more departed from in the Irish Presbyterian Church itself, which became to a large extent Arian or Unitarian. In 1830 a separation took place from the Arians, who then formed the *Remonstrant Presbytery of Ulster*. In 1840 a union took place of the Irish Presbyterian Church forming the *Synod of Ulster* and the *Secession Church in Ireland*, an offshoot of the Scottish Secession Church, which then reckoned 141 congregations in the north of Ireland. The Irish Presbyterian Church, adhering to the Westminster Confession, in 1889 had 620 ministers, with 102,057 communicants (Presbyterian pop. at 1891 census, 446,687), and it has not only displayed much zeal for the advancement of Protestantism in Ireland, but also of Christianity in other parts of the world, and supports a very successful mission in Gujarat and Manchuria. The act disestablishing the Irish Church in 1869 provided also for the discontinuance of the *Regium Donum* to the Presbyterians, with reservation of annuities for life to ministers already entitled to it; and further gave power for commutation of annuities for a capital sum, of which advantage has been taken to a very large extent, so that a fund has been formed for paying annuities and leaving a large surplus as the nucleus of a Sustentation Fund for the ministers in time to come. There are two colleges—one purely theological, at Belfast, with seven professors; the other, at Londonderry, has eight professors and a complete curriculum. The colleges were empowered in 1881 jointly to grant degrees in theology.

United States.—The first Presbyterians in America were emigrants from Scotland and Ireland. The first Presbyterian congregations in America were organised in Maryland before the close of the 17th century—the oldest that of Rehoboth, dating about 1690—and the first presbytery in Philadelphia in 1705. A synod, consisting of four presbyteries, was constituted in 1716. Dissensions ensued; but in 1758 the American Presbyterian churches were united in one; and in 1788 a General Assembly was instituted, the whole number of congregations being then 419, and of ministers 188. The increase of the church was rapid, and in 1834 it contained 22 synods, 111 presbyteries, and about 1900 ministers. In 1801 a scheme of union was adopted between Presbyterians and Congregationalists, under which hundreds of congregations were formed in the state of New York and elsewhere. About the beginning of the 19th century the Cumberland Presbyterians (q.v.) separated from the main body; and in 1838 the American Presbyterian Church was divided into two great sections, commonly known as *Old School* and *New School* Presbyterians, the former holding high Calvinistic doctrines, the latter a somewhat modified Calvinism. Both of these churches are extended over the whole of the United States, and both of them have missions in different parts of the heathen world, their collections for missions forming a large part of the contributions for that object from the United States of America. For some years they showed symptoms of a sincere desire to reunite; and this object they accomplished in 1869, notwithstanding the dissensions and new divisions caused by the struggles between the Northern and Southern States on the question of slavery. At the time of this union the Old School Presbyterians counted 2381 ministers, 2740 churches, and 258,903 communicants; while the New School numbered 1848 ministers, 1631 churches, and 170,562 communicants. Each possessed at the same time five theological seminaries. A revision of the Confession was in progress in 1891. There are several sections of the Presbyterian Church in the United States, each having its own theological seminaries and colleges, such as the Presbyterian Churches Northern and Southern, the Cumberland, the Reformed, the United Presbyterian, the Reformed Dutch and German, &c. In 1889 the number of ministers was 11,076, and of communicants 1,424,042.

British Colonies.—By the middle of the 18th century Presbyterian ministers were labouring in Nova Scotia and Quebec, the various divisions of the home churches being represented at an early stage; but most of the early ministers came from the Secession Church. A union between the sections representing the Free and United Presbyterian Churches took place in 1861. The Presbyterian Church in Canada is strong and prosperous, with six theological colleges. In 1890 there were above 800 ministers, and about 140,000 communicants. In the Australasia colonies Presbyterianism is also vigorous; see articles on the several colonies. In the Cape Colony and minor colonies Presbyterianism is also represented.

On Presbyterianism, as against Episcopacy and Independency, see, in the 17th century, works by Gillespie, Rutherford, Baillie, 'Smectymnuus,' Byfield, Baxter, Clarkson; in the 18th, Welles, Hall, John Brown, Whytock; later, Barnes, *Scriptural Argument for Episcopacy Examined* (1835), and *The Apostolic Church* (1848);

The Plea of Presbytery (1840); Miller, *Manual of Presbytery* (1842); Smyth, *Presbytery the Scriptural Polity* (1843); King, *Church Government* (1854); Macpherson, *Presbyterianism* (1883); Bannerman, *Worship of the Presbyterian Church* (1884); *Constitution and Law of the Church of Scotland* (1884); Witherow, *Form of the Christian Temple* (1889); Killen, *The Framework of the Church* (1890); works on the Westminster Assembly and its Confession of Faith by Hetherington (new ed. 1891), Hodge (1869), Macpherson (1881), Mitchell (1867, 1883, 1886). See also the articles in this work on Calvin, Knox, Assembly (General), Elder, Church History, Reformation, Confessions, Westminster Assembly. For Presbyterian missions, see Missions. For Presbyterianism in England, see Madrie, *Annals of English Presbytery* (1872); Drysdale's *History of the Presbyterians in England* (1889); *Minutes of the Manchester Presbyterian Classis* (Chetham Society, part i.–iii. 1890–91). For Ireland, see Ireland; also Reid, *History of the Presbyterian Church in Ireland* (1867); Irwin, *Irish Presbyterianism* (1890). For America, see Webster, *History of the Presbyterian Churches in America* (1857); Gillett, *History of the Presbyterian Church in the United States* (1864); *American Presbyterianism* (1885).

Presbytery. For presbytery as a part of Presbyterian church government, see the preceding article. In ecclesiastical architecture the presbytery is the space in the choir of a church in which the high altar is placed; the name is sometimes extended to the whole choir.

Prescot, a manufacturing town of Lancashire, 8 miles E. by N. of Liverpool. It has manufactures (introduced from Yorkshire in 1730) of watch-movements, watch-tools, small files, &c., and there are potteries near it. Prescot was the birthplace of John Kemble. Pop. (1851) 7393; (1891) 6745.

Prescott, a city of Arizona, lies in a picturesque mountain-valley, some 6000 feet above the sea-level. There is a railway (74 miles north) to Prescott Junction, which is on the Atlantic and Pacific Railroad, 595 miles SW. of Denver. Gold and silver are found in the neighbourhood, and daily lines of the United States Mail Coaches connect it with the numerous mining camps round about. Besides bullion, it has a trade in lumber and wool. Pop. (1880) 1836; (1890) 1759.

Prescott, William Hickling, historian, was born at Salem, Massachusetts, May 4, 1796. His father was a prosperous lawyer; his grandfather, Colonel William Prescott (1726–95), was a distinguished soldier in the Revolution, to whose memory a statue was erected on Bunker Hill in 1881. He entered Harvard College in 1811, and graduated in 1814. Early in his college course he had his left eye blinded by a piece of bread playfully thrown by a fellow-student, and the other was soon sympathetically affected, so that he was obliged to live for months in a darkened room. He next travelled in England, France, and Italy, married in 1820, and abandoned the study of law for literature. He now devoted himself to severe study, and formed splendid literary projects, in spite of the grievous disadvantage of being able only to use his remaining eye for brief periods. His first studies were in Italian literature, and it was not till the beginning of 1826 that he had found the work of his life within the range of Spanish history. Fortunately his means were ample, so that he was able to procure the services of assistants, and to live amid conditions of comfort. By constant habit he gained the power of carrying a great deal in his memory, and after he had revolved the whole of a chapter in his mind he quickly transferred it to paper by means of his stylus and an ingenious writing-case specially constructed for the blind. His first secretary knew no Spanish, yet he went through the seven quarto volumes of Mariana's History with him. So he laboured with almost unexampled courage and patience at his *History of Ferdinand and Isabella* (3 vols. Boston, 1838), which quickly carried his name across the ocean to the Old World, and was straightway translated into French, Spanish, and German. He next devoted six years to the *History of the Conquest of Mexico* (3 vols. 1843), and four years to the *Conquest of Peru* (2 vols. 1847). These works deservedly brought him a great reputation; he was chosen a corresponding member of the French Institute, and on a visit to Europe in 1850 was received with the highest distinction. In 1855 he published two volumes of his *History of Philip II.*, and a third volume in 1858, but died of apoplexy before its close at Boston, January 28, 1859. Prescott's style alone would have assured him popularity, and to this day he remains unrivalled among English historians for vigorous and direct narrative and for sustained splendour of colour. His imagination worked all the more freely because he saw but with the inward eye, and the splendid visions that it wove gave his pages the vivid colours of reality and life. He is not a philosophical historian, but he is a master of narrative and incident, and there is not a dull passage in all his histories. His Life, by George Ticknor, was published in 1864.

Prescription is the term applied to the written direction or receipt given by the physician or surgeon to the chemist for the preparation of a medicinal substance suitable to a special case. In prescribing the medical practitioner may either order an *officinal* or an *extemporaneous* compound. Officinal compounds (or preparations, as they are frequently termed) are those for which formulæ are introduced into the national pharmacopœias, and are therefore supposed to be always at hand in the laboratory of the dispensing chemist (such, for example, as *Mistura Ferri Composita*, *Pulvis Ipecacuanhæ Compositus*—i.e. Dover's Powder—*Confectio Sulphuris*, &c.); while extemporaneous compounds are those which are devised on the instant with the view of meeting the various peculiarities which almost every case of disease presents. In some cases, where no chemical action is apparent or probable, a mixture of two or more drugs seems to modify the physiological effect of each ingredient. For example, Dover's Powder contains as its active ingredients ipecacuanha and opium, and yet in well-regulated doses it neither exhibits the nauseating properties of the former nor the narcotic influence of the latter substance. The selection of the most eligible form of the remedy is of extreme importance. The physician here has to determine whether he shall prescribe his remedy in the form of pill, powder, or mixture; whether he shall administer it as an injection into the lower bowel; whether the patient shall (in certain cases) inhale it; &c. As a general rule we should accommodate the form and flavour of our remedies, provided we do not sacrifice their virtues, to the taste of the patient, who usually prefers pills to draughts or powders. The unpleasant taste of many medicines which must be given in the fluid form may often be obviated by the skill of the prescriber. Castor-oil, cod-liver oil, and copaiba are most easily taken on the surface of orange-wine, or water containing a bitter tincture, care being taken to moisten with water the edge or rim of the glass at the part applied to the mouth. The taste of solution of potash and of lime-water is best covered with milk; and the disagreeable flavour of senna is said to be concealed if its infusion is made with strong tea.

In conclusion it may be remarked that it is the custom to write prescriptions in the Latin language, to abbreviate well-known words, to use symbols for weights and measures, and to commence each prescription with the symbol ℞, which signifies *Recipe*, 'take.' As an illustration, we append a prescription for a tonic draught (where *f.* ℥ stands for fluid ounce; *f.* ʒ for fluid drachm; ♏ for minim; *gr.* for grain; M. for *misce*, 'mix'):

(*Name of Patient.*)
℞ Quinia Sulph., *gr.* j
Tinct. Calumbæ, *f.* ʒi
Acid. Sulph. Dilut., ♏x
Syrup. Aurant., *f.* ʒiss
Infus. Calumbæ, *ad f.* ℥j
M. *Fiat Haustus ter quotidie sumendus.*
Date. (*Initials or name of prescriber.*)

As a parallel to this retention in western Europe of a mediæval usage, it may be mentioned that in the palmy days of the republic of Athens the Attic-speaking practitioner was held bound to write his prescriptions in the ancient Doric dialects; the reason in this case being that the schools of medicine in the Doric colonies of Magna Græcia and elsewhere were long the most celebrated.

Prescription, in Roman law, means a clause inserted in the preface to the formula under which an action was tried. The prescription *longi temporis* directed that the claimant should not succeed if the defendant had been so long in possession of the property in dispute that equity would not allow him to be disturbed. In England lapse of time may affect property rights in various ways. The right of a claimant to bring an action may be taken away by statutes of Limitation (q.v.), or the law may regard the long enjoyment of the possessor as evidence to show that his rights had a lawful origin. Possessory title to land is now gained under the express provisions of the modern statutes of limitation. In proving title by prescription to easements (such as rights of way, ancient lights, &c.) and other incorporeal rights over the land of another the claimant relies on immemorial enjoyment; but the courts would always infer the immemorial character of the right from a comparatively short period of actual enjoyment. And now, under the Prescription Act of 1832, the period is fixed at twenty years in the case of lights and other easements and thirty years in the case of profits (such as common of pasture, and the like). For the rules of the act, see Shelford's *Real Property Statutes.*

In the law of Scotland prescription is a method both of acquiring and of losing a right; hence it is divided into positive and negative. The positive prescription was introduced by Statute 1617, chap. 12. As that statute has been interpreted by decisions, possession of heritable subjects for forty years, on the requisite titles, recorded in the appropriate register, is sufficient to secure an owner against any one alleging a better title; or to determine the extent of an estate, where a question arises either as to what is comprehended under a general description or as to whether a specific piece of property has been carried under a clause of parts and pertinents; or to merge a title of property in the higher title of superiority. The possession must be uninterrupted and co-extensive with the right claimed. The Conveyancing Act, 1874 (37 and 38 Vict. chap. 94 sect. 34), simplified the title necessary for founding prescription, by enacting that 'any *ex facie* valid, irredeemable title,' recorded in the appropriate register, shall be sufficient; and shortened the prescriptive period by enacting that possession for twenty years continually and together, following on such recorded title, shall be equivalent to possession for the old period of forty years.

The negative prescription of obligations was first introduced by the Statute 1469, chap. 29, which declares that unless a person follow an obligation and take document thereon within forty years, his right shall prescribe and be of no avail. By the Act 1617, chap. 12, this prescription was extended to heritable bonds and other heritable rights, and it was enacted that the years of minority of the party against whom the prescription was used should not be counted. In addition to these long prescriptions there are several shorter prescriptions, whose object, generally speaking, is to protect parties against the consequences of negligence in preserving vouchers and, after the expiration of the prescriptive period, to change the *onus probandi* and to restrict the mode of proof. Among these lesser prescriptions are the vicennial prescription of twenty years, applicable to retours and holograph writings; the ten years' or decennial prescription, applicable to actions against tutors and curators; the septennial prescription of cautionary obligations; the sexennial prescription of bills of exchange; the quinquennial prescription of arrears of rent in an agricultural lease, of ministers' stipends, of bargains concerning movables made verbally, and of inhibitions; the triennial prescription, introduced by the Act 1579, chap. 83, applicable to actions for servants' wages, for house-rents, or for accounts to attorneys, surgeons, agents, &c. In Scotland if, within twenty years after the commission of a crime, no step has been taken to bring the offender to justice, it would appear that the right to prosecute falls to the ground.

Presentment. See CRIMINAL LAW.

Preserved Provisions. Under the term *preserves* is usually included fruit, eaten whole or broken, or the juice of fruit, preserved by boiling with sugar. Whole fruit is boiled in clear syrup in such a manner that the sugar penetrates the fruit completely. It is then drained and dried at a gentle heat, so that the absorbed sugar crystallises in the substance and on the surface of the fruit, which is then known as *candied*. Jam consists of fruit boiled with an equal weight of sugar, which latter dissolves in the fruit juice set free as the fruit breaks down. If well made they can be preserved in this manner for years, but the quality deteriorates after twelve or eighteen months, owing to crystallisation and other changes taking place in the sugar. Fruit jellies consist of the juice of the fruit only, boiled with sugar, this vegetable jelly consisting principally of a substance known to chemists under the name of *pectin*. Fruits are also preserved by covering with water in suitable vessels, heating to a high temperature, and closing the vessel whilst hot.

Meat, vegetables, and other provisions may be preserved with more or less success in a number of ways, which may be classed roughly under four headings: (1) desiccation; (2) use of cold; (3) by chemical compounds (antiseptics); (4) by exclusion of air. The simple process of drying is effective both with meat and vegetables, and if completely carried out prevents the ordinary putrefactive changes from taking place. Dried vegetables are prepared largely for use on board ship, and the soup tablets so extensively used nowadays consist of meat and vegetables dried and pressed together. Jerked Beef (q.v.) and Pemmican (q.v.) are prepared chiefly by drying in the sun. The use of cold is mainly a temporary expedient employed for the carriage of meat from one country to another. This industry is carried on extensively in America, Australia, and New Zealand. The carcass is frozen hard by a refrigerating machine, and packed on board ship in a chamber cooled by a similar apparatus. Meat so preserved arrives in Europe in good condition, and if properly thawed is superior to all but the best home-grown beef and mutton (see Refrigeration). For condensed milk, see Milk.

Certain chemical substances have the power to prevent decay or arrest putrefactive changes, by destroying the activity of the germs or ferments which act as the exciting cause. Common salt is variously applied for the purpose of preserving meat (the food-value being thereby somewhat decreased); the meat may be immersed in brine, packed in salt, rubbed with salt and dried, or salted and smoked. The method of salting and smoking ham is described at Ham; the chief preservative element in the wood-smoke is creasote. Creasote, boric acid, salicylic acid, and sulphur compounds are all substances that can be used as food preservatives, but the objection to the use of chemical agents is that they either have a distinct taste themselves or have a toxic influence on the human body. Salicylic acid has been used in large quantities for preserving milk and other foods, but, when taken even in small doses for a lengthened period, it disturbs the animal economy; and in France any food preserved by its means is now condemned as unfit for human consumption. The use of creasote is confined to meats which are usually smoked. Boric acid has no taste, and in all probability is harmless when taken in the small quantities present in food preserved by its means. Milk, fish, poultry, and meat of all kinds may be preserved for months by its use. A very ingenious method of using this preservative has been tried with success. The boric acid is injected into the large vein of an insensible but living animal, so that it is carried in the ordinary circulation to all parts of the body, and the animal is then killed; meat so prepared has been kept fresh and palatable for about three months. Some sulphur compounds, notably the bisulphite of lime and sulphurous acid, are good preservatives, but they have an objectionable taste. The former is used by butchers as a preserver of meat in hot weather.

Exclusion of air is a method of preserving which is used almost exclusively for cooked foods. Various plans of coating meat with air-tight coating have been tried, but they have been carried little further than the experimental stage. Meat has been dipped in molten paraffin-wax, gelatine, gutta-percha, &c.—all of which exclude air; but the air, or, more correctly, the germs present in the air, are imprisoned in the tissues of the meat, and these speedily set up putrefactive changes. The only process which has successfully accomplished the desired end is by the use of high temperature to expel the air and destroy the germs, and then sealing to prevent ingress of more air. Many have claimed the credit of this invention, but in all probability it was first proposed by a M. Appert of Paris in 1810. The process as now carried on, however, is the outcome of many minds, Appert's original method simply supplying the groundwork. The various tinned meats, soups, &c. now in the market are examples of this method of preserving food. The meat, &c. is placed in tins, which are immersed in a solution of calcium chloride heated up to a temperature of 270° F., which destroys both germs and spores. The tins are previously closed, except a small pin-hole for the escape of steam. They are heated thus for about three hours, when the pin-holes are closed by solder, and the tins are allowed to cool. This process is thoroughly successful as far as mere preservation goes. Tins of meat thus treated have been opened after twenty years, and no sign of putrefaction has been noted; occasionally through some carelessness the air may not have been thoroughly removed and putrefaction ensues; such exceptions, however, are rarely met with in tins sent out by good firms. A bad tin can be detected before opening by the bulged-out appearance of the tin, the gases of decomposition pressing out the sides or ends. The objection to the process lies in the over-cooking to which the meat must be subjected. This impairs both the appearance and flavour, and no doubt removes some of the nutritive value of the meat, although this latter point is denied by some. Other plans, varying somewhat in detail but similar in principle, have been patented, and are in use in some of the food-preserving factories. Aberdeen and London are centres for this industry, the former having five factories, whilst in America and New Zealand (q.v.) a large amount of capital is invested in the trade. See Salmon.

The various extracts of meat are in a way preserved foods. They consist of the juice and extractive matter of the meat evaporated down to a thick consistence, and frequently preserved by a large addition of salt. The majority of these extracts are stimulants rather than foods, some of them being practically useless. Vegetables are frequently preserved by the process of pickling. The vegetables are boiled with vinegar and spices. The latter two substances, being antiseptic in their nature, prevent putrefaction and decay. For the preservation of wood, see Dry Rot.

Presidency. See India.

President of the United States, the head of the executive of the United States, is also the only executive officer who reaches his position by election; the appointment of the others being either in his hands (subject to their confirmation by the senate) or regulated by law. The president is elected for a term of four years; eight presidents—Washington, Jefferson, Madison, Monroe, Jackson, Lincoln, Grant, and Cleveland—have been chosen for a second term, but a third term, although there is nothing in the constitution to prevent it, is practically prohibited by the popular prejudice against it. A candidate must be a natural-born citizen of the United States, not under thirty-five years of age. The president has a salary of $50,000 a year, and must receive no other emolument during office from the United States or any state. He is commander-in-chief of the army and navy of the United States, and of the militia when in the actual service of the Union; he has the power to grant reprieves and pardons for offences against the United States, except in cases of impeachment, and (by and with the advice and consent of two-thirds of the senate) to make treaties and to appoint ambassadors, consuls, and all other officers of the United States whose appointments are not otherwise provided for; from time to time he sends to congress a 'message' (cf. the 'Queen's Speech') giving information as to the state of the Union, and recommending measures for consideration; he may convene both houses, or either house, in special session; and, if the two houses disagree as to the time of adjournment, he may adjourn them to such time as he thinks fit. The president, like the vice-president and all other civil officers, may be removed from office on impeachment by the House of Representatives for and conviction by two-thirds of the senate of treason, bribery, or other high crimes and misdemeanours. He may require the opinion, in writing, of the head of any of the executive departments on any subject relating to the duties of his department. Every bill which passes congress must have the president's signature to become a law, unless, after he has returned it with his objections, two-thirds of each house support it and pass it over his veto.

The Vice-president of the United States, although elected along with the president, is no part of the executive department. His sole function is to preside over the senate, where he has no vote unless in the case of a tie; and in practice he has little influence on the administration, and is regarded only as an 'under-study,' in readiness to take the presidency in the event of its being vacated by the president's removal, death, resignation, or inability. Four vice-presidents—Tyler, Fillmore, Johnson, Arthur—have so succeeded to the presidency. In the event of the removal, death, resignation, or inability of both the president and the vice-president, the secretary of state, and after him, in their order, other members of the cabinet, would act as president until the disability of the president was removed, or a new president elected. On the death of a vice-president the duties of his office are fulfilled by the president *pro tempore* of the senate.

The election of president and vice-president is controlled by the electoral system, under which the people do not vote directly for the candidates, but for electors from their separate states who are pledged to cast their votes for particular candidates. Each state is entitled to a number of electors equal to its number of senators (two in each case) and representatives in congress; these latter range from one to thirty-four (see table below). At first the electors simply voted for two candidates, and the one who received the second highest number of votes for president became vice-president; but since 1804 provision has been made for a separate election of the vice-president. In the event of no candidate having a majority of the electoral votes the House of Representatives chooses a president, voting by states, each state having one vote; if no vice-president is elected the senate chooses a vice-president, voting as usual. Such cases occurred in 1800–1, when Jefferson and Burr had tied, and the former was made president and the latter vice-president; in 1824–25, when none of the four candidates for the presidency had a majority, and John Q. Adams, who had received eighty-four electoral votes, was chosen by the House over Andrew Jackson, who had ninety-nine; and finally in 1836–37, when Richard M. Johnson, who had obtained a plurality of electoral votes for the vice-presidency, was elected by the senate. The territories have no vote in any case.

For other presidents, see the articles on the several republics that have such officers at the head of the government.

The presidents of the United States have been George Washington (1789–97), John Adams (1797–1801), Thomas Jefferson (1801–9), James Madison (1809–17), James Monroe (1817–25), John Quincy Adams (1825–29), Andrew Jackson (1829–37), Martin Van Buren (1837–41), William Henry Harrison (March–April 1841), John Tyler (1841–45), James Knox Polk (1845–49), Zachary Taylor (1849–50), Millard Fillmore (1850–53), Franklin Pierce (1853–57), James Buchanan (1857–61), Abraham Lincoln (1861–65), Andrew Johnson (1865–69), Ulysses S. Grant (1869–77), Rutherford Birchard Hayes (1877–81), James Abram Garfield (March–September 1881), Chester Alan Arthur (1881–85), Grover Cleveland (1885–89 and 1893–), Benjamin Harrison (1889–93). For all these see separate articles. The following table shows the number of electoral votes allowed to each state since the census of 1890.

Alabama	11	Maine	6	Ohio	23
Arkansas	8	Maryland	8	Oregon	4
California	9	Massachusetts	15	Pennsylvania	32
Colorado	4	Michigan	14	Rhode Island	4
Connecticut	6	Minnesota	9	South Carolina	9
Delaware	3	Mississippi	9	South Dakota	4
Florida	4	Missouri	17	Tennessee	12
Georgia	13	Montana	3	Texas	15
Idaho	3	Nebraska	8	Vermont	4
Illinois	24	Nevada	3	Virginia	12
Indiana	15	New Hampshire	4	Washington	4
Iowa	13	New Jersey	10	West Virginia	6
Kansas	10	New York	36	Wisconsin	12
Kentucky	13	North Carolina	11	Wyoming	3
Louisiana	8	North Dakota	3	Total	444

Presidio, a Spanish word for 'a fort,' applied especially to four Spanish fortified posts on the coast of Morocco—Ceuta, Melilla, Alhucemas, and Peñon de Velez.

Press, FREEDOM OF THE, the expression used to denote the absence of any official restraint on the publication of books and other printed matter. In England, at the Reformation, the control of the press came to be centred in the crown, the ecclesiastical in addition to the secular government being vested in Henry VIII. as temporal head of the church. The Company of Stationers, who came to have the regulation of printing and publishing, were servants of the government, subject to the control of the Star Chamber. The censorship of the press was enforced by the Long Parliament, in spite of Milton's eloquent protest (see his *Areopagitica*), and was re-established more rigorously at the Restoration. It was continued at the Revolution, and the statute regulating it was renewed from time to time till 1693, when the Commons by a special vote struck it out of the list of temporary acts to be continued. Since that time the censorship of the press has ceased to exist in Britain. But, though there are no official restrictions on what shall and what shall not be published, the authors and publishers of criminal or injurious matter are amenable to the law of libel; and there are certain statutory requirements in force to enable them to be traced. Every person who prints anything for hire or reward must, under a penalty of £20, keep one copy at least of the matter printed, and write on it the name and place of abode of the person who employed him to print it. Every person who prints any paper meant to be published must print on the first or last leaf his name and usual place of business; and on failure to do so he forfeits the sum of £5, and so does any person publishing the same. There are a few printed papers exempted from conforming to the above requirement—as, for instance, papers printed by parliament or in government offices, engravings, auction lists, bank-notes, bills of lading, receipts for money, and a few other similar matters. In the case of a libel legal publication is constituted by sending or showing a copy printed or in manuscript to any person; the sale of a newspaper or other publication in a shop, or its delivery to an officer at the Stamp-office, is also considered an act of publication. The truth of the statements published may be urged as a plea of defence in an action for libel; in criminal proceedings truth is a defence if the publication is for the public benefit. The publisher of a book or newspaper may also defend himself by showing that the matter complained of was published by order of either House of Parliament, that it is a fair criticism on a public person or act, or that it represents the honest belief of the defendant, and is published by him in the course of his official or moral duty. If a bill shall be filed in any court for the discovery of the name of the printer, publisher, or proprietor of a newspaper or other publication, with the view of rendering him liable in damages for slanderous matter, the defendant is bound to make the discovery required, which, however, cannot be made use of against him in any other proceeding than that for which it has been made. The penalties against newspapers can only be sued for in the name of the Attorney-general or Solicitor-general, or Lord Advocate. Certain regulations also exist regarding the exhibition of Plays (q.v.). Subject to these restrictions, the freedom of the press has subsisted in Britain since 1693. At least an equal degree of freedom obtains in the United States, where privilege is much more widely extended. See LIBEL.

A more or less rigorous censorship of the press exists in most European states. There is often no direct supervision previous to publication, but the official censor has it in his power to stop any publication which he deems objectionable, to confiscate the edition, and to prosecute the author and editor. Newspapers and pamphlets are generally subjected to a stricter censorship than larger works. See INDEX; also Odgers on Libel, and Paterson on the Liberty of the Press.—For Correction of the Press, see PROOFS.

Pressensé, EDMOND DE, a prominent French Protestant theologian, was born in Paris, January 24, 1824, studied at the university there, next under Vinet at Lausanne, and Tholuck and Neander at Halle and Berlin, and in 1847 became a pastor at Paris. He was deputy to the National Assembly for the Seine department in 1871-76, and was elected a senator for life in 1883. He received the D.D. degree from Breslau in 1869 and Edinburgh in 1884. He died April 8, 1891. A strong thinker and vigorous writer, as well as eloquent preacher, Pressensé took a foremost part in the great theological as well as ecclesiastical controversies of the day; published many learned and important books, most of which have been translated into English and German; and contributed to the theological and literary magazines on both sides of the Channel—the article on CHRISTIANITY in the present work is from his pen.

The following are the most important books: *Le Rédempteur* (1854; Eng. trans. 1864); *Histoire des Trois Premiers Siècles de l'Église Chrétienne* (4 vols. 1858-77; Eng. trans. 1869-78; a thoroughly revised and extended edition had reached its third volume in 1890); *L'Église et la Révolution Française* (1864; Eng. trans. 1869); *Jésus Christ, son Temps, sa Vie, son Œuvre* (1866; Eng. trans. 1866); *Études Contemporaines* (1880; Eng. trans. New York, 1880); and *Les Origines* (1882; Eng. trans. 1883).

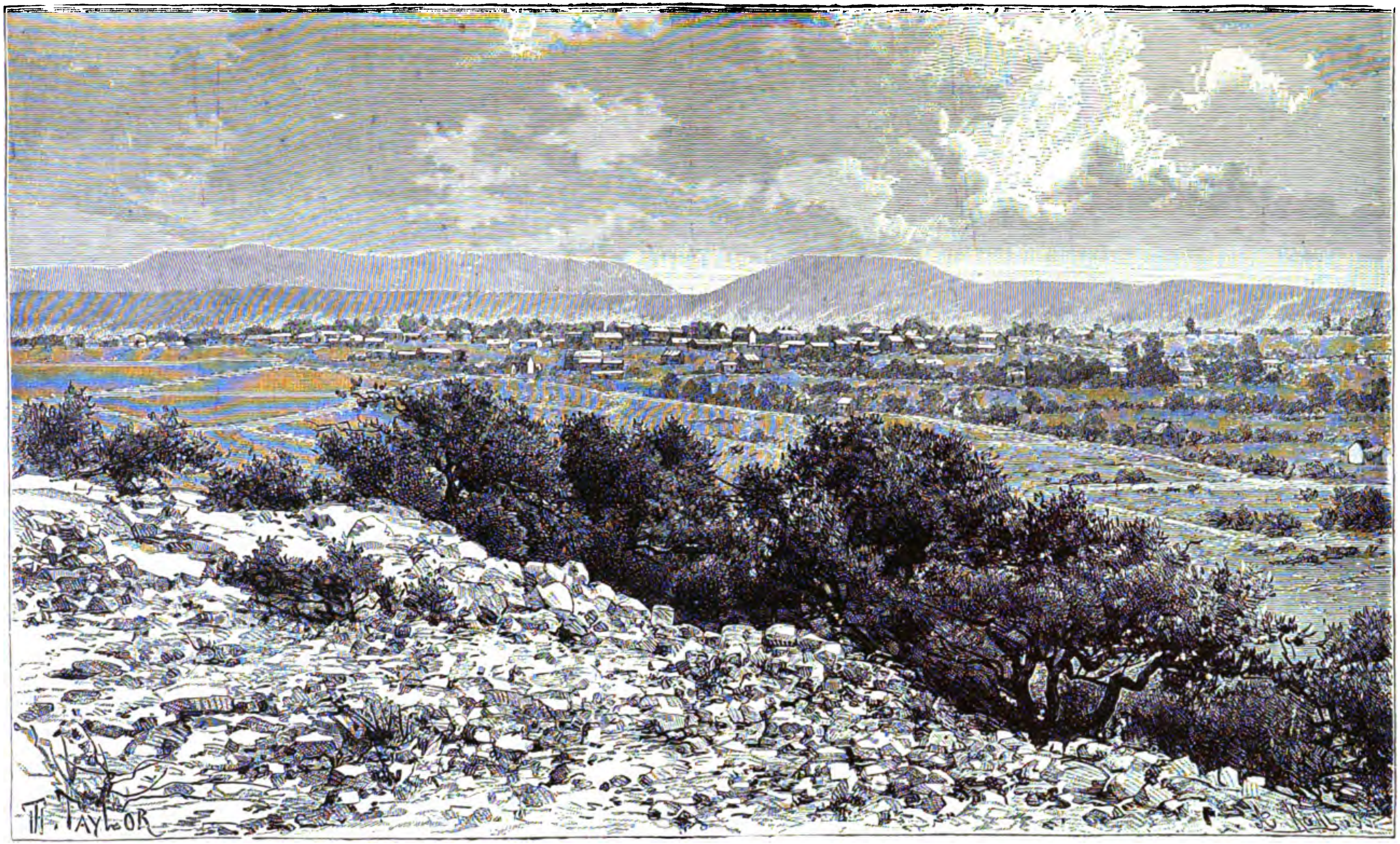
Pressgang. Impressment was the mode formerly resorted to for manning the British navy. The practice had not only the sanction of custom, but the force of law. It may be traced in English legislation from the days of Edward I.; and many acts of parliament, from the reign of Philip and Mary to that of George III., were passed to regulate the system of impressment. Impressment consisted in seizing by force, for service in the royal navy, seamen, river-watermen, and at times landsmen, when state emergencies rendered them necessary. The pressgang, an armed party of reliable men commanded by officers, usually proceeded to such houses in the seaport towns as were supposed to be the resort of the seafaring population, laid violent hands on all eligible men, and conveyed them forcibly to the ships of war in the harbour. As it was not in the nature of sailors to yield without a struggle many terrible fights took place between the pressgangs and their intended victims —combats in which lives were often lost. In point of justice there is little, if anything, to be said for impressment, which had not even the merit of an impartial selection from the whole available population. Under the laws all eligible men of seafaring habits were liable between the ages of eighteen and fifty-five; but exemptions were made in favour of apprentices who had not been two years apprenticed, fishermen at sea, a proportion of able seamen in each collier, harpooners in whalers, and a few others. A pressgang could board a merchant-vessel or a privateer of its own nation in any part of the world, and carry off as many of the best men as could be removed without actually endangering the vessel. The exercise of this power made a privateer dread a friendly man-of-war more than an enemy, and often led to as exciting a chase as when enemies were in pursuit of each other; for the privateer's men were the best sailors, for their purpose, that the naval officers could lay hold on. Mitigations of the harsh laws on the subject were frequently introduced. As early as 1563 the naval authorities had to secure the sanction of the local justices of peace; in 1835 the term of an impressed man's service was limited to five years save in urgent national necessity. By that time the system was becoming obsolete; the navy is now manned by voluntary service. In recent times, when volunteers fail, a system of bounties has been resorted to. But the laws sanctioning impressment slumber, without being repealed.

Pressing to Death. See PEINE FORTE ET DURE.

Prester John, the name applied by mediæval credulity for two hundred years to the supposed Christian sovereign of a vast but ill-defined empire in central Asia. The idea of a powerful Christian potentate in the far East, at once priest and king, was universal in Europe from about the middle of the 12th to the beginning of the 14th century, when it was transferred to Ethiopia and finally found a fancied historical justification in identification with the Christian king of Abyssinia.

The first mention of a Prester John, sprung from the ancient race of the Magi of the Gospels, occurs in the Chronicle of Otto, bishop of Freisingen. Here, on the authority (1145) of the bishop of Gabala (*Jibal* in Syria), we find a circumstantial account of his power, his Christianity after the Nestorian pattern, his victories over the Medes and Persians, and how his progress to Jerusalem was stayed by the intervening Tigris, which refused to freeze over to give him passage. Again, about 1165, there was widely current in Europe an extravagant epistle supposed to be addressed by Prester John to the Greek emperor Manuel. Herein we read astounding wonders enough: how that he ruled over the three Indies and countless hordes of men, among them those unclean races which Alexander the Great shut up within the northern mountains; that thirteen great crosses of gold and jewels were borne before as many armies, each of 10,000 knights and 100,000 foot; that all his subjects were virtuous and happy; attendant upon him were seven kings, sixty dukes, and 365 counts, twelve archbishops, and twenty bishops, while seventy-two kings with their kingdoms were his tributaries; before his throne stood a wondrous mirror, in which he saw everything that was happening in all his vast dominions; his kingdom contained the Fountain of Youth, the Sea of Sand, the River of Stones, and the river whose sand was precious gems, ants that dug gold, fish that yielded purple, pebbles that give light and make invisible, and the salamander which lives in fire, from the incombustible covering of which were fashioned robes for the presbyter to wear. There is also extant a letter of date 1177, written by Pope Alexander III. and evidently addressed to the imaginary author of the grandiloquent epistle of 1165.

About the year 1221 the distant rumour of the conquests of Genghis Khan again gave strength to the belief in such a mighty Christian potentate. M. d'Avezac first pointed out the true historical source of the story in the Chinese Yeliu Tashi, founder of the empire of Kará-Khitái, who assumed the title of Gur Khán (supposed by Oppert to have been confounded with *Yukhanan* or *Johannes*), and fixed his capital at Balasaghun, north of the T'ian Shan range. He defeated Sanjar the Seljuk sovereign of Persia in 1141 at a great battle near Samarkand, but, though hateful to the Moslem historians, of course never made any profession of Christian faith. Professor Bruun of Odessa identifies Prester John with the 12th-century Georgian prince John Orbelian, a redoubtable enemy of the Turks



VIEW OF PRETORIA.

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(see Colonel Yule's *Marco Polo*, 2d ed. 1875, app. to vol. ii.). Many writers about the close of the 13th century, as Marco Polo, the Sieur de Joinville, and even Gregory Abulfaraj, identify him with Ung Khân, king of the Nestorian tribe of Kerait. Friar Odoric about 1326 visited the country—the Tenduc of Marco Polo—still ruled over by a prince whom he styles Prester John, but he adds, with the cautious gravity of the true historian, 'as regards him, not one hundredth part is true that is told of him as if it were undeniable.' From this time the Asiatic phantom entirely disappears from view, but from the 14th century onwards Prester John continues a less romantic existence under the guise of the Christian king of Abyssinia.

See D'Avezac in vol. iv. (1839) of the *Recueil de Voyages et de Mémoires* of the Paris Société de Géographie; Dr Gustav Oppert, *Der Presbyter Johannes in Sage und Geschichte* (2d ed. 1870); Friedrich Zarncke, *Der Priester Johannes* (1876–79). See also Colonel Sir Henry Yule's article in *Ency. Brit.* (9th ed.), his Hakluyt Society *Cathay and the Way Thither* (vol. i. 1866), and *The Book of Ser Marco Polo* (2d ed. 1875).

Preston, an important manufacturing town of Lancashire, a municipal, parliamentary, and county borough, on the north bank, and at the head of the estuary, of the Ribble, 14 miles from the Irish Sea, 28 NNE. of Liverpool, 31 NW. of Manchester, and 209 NNW. of London. Occupying an eminence 120 feet above the river, and built mostly of brick, it is on the whole well laid out, and is surrounded with pleasing scenery. The town-hall, built in 1862–67 from designs by Sir G. G. Scott at a cost of £80,000, is a French Gothic pile, with a clock-tower and spire 195 feet high. In September 1882 were laid the foundation-stones both of the Lancashire county hall and of the Harris free library and museum, to the latter of which in 1883 Mr R. Newsham bequeathed a collection of pictures and art-treasures worth £70,000. The places of worship are all of them modern, for even the parish church has been rebuilt. St Walburge's (Roman Catholic), by Hansom of cab celebrity, has a spire 306 feet high, the loftiest built in England since the Reformation, which amply redeems 'proud Preston' from its old 'no-steeple' reproach. Other edifices are the grammar-school (1550; rebuilt 1841), the corn exchange and market-house (1824), public baths (1851), a covered market (1870), militia barracks (1856), the infirmary (1869), &c. Three large public parks were laid out in 1867—the Miller and Avenham parks, and the former unsightly 'Moor' of 100 acres to the north of the town. In the first a statue was erected in 1873 of the fourteenth Earl of Derby; in Winckley Square is a monument to Sir Robert Peel. Preston was constituted an independent port in 1843; and great improvements have been effected at a cost of three-quarters of a million under the 'Ribble Navigation and Preston Dock Act, 1883,' these including the deepening of the channel so as to admit vessels of 1000 tons, the construction of a dock of 40 acres, the erection of warehouses, &c. Arkwright (q.v.), who was born here in 1732, in 1768 set up here his famous spinning-frame; and Preston now is one of the principal seats of the cotton industry, which gradually superseded the linen manufacture, its staple in the 18th century. There are also iron and brass foundries, iron shipbuilding yards, engineering and machine shops, steam-boiler works, rope-walks, &c. A guild-merchant festival, first clearly heard of in 1397, has been held regularly every twenty years since 1562—the last on 4th September 1882. Preston, the first of whose royal charters was granted by Henry VI., returns two members to parliament. The borough boundary was extended in 1885. Pop. (1811) 17,115; (1841) 50,073; (1881) 100,262; (1891) 111,696. Preston arose whilst ancient *Coccium* or Ribchester, higher up the Ribble, decayed. In Athelstan's reign Amounderness, the hundred in which it is situated, was granted to the cathedral church of York; hence its chief town came to be known as Preston or 'priests' town.' Near Preston, on 17th August 1648, Cromwell totally routed the royalists under Sir Marmaduke Langdale; and Preston figures in both the Jacobite rebellions of 1715 and 1745. For Forster's little army surrendered here to General Willes; and Prince Charles Edward occupied the town on both his march to and his retreat from Derby. Lady Hamilton has been claimed, but falsely it seems, as a native. On 1st September 1832 Joseph Livesey of Preston and six others here signed a pledge of total abstinence—the first ever taken in England.

See works by Whittle (2 vols. 1821–37), Dobson (four, 1856–62), Hardwick (1857), Abram (1882), and T. C. Smith (1891).

Prestonpans, a coast-town of Haddingtonshire, 8 miles E. of Edinburgh. Its salt-pans flourished from the 12th century till 1825; now brewing and fishing are the principal industries. Pop. 2623. To the south-east, on 21st September 1745, was fought the battle of Prestonpans, Preston, or Gladsmuir, when in a five minutes' rush Prince Charles Edward's 2500 Highlanders completely routed 2300 disciplined soldiers under Sir John Cope and Colonel Gardiner (q.v.).

Prestwich, a cotton manufacturing town of Lancashire, 4 miles NNW. of Manchester. It has a Gothic church, built in the 13th century, and restored in 1861, also many fine villas and a large lunatic asylum. Pop. (1881) 8627; (1891) 7869.

Presumption is an inference drawn by the law in certain circumstances or conditions of facts, and is used generally as a mere starting-point in an argument or litigation. Presumptions abound in all departments of the law, and are adopted from the necessity of coming to some conclusion or other in most cases where the evidence is general or inconclusive. Thus, a person who has possession of goods is presumed to be the owner till the contrary is proved. A man is presumed to be innocent till the contrary is proved. The law of England presumes that any one who has not been heard of for seven years is dead. By an act of 1881 for Scotland the heir of a person who has disappeared for seven years may obtain authority to uplift the annual income, and thirteen years later may obtain full possession of the heritable estate of the person presumed to be dead; for securing full right to inherit and dispose of movable estate, the person must be dead for fourteen years.

Pretender. See JACOBITES, STEWART.

Pretoria, the capital of the South African Republic (Transvaal), 980 miles by rail (1893) from Capetown and 285 miles W. of Lorenzo Marques, on Delagoa Bay; to which a railway was opened in 1895. Pretoria was founded in 1855 by the Boer leader Pretorius, has broad streets, and pure water. It owes its prosperity chiefly to the gold-mines at Johannesburg, about 30 miles distant. Estimated pop. 12,000, one-half whites.

Preventive Officers. See COASTGUARD.

Preveza, or PREVISA, a fortified town in the extreme south-west of European Turkey, stands on the north side of the entrance to the Gulf of Arta. It exports valonia acorns, wool, cotton, and oil. The Venetians held the town from 1683 to 1797. One year later Ali Pasha drove out the French garrison and plundered the place. Pop. 6000.

Prévost, ABBÉ. Antoine François Prévost d'Exiles, commonly called the Abbé Prévost, and immortal as the author of *Manon Lescaut*, was born of good family at Hesdin in Artois, 1st April 1697. He was educated by the Jesuits at Hesdin, and at the Collége d'Harcourt in Paris, at sixteen volunteered for service as the last war of Louis XIV. was drawing to its close, but soon returned to the Jesuits, and indeed had almost joined the order when a fresh temptation drew his impulsive and restless nature once more to the soldier's life. Of this second period of soldiering little is known, but it is certain that at twenty-four he joined the Benedictines of St Maur, and spent the next six years in a round of religious duties, in study, and in writing a volume of *Gallia Christiana*. About the year 1727, being anxious to be transferred to Cluny, where the rule was less austere, he discounted his permission, and so found himself unexpectedly guilty of the sin of disobedience. He fled to Holland, and spent six years of exile in that country and in England, and there is even a dim story of a love entanglement against which he strove for a while in vain. In 1728 he published the first and best of his long novels, the *Mémoires d'un Homme de Qualité*, to which indeed *Manon Lescaut* (apparently first published at Amsterdam in 1733) forms a kind of supplement. His fluent pen employed itself in further novels—*Cléveland, fils naturel de Cromwel; Le Doyen de Killerine*—in translations, and in *Le Pour et Contre* (1733–40), a periodical review of life and letters, modelled on the *Spectator*, and showing an excellent appreciation of English books. By 1735 he was back in France by royal permission, and allowed to wear the dress of the secular priesthood. He was befriended by Cardinal de Bissy, and the Prince de Conti, whose chaplain he became, and for thirty years he wrote assiduously over a hundred volumes of compilations, including a voluminous *Histoire générale des Voyages* (of which vol. i., 1746, contains a fine portrait by Schmidt), histories, moral essays, translations of *Pamela* and *Clarissa Harlowe*, and at least one novel—*Histoire d'une Grecque Moderne*. In 1741 a literary service thoughtlessly rendered to a satirical novelist drove him from France to Brussels, thence to Frankfort; but he was soon forgiven by M. de Maurepas, and allowed to return. His death is one of the most tragical in the history of letters. He lived in a cottage at Saint-Firmin near Chantilly, walked much in the woods there, and one day, 23d November 1763, was struck down with a fit of apoplexy. He was found senseless and apparently dead, whereupon a stupid surgeon, in his haste to begin a post-mortem examination, both brought him to life and killed him by a single thrust of his knife. This shocking story is not completely authenticated, and it must be remembered that many legends have clustered round Prévost's romantic life. Of these the most remarkable is a perfectly baseless calumny, that he killed his own father, who had caught him in an intrigue, by throwing him downstairs.

Prévost's is one of the names lifted securely above the flood of time by one book written in a moment of happy inspiration. *Manon Lescaut* remains fresh, charming, and perennial, from its perfect and unaffected simplicity, the stamp of reality and truth throughout, and a style so flowing, easy, and natural, that the reader forgets it altogether in the overpowering pathetic interest of the story. The half-dozen figures portrayed have the likeness of life itself: the young Chevalier des Grieux, the hero, is a lover of the noblest pattern, absolutely forgetful of self, and idealising even the unworthiness of his mistress; Tiberge is an admirable type of the sensible and faithful friend, Lescaut, Manon's brother, of the ruffian and bully; but the triumph of the book is Manon herself, charming, light-hearted, shallow, incapable of a love that she will not sacrifice for luxury, yet ever moved with a real affection for her lover, constant even in her inconstancy and her degradation, the goodness ever shining through the guilt, and at last purified by love and suffering. One feels in this unique book that it is impossible to say where reality ends and fiction begins, and indeed it remains to this day unequalled as a truthful realisation of one over-mastering passion. From beginning to end a careful reader detects the traces of a sad experience, for its author had himself a sensitive heart and warm imagination, joined to a weak and vacillating character. Both a Tiberge and a Des Grieux met in himself, for his character and ideals were pure and elevated, despite the weaknesses that grew out of his passionate and impulsive soul. Compounded, like his hero, at once of weakness and of strength, he is not to be regarded with admiration so much as sympathy and affection, for, if his sensitive and impressionable heart opened a door to frailties ill-befitting the habit that he wore, these frailties at least were natural and not dissimulated, and did not corrupt his heart any more than they did his heroine's.

There is no complete edition of Prévost's works. His *Œuvres Choisies* were collected at Amsterdam (39 vols. 1783–85). Of his one masterpiece the editions are numberless, and there is at least one fair English translation, by D. C. Moylan (1841; reprinted 1886). See the biography prefixed to Prévost's *Pensées* (1764), and Sainte-Beuve in *Portraits Littéraires*, vols. i. and iii., and *Causeries du Lundi*, vol. ix.

Prévost-Paradol, Lucien Anatole, French journalist, was born at Paris, son of an actress, 8th August 1829, passed with distinction through the Collége Bourbon and École Normale, and became in 1855 professor of French Literature at Aix. Hardly a year later he was at work in Paris on the *Journal des Débats* and *Courrier du Dimanche*, and from time to time he published collections of essays on literature and politics, of which the best is his *Essais sur les Moralistes Français* (1864). In 1865 he was elected to the Academy, and in 1868 he visited England, and was honoured at Edinburgh with a public entertainment. He had always been, as a moderate liberal, an opponent of the empire, but the accession of Ollivier to power in January 1870 seemed to open up a new era for French policy, and he allowed himself to accept the post of envoy to the United States. Scarcely was he installed when the war with Germany broke out, and Prévost-Paradol, his mind unhinged by the virulent attacks made upon him by the republican press, and hopeless of the issue of the struggle before his country, solved his own difficulties by suicide at Washington, 20th July 1870.

Prey, Birds of. See Birds of Prey.

Priam, king of Troy at the time of the Trojan war, was the son of Laomedon and Strymo or Placia. The name means 'the ransomed,' and was given him on account of his having been ransomed by his sister Hesione from Hercules, into whose hands he had fallen. His first wife was Arisba, daughter of Merops, whom he gave away to a friend in order to marry Hecuba, by whom, according to Homer, he had nineteen sons. He had altogether fifty sons; later writers add as many daughters. The best known of these are Hector, Paris, Deïphobus, Helenus, Troilus, and Cassandra. Priam is represented as too old to take any active part in the Trojan war, and in Homer only once appears on the field of battle. After Hector's death he went to the tent of Achilles to beg the body for burial. The oldest Greek legends are silent respecting his fate; but later poets like Euripides and Virgil say that he was slain by Pyrrhus when the Greeks stormed the city.

Pria'pus, son of Dionysus and Aphrodite, born at Lampsacus on the Hellespont, considered as a divinity of fruitfulness, especially of flocks of sheep and goats, of bees, the vine, and of all kinds of garden produce. His statues usually stood in gardens, in the form of rude wooden images, painted vermilion, with a club, sickle, and phallic symbol of exaggerated dimensions.

Pribram, a mining town of Bohemia, 48 miles by rail SSW. of Prague, employs 6000 men in the royal lead and silver mines, and various manufactures. There is a mining academy, and a church much frequented by pilgrims. Pop. (1890) 13,412.

Pribylof Islands. See ALASKA.

Price, RICHARD, philosopher, was born at Tynton, in Glamorganshire, on 22d February 1723. His father was a dissenting minister, morose, bigoted, and intolerant, in complete antithesis to the disposition of the son. As a boy he read Clarke and Butler, went at eighteen to a dissenting academy in London, and at the close of his studies became chaplain to a Mr Streatfield at Stoke-Newington, with whom he lived for thirteen years. Legacies from his patron and an uncle in 1756 enabled him to marry. He laboured as a preacher at Newington Green and at Hackney, and established a reputation by his somewhat heavy but able *Review of the Principal Questions in Morals* (1758). His apologetic work, *On the Importance of Christianity*, appeared in 1766. In 1769 he received from Glasgow the degree of D.D., and published his *Treatise on Reversionary Payments;* which was followed by the compilation of the celebrated *Northampton Mortality Tables*, and various other works of value relating to life assurance and annuities. In 1771 appeared his famous *Appeal to the Public on the Subject of the National Debt;* in 1776 his *Observations on Civil Liberty and the Justice and Policy of the War with America.* The latter brought him the freedom of the city of London and an invitation from congress to assist in regulating its finances. Price lived long enough to herald the promise of the French Revolution, and to be denounced in Burke's *Reflections.* He died April 19, 1791. Price was a believer in the immateriality of the soul, holding that it remained in a dormant state between death and resurrection. Their difference of opinion on this subject led to a controversy of some celebrity between him and his friend Dr Priestley. His views respecting the divinity of Christ were what is called Low or semi-Arian. As a moralist he has a close affinity with Cudworth, and in some points strangely foreshadows the greater name of Kant. Of his great treatise on morals the chief positions are these: actions are *in themselves* right or wrong; right and wrong are simple ideas incapable of analysis; these ideas are received immediately by the intuitive power of the reason or understanding. See the Life by his nephew, William Morgan (1815).

Price, THOMAS (1787–1848), a distinguished Welsh scholar. See WALES (LANGUAGE AND LITERATURE).

Prichard, JAMES COWLES, ethnologist, was born at Ross in Herefordshire, 11th February 1786. The son of a Quaker merchant, he received a careful home education at Ross and in Bristol, where he had many chances of picking up foreign languages. There, at St Thomas's, London, and in Edinburgh he studied medicine; and in 1810, after a residence both at Cambridge and at Oxford, he commenced practice in Bristol as a physician. His talents were soon recognised. He was appointed physician first to the Clifton dispensary and St Peter's Hospital, and afterwards to the Bristol infirmary. In 1813 appeared his *Researches into the Physical History of Mankind*, which at once secured him a high standing as an ethnologist. The different editions of this work (4th, 5 vols. 1841–51) gave further proofs of the zeal with which he pursued his ethnological inquiries; and at the same time he devoted himself much to philology, which he rightly judged to be absolutely indispensable for an enlarged study of ethnology. He made himself master not only of the Romance, Teutonic, and Celtic languages, but also of Sanskrit, Hebrew, Arabic; and in *The Eastern Origin of the Celtic Nations* (1831; 2d ed. by Latham, 1857) he compared the different dialects of Celtic with the Sanskrit, Greek, Latin, and Teutonic languages, and succeeded in establishing a close affinity between them all, from which he argued in favour of a common origin for all the peoples speaking those languages. Besides several medical works, he also published an *Analysis of Egyptian Mythology* (1819; Ger. trans. by A. W. von Schlegel, 1837) and *The Natural History of Man* (2 vols. 1843; 4th ed. by E. Norris, 1855). As a tribute to his eminence as an ethnologist, Dr Prichard was elected president of the Ethnological Society; while in recognition of his researches into the nature and various forms of insanity he was appointed in 1845 a commissioner in lunacy. This occasioned his removal to London, where on 22d December 1848 he died of rheumatic fever. The first to raise ethnology to the rank of a science, he was himself a monogenist, maintaining that man is one in species, and that the negro is the primitive type of the human race.

Prickle (*Aculeus*), in Botany, is simply a hard, pointed hair. See HAIRS OF PLANTS.

Prickly Heat is the popular name in India and other tropical countries for a form of skin disease sometimes known as *Lichen tropicus* (see LICHEN). It more frequently attacks strangers from temperate climates than the natives, although the latter are not altogether exempt from it. It consists in a copious eruption of small red papules. The sensations of itching and stinging which attend it are intense, and give rise to an almost irresistible propensity to scratching, which of course only aggravates the irritation. Little or nothing can be done in the way of treatment, except keeping as cool as possible.

Prickly Pear, or INDIAN FIG (*Opuntia*), a genus of plants of the natural order Cactaceæ (q.v.), having a fleshy stem, generally formed of compressed articulations; leafless, except that the youngest shoots produce small cylindrical leaves which soon fall off; generally covered with clusters of strong hairs or of prickles; the flowers springing from among the clusters of prickles, or from the margin or summit of the articulations, solitary, or corymboso-paniculate, generally yellow, rarely white or red; the fruit resembling a fig or pear, with clusters of prickles on the skin, mucilaginous, generally eatable—that of some species pleasant, that of others insipid. The prickles of some species are so strong, and their stems grow up in such number and strength, that they are used for hedge-plants in warm countries. The Common Prickly Pear or Indian Fig (*O. vulgaris*), a native of Virginia and more southern parts of North America, is now naturalised in many parts of the south of Europe and north of Africa, and in other warm countries. It grows well on the barest rocks, and spreads over expanses of volcanic sand and ashes too arid for almost any other plant. It is of humble growth; its fruit oval, rather larger than a hen's egg, yellow, and tinged with purple, the pulp red or purple, juicy, and pleasantly combining sweetness with acidity. It is extensively used in many countries as an article of food. In the south of England the prickly pear lives in the open air, and occasionally ripens its fruit. In America it is cultivated considerably to the north of its native region. Lime rubbish is often mixed with the soil in which it is to be planted. The fruit is imported into Britain, to a small extent, from the Mediterranean. The Dwarf Prickly Pear (*O. nana*), very similar, but smaller, and having prostrate stems, is naturalised in Europe as far north as the sunny slopes of the Tyrol. The Tuna (*O. tuna*), much used in some parts of the West Indies as a hedge-plant, and also valuable as one of the species which afford food to the cochineal insect, yields a pleasant fruit. It has red flowers, with long stamens, which display a remarkable irritability.

Pride, THOMAS, one of the most resolute of Cromwell's soldiers, was a native of London, and of humble origin. At first a drayman and brewer, he enlisted at the commencement of the Civil War, and by his merit quickly rose to be colonel. He commanded a brigade under Cromwell in Scotland, and, when the House of Commons betrayed a disposition to effect a settlement with the king, was appointed by the army to purge it of its Presbyterian royalist members. By 'Pride's Purge' about a hundred were excluded, whereupon the House, now reduced to about eighty members, proceeded to bring the king to justice. Colonel Pride sat among his judges, and signed the death-warrant. He died 23d October 1658, and so felt not the rage of his enemies when his body was dug up and hanged beside Cromwell's on Tyburn.

Prideaux, HUMPHREY, scholar and divine, was born of an ancient and honourable family at Padstow, Cornwall, 2d May 1648. He was educated at Westminster School under Dr Busby, and then at Christ Church, Oxford, where he graduated B.A. in 1672. His *Marmora Oxoniensia* (1676), an account of the Arundel Marbles, procured for him the friendship of Lord Chancellor Finch (afterwards Earl of Nottingham), who in 1679 appointed him rector of St Clement's, Oxford, and in 1681 a prebendary of Norwich. After several minor preferments he was collated in 1688 to the archdeaconry of Suffolk, and in 1702 was made Dean of Norwich. He died 1st November 1724. His nine works include a *Life of Mahomet* (1697), long very popular; *Directions to Churchwardens* (1701; 15th ed. 1886); and *The Connection of the History of the Old and New Testament* (1715–17; 27th ed. 1876). The last treats with much learning, but less discernment, the affairs of ancient Egypt, Assyria, Persia, Judæa, Greece, and Rome, so far as they bear on the subject of sacred prophecy. See Prideaux's *Letters to John Ellis*, edited by E. M. Thompson (Camden Soc. 1875).

Pride of China (also called Pride of India and Bead-tree), a handsome tree of the order Meliaceæ (*M. azedarach*), a native of India, naturalised in the southern states of the American Union. It grows rapidly, has large bunches of flowers, and enormous quantities of small fruit. A decoction of the bark of its root is used as a vermifuge.

Prie-dieu (Fr., 'pray God'), a portable kneeling-desk; a chair which may be used for kneeling in prayer.

Priego, a town of Spain, 46 miles SE. of Cordova, grows wine and weaves silk. Pop. 15,674.

Priene, anciently one of the 'twelve' cities of Ionia, stood a little NW. of the mouth of the Mæander in Caria. Here in the second half of the 19th century the remains of an elegant Ionic temple to Athene Polias were examined by an agent of the British Society of Dilettanti, who carried off and gave to the British Museum the stone bearing the inscription that recorded its dedication by Alexander the Great. See *Antiquities of Ionia*, part iv. (1882).

Priessnitz. See HYDROPATHY.

Priest (Gr. *presbyteros*, Lat. *presbyter*, Fr. *prêtre*), the title, in its most general signification, of a minister of public worship, but specially applied to the minister of sacrifice or other mediatorial offices. In the early history of mankind the functions of the priest seem to have commonly been discharged by the head of each family; but on the expansion of the family into the state the office of priest became a public one. It thus came to pass that in many instances the priestly office was associated with that of the sovereign. But in many religious and political bodies, also, the orders were maintained in complete independence, and the priests formed a distinct and, generally speaking, a privileged class. The priestly order, in most of the ancient religions, included a graduated hierarchy; and to the chief, whatever was his title, were assigned the most solemn of the religious offices entrusted to the body. In Egypt the population is supposed to have been divided into three or four castes, at the head of which was the sacerdotal, or priests. This division, however, was not very strictly observed, as the son did not invariably follow the profession of the father. That of the priest appears most honourable, and two principal classes of priests were in existence at the earliest periods—the *hont*, or prophets, and the *ab*, or inferior priests. The first were attached to the worship of all the deities of Egypt; and in the greater cities there was *hont api*, high prophet, or priest, who presided over the others; at Thebes there were as many as four prophets of Ammon. Their duties appear to have comprised the general cultus of the deity. They also interpreted the oracles of the temples. Besides the prophets of the gods, others were attached to the worship of the king, and to various offices connected with the administration of the temples. The class of priests called *ab*, or 'pure,' were inferior, and were also attached to the principal deities and to the personal worship of the monarch. They were required to be scrupulously neat and clean, entirely shaven, and ascetic in their diet, bathing and fasting frequently. The priesthood of India belongs to the first caste, or that of the Brahmans, exclusively (see CASTE, INDIA). But, as the proper performance of such functions requires, even in a Brahman, the knowledge of the sacred texts to be recited at a sacrifice, and of the complicated ceremonial of which the sacrificial acts consist, none but a Brahman learned in one or more Vedas, and versed in the works treating of the ritual, possesses, according to the ancient law, the qualification of a priest. See also BUDDHISM, LAMAISM.

In sacred history the patriarchal period furnishes an example of the family priesthood; while in Melchizedec, king of Salem, we find the union of the royal with the priestly character. In the Mosaic law the whole theory of the priesthood, as a sacrificial and mediatorial office, is fully developed. The priest of the Mosaic law stands in the position of a mediator between God and the people; and, even if the sacrifices which he offered be regarded as but typical and prospective in their moral efficacy, the priest must be considered as administering them with full authority in all that regards their legal value. The Mosaic priesthood was the inheritance of the family of Aaron, of the tribe of Levi (q.v.). It consisted of a High-priest (q.v.), and of inferior ministers, distributed into twenty-four classes. The age for admission to the priesthood is nowhere expressly fixed; but, from

2 Chronicles, xxxi. 17, it would seem that the minimum age was twenty. In the service of the temple the priests were divided into twenty-four classes, each of which was subject to a chief priest, and served, each company for a week, following each other in rotation. Their duties in the temple consisted in preparing, slaying, and offering victims, in preparing the show-bread, burning the incense, and tending the lights of the sanctuary. Outside they were employed in instructing the people, attending to the daily offerings, enforcing the laws regarding legal uncleanness, &c. For their maintenance were set aside certain offerings (see FIRST-FRUITS) and other gifts. They wore a distinguishing dress, the chief characteristics of which were a white tunic, an embroidered cincture, and a turban-shaped head-dress. The Jewish priesthood may be said to have practically ceased with the destruction of the temple.

In the Christian dispensation the name primitively given to the public ministers of religion was *presbyteros*, of which the English name 'priest' is but a form derived through the old French or Norman *prestre*. The name given in classical Greek to the sacrificing priests of the pagan religion, Gr. *hiereus*, Lat. *sacerdos*, is not found in the New Testament explicitly applied to ministers of the Christian ministry; but very early in ecclesiastical use it appears as an ordinary designation; and with all those bodies of Christians—Roman Catholics, Greeks, Syrians, and other Orientals—who regard the eucharist as a sacrifice (see LITURGY) the two names were applied indiscriminately. The priesthood of the Christian church is one of the grades of the hierarchy, second in order only to that of bishop, with which order the priesthood has many functions in common. The priest is regarded as the ordinary minister of the eucharist, whether as a sacrament or as a sacrifice; of baptism, penance, and extreme unction; and although the contracting parties are held in the modern schools to be themselves the ministers of marriage, the priest is regarded by all schools of Roman divines as at least the normal and official witness of its celebration. The priest is also officially charged with the instruction of the people and the direction of their spiritual concerns, and by long-established use special districts, called parishes, are assigned to priests, within which they are entrusted with the care and supervision of the spiritual wants of all the inhabitants. The holy order of priesthood can only be conferred by a bishop, and he is ordinarily assisted by two or more priests, who, in common with the bishop, impose hands on the candidate. The rest of the ceremonial of ordination consists in investing the candidate with the sacred instruments and ornaments of his order, anointing his hands, and reciting certain prayers significative of the gifts and the duties of the office. The distinguishing vestment of the celebrant priest in the mass is the *Chasuble* (q.v.). In Catholic countries priests wear even in public a distinctive dress, in most respects common to them with the other orders of Clergy (q.v.). In the Latin Church priests are bound to a life of celibacy. In the Greek and oriental churches married men may be advanced to the priesthood; but no one is permitted to marry after ordination, nor is a married priest permitted to marry a second time, should his wife die.

In the Church of England, and other Reformed Episcopal Churches, the term priest is retained as the designation of the second order of clergy, whose special office it is (1) to celebrate the Sacrament of the Lord's Supper; (2) to pronounce the forms of Absolution in the Morning and Evening Prayer, in the Communion Service, and in the Office for the Visitation of the Sick; and (3) to preach, though this last office is, by special license, sometimes extended to deacons. See DEACON, ORDERS (HOLY).

Priestley, JOSEPH, son of a cloth-draper, was born at Fieldhead, near Leeds, 13th March 1733. For some time he was obliged to abandon school studies, owing to weak health, and betook himself to mercantile pursuits, but with returning strength his literary studies were resumed at a dissenting academy at Daventry (founded by Dr Doddridge). Though his father and family were strong Calvinists, young Priestley, during his residence at the academy, felt called on to renounce nearly all the theological and metaphysical opinions of his youth. 'I came,' he says, 'to embrace what is called the heterodox side of every question.' In 1755 he became minister to a small congregation at Needham Market, in Suffolk. While here he composed his work against the doctrine of Christ's death being a sacrifice or satisfaction for sin, entitled *The Scripture Doctrine of Remission*. In this he taught that the Bible is indeed a divine revelation, made from God to man through Christ, himself a man and no more, nor claiming to be more, and rejected the doctrines of the Trinity and the Atonement. In 1758 he quitted Needham for Nantwich; and in 1761 he removed, as teacher of languages and belles-lettres, to an academy at Warrington; and here his literary career may be said first fairly to have begun. A visit to London led to his making the acquaintance of Franklin, who supplied him with books which enabled him to write his *History and Present State of Electricity*, published in 1767. It was followed by a work on *Vision, Light, and Colours*. In 1762 he published his *Theory of Language and Universal Grammar*. In 1766 he was made F.R.S., and LL.D. of Edinburgh. In the following year he removed to Mill-hill, near Leeds, where he was appointed minister of a dissenting chapel. The fact of a brewery being beside his dwelling gave a new direction to his energetic and versatile mind; he began to study chemistry. In 1773 he was appointed literary companion to Lord Shelburn, and accompanied the earl on a continental tour in 1774. Having been told by certain Parisian savants that he was the only man of understanding they had ever known who believed in Christianity, he wrote, in reply, the *Letters to a Philosophical Unbeliever*, and various other works, containing criticisms on the doctrines of Hume and others. But, while laughed at in Paris as a believer, at home he was branded as an atheist. To escape the odium arising from the latter imputation, he published, in 1777, his *Disquisition Relating to Matter and Spirit*, in which, partly materialising spirit and partly spiritualising matter, he holds that our hopes of resurrection must rest solely on the truth of the Christian revelation, and that on science they have no foundation whatever. On leaving Lord Shelburn, he became minister of a dissenting chapel at Birmingham. The publication, in 1786, of his *History of Early Opinions concerning Jesus Christ* occasioned the renewal of a controversy, which had begun in 1778, between him and Dr Horsley, concerning the doctrines of Free-will, Materialism, and Unitarianism. His reply to Burke's *Reflections on the French Revolution* led to his being made a citizen of the French Republic; and this led to a mob on one occasion breaking into his house, and destroying all its contents, books, manuscripts, scientific instruments, &c. A brother-in-law, however, about this time left him £10,000, with an annuity of £200. In 1791 he succeeded to the charge at Hackney; but his honestly-avowed opinions had made him unpopular, and he (1794) removed to America, where he was heartily received. He died at Northumberland, Pennsylvania, 6th February 1804, expressing (though he agreed that he should be called a materialist) his confidence in immortality. He was a man of irreproachable character, serene of temper, fearless in searching after and confessing the truth. His services to chemistry are summed up at Vol. III. p. 147 (and see OXYGEN); recent research fully justifies Priestley's title to be called the father of pneumatic chemistry; Thorpe, at the British Association, 1890 (see *Nature*, xlii. 449), not merely defended the priority of his discovery of oxygen (1774) and of the composition of water (1781), but denied Lavoisier's claim to be considered an independent discoverer. See J. T. Rutt's edition of Priestley's *Works* (25 vols. 1832), including Autobiographical Memoir; and Martineau's *Essays, Reviews, and Addresses* (vol. i. 1891).

Priest's Holes. See SECRET CHAMBERS.

Priluki, a town of Russia, 87 miles E. by N. of Kieff, with trade in corn and cattle. Pop. 15,231, mostly engaged in the cultivation of tobacco.

Prim, JUAN, Spanish general, was born at Reus, 6th December 1814, and rapidly rose to be a colonel, and so distinguished himself in war and statesmanship as to be made general, marshal, and marquis. As progressist he opposed Espartero. Failing in an insurrectionary attempt in 1866, he had to flee to England and Brussels, but here he guided the movement that in 1868 overthrew Isabella. He was war minister under Serrano, but soon became virtually dictator. He secured the election of an Italian prince, Amadeo, as king (in order, as was thought, that the king might be under the minister's control), and was thereupon shot by an assassin as he left the Cortes, 28th December 1870. He died on the 30th.

Prima Donna (Ital.), the first female singer in an opera.

Primage, a charge (over and above the freight) paid by the shipper or consigner of goods for loading the same, to the master and sailors of a ship, or to the owner or freighter.

Primary Colours. See COLOUR.

Primary Rocks. See PALÆOZOIC.

Primate (Lat. *primas*), anciently a bishop holding a position of pre-eminence. Thus the bishop of Rome was called primate of the whole church. In modern times the title belongs only to such sees as had formerly the dignity of vicar of the holy see annexed—Armagh, Arles and Lyons, Mainz, Toledo, Pisa and Salerno, &c. But none of these possess any special primatial jurisdiction. For the primates in the Church of England, see the article ARCHBISHOP. The name *primus* is applied in the Scottish Episcopal Church to the presiding bishop. He is chosen by the bishops out of their own number, without their being bound to give effect to seniority of consecration or precedency of diocese.

Primates, the name given by Linnæus in his system to the first order of Mammals (q.v.), which he placed first (whence the name, Lat. *primus*, 'first') because he ranked man amongst them.

Prime, the first of the 'lesser hours' of the Roman breviary. See BREVIARY.

Prime-minister. See TREASURY, CABINET.

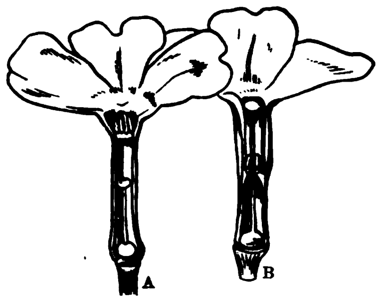
Primero, or PRIME, a game at cards popular in England in the 16th century, but now obsolete. The same or a very similar game was played in Italy under the name *primiera*, and in France under the names *prime*, *ambigu*, &c. Primero belonged to the family of games of which the old post and pair and the more modern brag and poker are members.

Primitive Methodists. See METHODISTS.

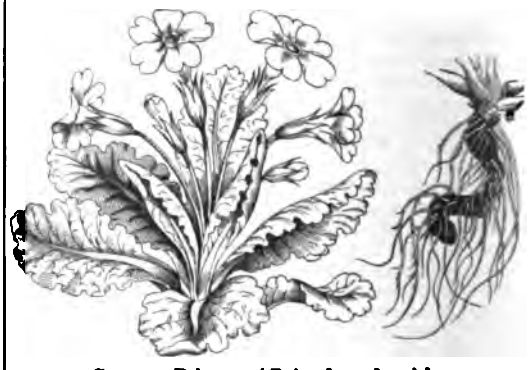
Primogeniture is the rule of law under which the eldest son of the family succeeds to the father's real estate in preference to, and in absolute exclusion of, the younger sons and all the sisters. See ENTAIL, FAMILY, FEUDALISM, FIRST-BORN, LAND LAWS, SUCCESSION.

Primordial Zone, a name applied by Barrande to the group of strata which in Bohemia underlies the Silurian rocks, and is therefore on the horizon of the Cambrian system, as that is now generally understood by geologists.

Primrose (*Primula*), a genus of plants of the natural order Primulaceæ, having a bell-shaped or tubular five-toothed calyx, a salver-shaped corolla with five segments, five stamens, a globose germen containing many ovules, and a many-seeded capsule opening by five valves, and generally with ten teeth at the apex. The dimorphism of the stamens and pistil of primrose, illustrated in the accompanying figure, is not uncommon in other species of the genus, and has given rise to the terms *thrum-eyed* (A) and *pin-eyed* (B) in the language of florists in describing varieties of the Auricula and Polyanthus. The distinction is of some practical importance in so far as fertilisation of the individual flowers is affected by the relative positions of the respective organs. The species are all herbaceous perennials, generally having only radical leaves; and the flowers in a simple umbel, more rarely with scapes bearing solitary flowers. Almost all of them are natives of Europe and the north of Asia. Some of them are among the finest ornaments of our groves and meadows; some are found in mountainous regions. Their fine colours and soft delicate beauty have led to the cultivation of some of them as garden flowers, probably from the very beginning of floriculture. The name Primrose (Fr. *Primevère*, Lat. *Primula*) is derived from the Latin *primus*, 'first,' and refers to the early appearance of the flowers of some of the most common



Primroses; short (A) and long styled (B).

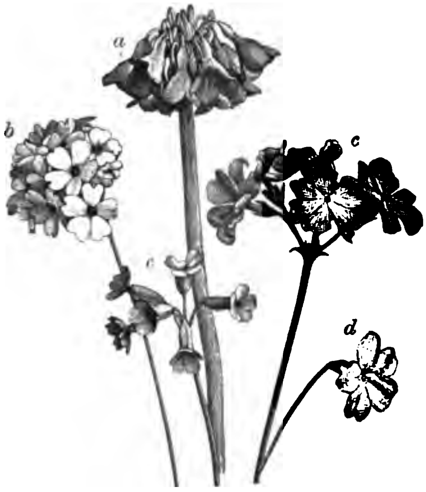


Common Primrose (*Primula vulgaris*).

species in spring. The Common Primrose (*P. vulgaris*), abundant in woods, hedgebanks, and pastures in Britain and in most parts of Europe, has obovate-oblong, wrinkled leaves, and single-flowered scapes; the flowers about an inch broad, yellowish white. This is the plant to which the English name primrose specially belongs. Akin to it is the Cowslip (q.v.), or Paigle (*P. veris*), and perhaps still more nearly related is the Oxlip (*P. elatior*), apparently wild in some parts of England, particularly in the eastern counties, but supposed by some botanists to be intermediate between the common primrose and the cowslip, which they therefore regard as extreme forms of one species. The Polyanthus (q.v.) is a cultivated variety of the cowslip. The Auricula (q.v.; *P. auricula*), an Alpine species, is a favourite garden flower. The Bird's-eye Primrose (*P. farinosa*) and the Scottish Primrose (*P. scotica*) are both flowers of exquisite beauty, found in the northern parts of Britain, the latter chiefly on the coasts of Sutherland, Caithness, and the Orkney Islands. The Alps and the Himalaya Mountains produce several species. The Chinese Primrose (*P. sinensis*) has for more than fifty years been very common in Britain, not only as a greenhouse but a window plant. It produces compound umbels of very numerous lilac, red, or white flowers, which are displayed in autumn, winter, and spring. Two varieties occur in the eastern states of the American Union—the Bird's-eye Primrose (*P. farinosa*) and *P. mistassinica*, both rare—and several varieties in the western states, the most conspicuous being *P. parryi*, with large purple flowers, which grows on the Rocky Mountains.

Primrose League. This political organisation was founded November 17, 1883, by Lord Randolph Churchill, Sir John Gorst, Sir Alfred Slade, and Sir H. Drummond Wolff. The name was chosen in reference to the fact that the primrose was Lord Beaconsfield's favourite flower (a fact by some unkindly disputed; cf. *Notes and Queries* for 1888, pp. 146, 416); and the fivefold petal of that flower is taken to indicate the five principal divisions of the British empire in Europe, Asia, Africa, America, and Australia. This strictly Conservative society, by the moderation and even liberality of its professions, by its enlistment and organisation of women, by its distribution of titles and badges, and by its choice of an emblem dear to all and accessible to all, has attained an enormous growth and great political influence. It was originally intended to admit men only, banded in companies of about 100 to act as missionaries of the league; and the effect of admitting women may be gathered from the fact that the number of members rose from 957 in 1884 to 237,283 in 1886. The numbers as given by the society in 1891 were: habitations, 2126, and knights, dames, and associates enrolled as members, 963,943. The first grand-master of the Primrose League was the Marquis of Salisbury, K.G. The head office is at 64 Victoria Street, Westminster. In July 1890 the first branch in Canada was established at Winnipeg. See an article by Sir A. Borthwick in the *Nineteenth Century* for July 1886.

Primulaceæ, a natural order of exogenous plants, containing more than 200 known species, mostly natives of temperate and cold regions. They are all herbaceous, or scarcely half-shrubby, with leaves generally all radical, and no stipules. The calyx is generally five-cleft, inferior or half-superior, regular, persistent; the corolla, with the limb divided into as many segments as the calyx, rarely wanting; the stamens inserted on the corolla, one opposite to each of its lobes; the ovary one-celled, the style solitary, the stigma capitate; the capsule with a central placenta and many seeds.—Many of the Primulaceæ have flowers of much beauty, and some are very fragrant, as the Primrose, Cowslip, Auricula, Pimpernel, &c.



Flowers of a few of the Primulaceæ:
a, *Primula sikkimensis*; *b*, *P. obconica*; *c*, *P. sieboldii*; *d*, common primrose (*P. vulgaris*); *e*, cowslip (*P. veris*).

Primum Mobile. See PTOLEMY.

Prince (Lat. *princeps*), an epithet which was originally applied to the *princeps senatûs* of the Roman state, and afterwards became a title of dignity. It was adopted by Augustus and his successors; hence the word was afterwards applied to persons enjoying kingly power, more especially the rulers of small states, either sovereign or dependent. The title is now very generally applied to the sons of kings and emperors and persons of the blood-royal, sometimes with a territorial title (Prince of Wales, Prince of Orange), or with an addition, 'crown prince,' 'prince imperial,' &c. In various parts of continental Europe the title prince is borne by families of eminent rank but not possessed of sovereignty. Practically in Britain the term prince is restricted to members of the royal family (see PRECEDENCE). The eldest son of the reigning sovereign is by a special patent created Prince of Wales (see WALES, PRINCE OF). In France, under the old regime, dukes took precedence of princes; and many dukes had princedoms as minor titles. Napoleon put his new-created princes above dukes. In Italy princes rank after dukes, sons of dukes being called princes. In Germany the ambiguity of applying the same title to the members of royal houses and princely families, not sovereign, is avoided, the former being styled 'Prinz,' the latter 'Fürst.' The German Fürst takes rank below the Duke (Herzog). Most of the counts who had a seat in the old German Diet were elevated to the dignity of Prince on their acquiescence in the dismemberment of the German empire (see GERMANY, Vol. V. p. 177). In a more general acceptation the term prince is often used for a sovereign or the ruler of a state.

Prince Edward Island is a province of the Dominion of Canada, having entered the confederation in 1873. It is situated in the Gulf of St Lawrence, and is separated from New Brunswick and Nova Scotia by Northumberland Strait. The greatest length of the island is 130 miles; its breadth varies from 4 to 34 miles, and it has an area of 2133 sq. m.—i.e. about 1,365,400 acres, nearly all of which are occupied. Population in 1891 numbered 109,088, or 51 persons to the square mile. Although discovered by the Cabots, no claim was made to it by the British on that account. Possession was assumed by the French, but little was done towards its settlement until 1715, when its fertility attracted some Acadians from Cape Breton. It was finally ceded to Great Britain in 1763. In the first instance it formed part of Nova Scotia, but in 1768 was made a separate province. The pop. in 1763 was 4000; but about that time an emigration set in to the mainland, and the Acadians were expelled, so that in 1768 it had been reduced to about 1300 (see ACADIA). Until 1799 it was called St John's Island, but its name was then changed to Prince Edward Island, in compliment to the Duke of Kent, who paid it a visit in that year. Prior to 1875 most of the land was the property of absentee proprietors, and for many years the land question was a source of difficulty. The local government, however, passed a measure in 1875 giving them powers to buy out the landlords, and to sell the land to the tenants or others on easy terms of repayment. Out of the 843,981 acres acquired by the government in that way, all but 97,162 acres had been disposed of up to 1889; and the payments are being met in a satisfactory manner, the arrears being very trifling. By this legislation a fruitful source of irritation was removed, and the agricultural industry—the principal one in the province—placed on a more satisfactory footing.

Seen from the water, the appearance of the island is exceedingly prepossessing. The surface is undulating, but never exceeds 500 feet; the soil is very fertile, consisting generally of a light reddish loam, and occasionally of a stiffer clay, resting in some places on red sandstone, although in other localities it seems to be entirely alluvial. All kinds of cereals, roots, and vegetables are raised. Oats and potatoes from the island enjoy a special reputation, and the same thing may be said of its sheep and horses. A natural manure, called mussel mud, and made of decayed oyster, clam, and mussel shells, is found on the coasts of the island. It is largely used by the farmers, and is said to be a most valuable fertiliser. Although coal is known to exist, it is not worked, owing to the depth at which it is found and the cheapness at which it can be purchased from Nova Scotia. There are apparently no other minerals on the island. The climate is healthy, being milder than that of the mainland, and freer from fogs. Winter is long and tedious, but the summer months are pleasant and enjoyable. Prince Edward Island is without doubt the best fishing station in the Gulf of St Lawrence, but the habits and feelings of the inhabitants are so decidedly agricultural that the fisheries have not received from them the attention they deserve. They consist chiefly of mackerel, lobsters, herring, cod, hake, and oysters; while salmon, bass, shad, halibut, and trout are caught in limited quantities. In the year 1889 the value of the fisheries was $886,430; the catch included 13,450 barrels and 99,270 cans of mackerel, 33,940 barrels of herring, 21,196 cwt. of cod, 90,000 lb. of haddock, 748 cwt. of hake, 3730 lb. of halibut, 56,820 lb. of trout, 364,100 lb. of smelts, 18,140 barrels of eels, 41,237 barrels of oysters, 2,060,947 lb. of lobsters, 13,647 lb. of cod and hake sounds, and 13,852 gallons of fish oils. The present annual value of the oyster-fishery exceeds $120,000; and this industry is capable of vast development. Lobsters in 1889 were exported to the extent of 918,200 lb., of the value of $102,883.

The coast-line is a succession of bays and projecting headlands; the largest bays are Egmont, Hillsborough, and Cardigan, which by penetrating into the land from opposite directions form narrow isthmuses, dividing the island into three distinct peninsulas. Charlottetown is the capital, and has a pop. of 13,000. Other principal towns are Summerside (3000), Georgetown, and Souris. The rivers are naturally short, but the province is well watered. Manufactures are not carried on to any large extent, and chiefly for local purposes. Shipbuilding was an important industry previous to the substitution of iron and steel for wooden vessels.

The exports for 1890 were valued at $875,964, divided as follows: Produce of the mine, $20; forest, $7575; fisheries, $187,743; agriculture, $664,638; manufactures, $14,871; and miscellaneous, $1117. Imports were valued at $581,177. There is a railway, built and worked by the Dominion government, running from one end of the island to the other. The island is connected by telegraph with the mainland, and there is daily steam communication between the two, although it is occasionally interrupted during the winter. In 1891 the people were urging the construction of a tunnel under the Northumberland Strait, for the purpose of establishing communication with the mainland all the year round. The Dominion government directed an estimate of the cost to be prepared. The tunnel would be some 7 miles long. According to the census of 1891, the settlers were largely of English, Irish, and Scotch descent, and French, Germans, and Scandinavians. The principal religious denominations were: Roman Catholics, 47,837; Presbyterians, 33,072; Methodists, 13,596; Church of England, 6646. The Bishop of Nova Scotia exercises episcopal authority over the island, and the Roman Catholics have one diocese, that of Charlottetown. Free education has prevailed since 1853. In 1889 the district schools numbered about 436. There are also grammar-schools, private schools, a normal and a model school, and two colleges—the Prince of Wales (Protestant) and St Dunstan's (Roman Catholic). The government of the island is administered by a lieutenant-governor, appointed by the governor-in-council, and paid out of federal funds. The legislative council consists of thirteen members, and the assembly of thirty members, the latter being elected for four years. In the Dominion senate the province is represented by four members, and in the House of Commons by six.

Princeites, a name given to the Agapemoné (q.v.) from the founder.

Prince of Wales. See WALES, PRINCE OF.

Prince of Wales Island. See PENANG.

Prince Rupert's Drops. See ANNEALING.

Princes Islands (anc. *Demonnesoi*), a beautiful group of nine islets near the eastern end of the Sea of Marmora, about 10 miles SE. of Constantinople, the largest being called Prinkipo. They are a favourite summer-resort of the Constantinople Greeks, and in old times were frequently a place of exile for those in disfavour at the Byzantine court. See Schlumberger, *Les Îles des Princes* (1884); S. S. Cox, *The Isles of the Princes* (New York, 1888).

Prince's Metal, a name, derived from Prince Rupert, given to an alloy of copper and zinc, in which the proportion of zinc is greater than in brass.

Princeton, (1) capital of Gibson county, Indiana, 161 miles by rail E. of St Louis. It has woollen manufactures. Pop. (1880) 2566; (1890) 3076.—(2) A pleasant borough of New Jersey, 50 miles by rail SW. of New York and 47 NE. of Philadelphia. Pop. 3422. On January 3, 1777, it was the scene of a battle between the British under Colonel Mawhood and the Americans under Washington, in which the former were defeated; here the Continental Congress sat in 1783; and from Princeton Washington dated his farewell address to the army. Princeton, however, is chiefly celebrated as the seat of the College of New Jersey, popularly known as Princeton College, which, founded by charter in 1746, under the auspices of the Presbyterian Synod of New York, held its first commencement under its second charter at Newark in 1748. Liberal subscriptions were obtained both in America and in Britain, the Bishop of Durham being among the contributors, and the General Assembly of the Church of Scotland ordering a national collection. In 1756 the college was transferred to Princeton, on the erection of a hall named Nassau Hall in honour of William III. Within it hangs a portrait of Washington. The College of New Jersey has had several distinguished Presbyterian divines for its presidents, as Jonathan Edwards and Dr James M'Cosh. Since the civil war benefactions have poured in upon the college; during the twenty years of Dr M'Cosh's presidency these exceeded $3,000,000. Post-graduate courses have been introduced, and the staff of instructors raised to about fifty; the number of students is now about 600. Among its graduates have been James Madison, fourth president of the United States, and many very eminent men. The college possesses a school of science and museums, laboratories, observatories, and libraries with 137,000 volumes. The theological seminary, founded in 1812, the oldest and largest of the Presbyterian Church in America, has nearly 200 students. With this (theological) school was associated the fame of the *Biblical Repertory and Princeton Review* ("old school"), founded in 1825, and edited till 1872 by Dr. Charles Hodge (q.v.), but subsequently united with the *Presbyterian Quarterly* ("new school"), which was succeeded by the *American Presbyterian Review*. See Hageman, *History of Princeton and its Institutions* (2 vols. 1879).

Principal. See AGENT and SURETY; also ACCESSARY.

Pringle, THOMAS, minor poet, was born at Blaiklaw (near Kelso), Roxburghshire, 5th January 1789. Lame from childhood, dyspeptic, devout, he went at seventeen to Edinburgh University, and found bread if not contentment of mind as clerk in the Scottish Public Records Office. He took to writing at an early age, and, besides other literary schemes and ventures, started the *Edinburgh Monthly Magazine*, the parent of *Blackwood*, in which his own most important article was on the Gypsies, from notes supplied by Scott. In 1820 he set sail with a party of twenty-four emigrants of his father's family for Cape Colony. He travelled into the interior with the party, and had his heart stirred within him to see the inhumanity practised towards the natives by English and Dutch residents alike. For three years he lived at Capetown as librarian of the government library at a salary of £75 a year. He started the *South African Journal*, and fought a brave fight for the freedom of the press. But he was bullied by the tyrannical and petty-minded governor of the day, Lord Charles Somerset, his schemes crushed, and himself reduced to poverty. He returned to London in 1826, and became secretary of the Anti-Slavery Society. He died in London, 5th December 1834. His *Ephemerides* (1828) was a collection of graceful verse. Those poems that related to South Africa—the best 'Afar in the Desert'—were reprinted in the volume of *African Sketches* (1834), a series of glowing sketches of South African scenery. Pringle's *Poetical Works* were edited, with a florid eulogium, rather than a life, by Leitch Ritchie (1839).

Printing is the art of taking, by pressure, prints or copies in reverse of an original design of a suitable character, coated with a pigment or ink. The word has a very wide application, and is used, for instance, in connection with such different processes as photographic 'printing,' in which no pressure is required, and calico-printing. A definition based upon pressure alone would bring within the category of 'prints' such operations as moulding, stamping, and embossing. The word has, however, acquired conventional limitations of meaning, and is now applied usually to the three methods of copperplate printing (see ENGRAVING), Lithography (q.v.), and letterpress printing. The first two being already described, the present article will be confined to a description of the latter.

There is no doubt the Chinese practised printing in some senses of the word many centuries before it was known in Europe, as has been noticed at CHINA, Vol. III. p. 196. The method commonly used down to the present time is one originally adopted by Foong Taou in the 10th century. A piece of pear-tree wood is cut up into boards of about half an inch thick, and these into blocks large enough for two pages of the book to be printed. The blocks are planed, squared, and sized or varnished. The design to be engraved is drawn or written on thin transparent paper, and transferred to the surface of the block by rubbing. The engraver next cuts away the field, leaving the transferred letters in high relief. Labour being cheap, a block of this kind can be cut at about the same expense as it could be set up in movable metal types, and it needs no proof-reading or correction. For printing no press is used, the block being adjusted on a table, before which the printer stands, having a bowl of fluid ink on one side and a pile of paper on the other. In his right hand he has two flat-faced brushes, fixed on the opposite ends of the same handle. One brush is dipped into the ink and swept over the face of the block, on which a sheet of paper is placed; the back of the paper is then swept lightly but firmly with the dry brush at the other end of the handle. This is all that is needed to fasten the ink on the paper—which is soft, thin, pliable, and a quick absorbent of fluid ink. Printing from movable types was, according to Professor Douglas, probably practised in China as early as the 12th or 13th century, as there are Corean books printed from movable clay or wooden types in 1317. But the Chinese still prefer block-printing; and printing from metal types in China is mainly practised for circulating the Bible and for newspapers, according to methods invented by Europeans. About 6000 Chinese characters suffice for a missionary printing-office; but for magazine work about 10,000 are necessary. For the baseless tradition that Marco Polo brought the knowledge of block-printing thence, see POLO.

The art of printing by the use of movable types was invented in Europe about the middle of the 15th century; but no more definite statement concerning its origin can be made with confidence. The name of the country in which the invention took place, the name of the inventor, the year of the invention are, up to the present time, matters of dispute. Modern researches have completely disposed of as a mere legend the widespread belief that the invention of movable metal types, cast in a mould from a matrix—the essential principle of typography—was preceded by or was the outcome of the use of wooden types, which it was formerly thought formed the link between the block-books common in the early part of the 15th century (see WOOD-ENGRAVING) and the earliest letterpress prints. Equally baseless is the belief that the first metal types were cut instead of being cast. The evidence on these two points is too minute and technical to be adduced here.

The controversy as to the invention of printing has lasted nearly four centuries, and it has unhappily been carried on with a vehemence and bitterness which perhaps no other controversy, not a religious one, has ever excited. Up to 1499 it was universally believed that typography was invented at Strasburg by Gutenberg (q.v.), who afterwards set up a press at Mainz, from which emanated the magnificent Latin Bible, for many years called the Mazarin Bible, owing to a copy having been discovered by De Bure in Cardinal Mazarin's library at Paris. Gutenberg's name does not appear in a single production of his press, and none of his associates mention his name as the inventor of printing. In 1499 there was published at Cologne the *Cronica van der hilliger Stat van Coellen*, since known as the *Cologne Chronicle*, in which one chapter is devoted to the origin of printing. The chronicler declares that the art was discovered first of all in Germany, at Mainz on the Rhine; that it took place about 1440, but that, although it was discovered at Mainz, the first 'prefiguration' was in Holland, in the form of the *Donatuses* which were printed before that time; that the circumstances of the origin had been communicated to the chronicler by Ulric Zell, a contemporary printer at Cologne. To these statements may be attributed the commencement of the controversy ever since carried on. In 1588 Adriaen de Jonghe ('Hadrianus Junius'), in his *Batavia*, printed in the Plantin office at Antwerp, gave the first circumstantial account of the alleged Dutch invention, which, he said, he had heard from old and trustworthy people. This was, it will be noticed, about a century and a half after the invention. Junius stated that in 1440 'Lourens Janszoon,' surnamed Coster (q.v.), lived at Haarlem; that he one day took a walk in the Hout, and cut letters on the bark of a beech-tree; that he printed these letters on paper for the amusement of children; that he invented a suitable printing-ink, and afterwards began to print whole sheets, with pictures; subsequently he used leaden letters, and then tin ones. Among his workmen was one Johannes—the surname was not given by Junius—who in 1441 stole the types and fled to Mainz, where he opened a workshop, and in 1442 published, with Coster's types, the *Doctrinale* of A. Gallus and the *Tractatus* of P. Hispanus. From this date, as already stated, the question whether printing was 'invented' in Holland or in Germany has been fiercely debated, and scores of books have been written upon it. The titles of these are given in Bigmore and Wyman's *Bibliography of Printing* (3 vols. Lond. 1880–86). The controversy was renewed with much vigour, and unfortunately with much acrimony, in 1870; and it has since been maintained, the balance of evidence, or rather of probability—for of evidence there is an extraordinary lack—oscillating from time to time to one side and then to the other. In 1870 the 'Costerians' included nearly all the leading bibliographers and typographical historians. An eminent Dutch investigator, Dr van der Linde, published a series of articles, since translated into English (Lond. 1871) under the title of *The Coster Legend*. The purport of the book was that the documents brought forward to support the claims of Coster were false, and that the arguments in his favour were devoid of any historical or bibliographical support. Van der Linde showed further that several of the documents on which the Costerians relied were actually frauds and forgeries. This exposure for a time completely routed the supporters of the Dutch claims. In 1878 the same author produced a companion volume, *Gutenberg—Geschichte und Erdichtung aus den Quellen nachgewiesen*, but there was little new in it. Mr Hessels of Cambridge, a native of Haarlem, next took up the subject on original lines, and issued the work *Gutenberg: Was he the Inventor of Printing?* (Lond. 1882). He maintained that Van der Linde was untrustworthy, and that his book presented a more complete chaos of error on the subject than its predecessors. Mr Hessels spent several years in examining in Germany all the documents extant connected with the history of Gutenberg, and exposed a number of falsifications and forgeries which had passed current. Space will not here suffice to recapitulate his discoveries; his book is indispensable to any one desiring an accurate knowledge of the subject. The result of his researches was more negative than positive. He said that he had not found anything which enabled him to answer in the affirmative or in the negative the question, Was Gutenberg the inventor of printing? Of the three principal documents relied upon by his supporters one is lost entirely, and the other two are only transcripts. Even if we accept these transcripts, he says, they point to Gutenberg only as a printer, but not as the inventor of printing. In 1886 Dr van der Linde wrote from the German side another book, *Geschichte der Erfindung der Buchdruckerkunst*. It was produced in magnificent style at the cost of the German government, but it added to our knowledge of the contention nothing of importance. Mr Hessels has since continued his investigations, and the result is indicated in the title of his book, issued in 1887, *Haarlem the Birthplace of Printing, not Mainz*. This important work virtually takes us back to 1499, when the *Cologne Chronicle* declared that the first idea of printing was found in Holland. The case now stands thus: very crude and clumsy specimens of printing—some of which have been quite recently discovered—are generally allowed to be 'Costeriana.' On the other hand, there is the magnificent Bible and Psalter undeniably printed by Gutenberg and his associates. It is difficult to believe that the masterpiece preceded the rude essays. It is more reasonable to conclude that, anterior to Gutenberg's press, there was a rude school of typography in existence. Important discoveries may at any time take place. The contents of many old continental libraries have even up to the present not been adequately examined. Possibly within some ancient bindings there exist at the present moment prints that would settle for all futurity the controversy which has raged for four centuries as to the 'origines typographici.'

It has been mentioned at GUTENBERG that after Fust had obtained possession by action at law of Gutenberg's office, and while he was carrying it on as a printing concern, Gutenberg, by the assistance of another capitalist, set up a second office. With two rival establishments in existence, it was impossible to keep secret the processes of printing. In 1462 the city of Mainz was sacked, and the catastrophe dissolved engagements between employers and employed, and caused many of the latter to migrate to other countries, taking with them, of course, their knowledge of the art. Printing spread with marvellous rapidity, considering the means of transport and of communication then in existence. For instance, before 1500 there were 16 master printers at Strasburg, 22 at Cologne, 17 at Nuremberg, 20 at Augsburg. By the end of the 15th century the business was carried on in about 60 places in central and northern Europe, 21 in the Netherlands, 32 in Italy, 31 in France, 22 in Spain and Portugal

(Henry Cotton's *Typographical Gazetteer*, 3d ed. Oxford, 1852–66).

Printing was brought to England in 1476 or 1477 by William Caxton (q.v.), who set up his office within the 'precincts' of Westminster Abbey—but not within the sacred building itself, as often erroneously stated. See William Blades's *Biography and Typography of William Caxton* (2d ed. Lond. 1882). The first hundred years of the history of printing in England was a period of great activity. In 1478 printing was done at Oxford by Theo. Rood; in 1480 at St Albans by an unidentified printer now called 'the Schoolmaster;' in the same year in the city of London by Lettou; in 1521 at Cambridge by Siberch. When the art had spread throughout the country, when education became more common, and men began to read about the questions and events of the day, it began to be seen by the authorities and rulers that a mighty power for good or evil had arisen in the land. Then it was deemed necessary to regulate the press. In 1530 censorship was established in England. It ushered in a period of lamentable decadence in the quality and quantity of the printing done. Printers were cruelly punished, especially during the existence of the unconstitutional Star-chamber (q.v.). Oppressed, abused, and often imprisoned, printers lost all enterprise and all social position. For many years there were no good printers at all. Censorship was abandoned in 1694. Then began a period of revival, greatly aided by the improvements in type-founding in the middle of the 18th century, and the prevalence of the 'Bibliomania' towards its close. The 19th century has been one of marvellous development, following the invention in 1814 of the steam printing-press.

It is believed that printing was introduced into Scotland in 1507. A patent has been discovered, of King James IV., which shows that a printing-press was established at Edinburgh during the year named. This patent was granted to two burgesses of the city of Edinburgh—Walter Chepman, a capitalist and speculator, and Andrew Myllar, a bookseller who had learned in France the art of printing. The 'prent and expert men' to use the press came from France. The office was in the Southgait, now the Cowgate. As early as 1508 several small publications were issued. After these came the great work for which the press was ostensibly established—the 'Aberdeen Breviary,' in two volumes, forming 1554 pages of small type. It was intended to become the standard Scottish service-book. Myllar was probably dead when it was completed, and with its publication Chepman's connection with typography came to an end. For many years subsequently all works of Scottish authors were printed in France. The next printer was Thomas Davidson, a practical man who in 1541 was chosen to print acts of the parliament of James V., which placed him in the position of king's printer. It is not necessary to catalogue the names or the works of his immediate successors. Up to 1600 the average workmanship of the Scottish printers was about as bad in quality as that of their later successors has been distinguished for its beauty, excellence, and accuracy. This is not the only noteworthy feature of early Scottish typography. The printers were astonishingly few in number; during 150 years after the introduction of the art there were only about a dozen master printers who were natives. During the first hundred years only twenty-five different works are known to have been printed in Scotland. See R. Dickson and J. P. Edmond, *Annals of Scottish Printing from the Introduction of the Art to the Beginning of the 17th Century* (4to, Cambridge, 1890)—a most exhaustive and trustworthy book.

The first printing-press set up in America was introduced by the viceroy of Mexico, Antonio de Mendoza, and the first book printed by it in the New World was *La Escala de S. Juan Climaco* (1536). The earliest press in the British-American colonies was brought over for Harvard College in 1638. The *Bay Psalm Book* (1640; see ELIOT, JOHN) was its first important work; but in 1639 it printed the *Freeman's Oath* and an almanac. The first press in Philadelphia was set up in 1685, in New York in 1693. See I. Thomas, *History of Printing in America* (2d ed. Albany, 1874).

The practical art of letterpress printing consists essentially in coating certain relief surfaces with printing-ink, and then transferring that ink to the fabric, such as paper. The relief surface may be a forme of movable types or an engraved design cut in wood or metal, or a block cast or electrotyped from the type or the engraving; and the impressing is effected by the press or machine presently to be described.

Types are cut, cast, or otherwise formed from various materials, though the printer recognises only two kinds—wooden ones, which are cut to form the larger letters used in placards, and metal ones. All books and newspapers and the great bulk of jobbing are done from the last named (see TYPES).

A complete assortment of type of any one particular style is called a 'fount,' and may vary in amount to any extent, according as it may be required in large or small quantities. The individual type is a piece of metal about 1 inch long with a letter, point, comma, or other printing device cut in relief on one end as shown in fig. 1. The notch shown on one side is to enable the compositor to place it right side up when 'setting' without the trouble of looking at the letter. The different founts are arranged in one or more pairs of 'cases,' a 'lower' and 'upper' case, the former holding the small letters (technically called 'lower case' letters in consequence), figures, commas and points, spaces to put between the words, 'quads,' &c. The upper case holds the capitals, small capitals, and the less often used 'sorts.'

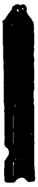
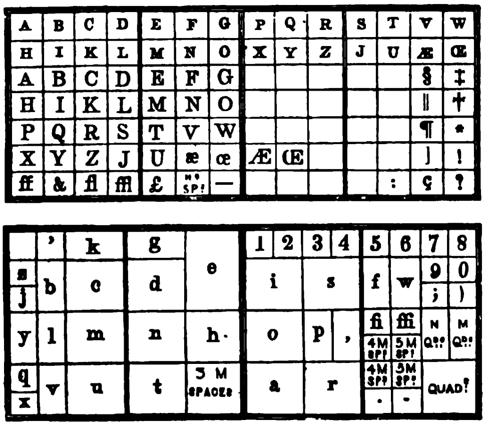


Fig 1. A Type.

The cases, wooden trays divided into 'boxes' by thin slips of wood, are shown diagrammatically in fig. 2. The lower case is arranged not alphabetically, but so that the letters most used will be nearest the compositor's hand and have the largest

Upper Case.



A	B	C	D	E	F	G	P	Q	R	S	T	V	W
H	I	K	L	M	N	O	X	Y	Z	J	U	Æ	Œ
A	B	C	D	E	F	G						§	‡
H	I	K	L	M	N	O						‖	†
P	Q	R	S	T	V	W						¶	*
X	Y	Z	J	U	æ	œ	Æ	Œ				]	!
ff	&	fi	ffl	£	N SP	—					:	ç	?

Lower Case.

Fig. 2.—Cases.

compartments, an ingenious arrangement for saving labour. The arrangement of the lower case varies slightly in different places, but the principle is the same in all. The proportion of the different letters of the English language in a fount of types is rather curious, and is shown in the following table:

a	8,500	h	6,400	o	8,000	u	3,400
b	1,600	i	8,000	p	1,700	v	1,200
c	3,000	j	400	q	500	w	2,000
d	4,400	k	800	r	6,200	x	400
e	12,000	l	4,000	s	8,000	y	2,000
f	2,500	m	3,000	t	9,000	z	200
g	1,700	n	8,000				

Provided with a metal instrument called a setting-'stick,' shown half-filled with type in fig. 3, and with his 'copy' before him, the compositor picks up the necessary letters, &c. one by one, arranging them in lines in the stick, which may be regulated to any width of line; each line is carefully spaced out to fit accurately into the stick before proceeding to the next, any *italics* or other sorts required being got from other cases. When the stick is full the matter is carefully lifted with the fingers, aided by the setting-rule, a piece of brass rule used in setting the lines, and shown in fig. 3, and put into a galley—a brass tray with wooden sides, about 18 or 20 inches long as used in setting such a book as the present work. This galley when filled contains about a page of matter in one long column, which is kept together by wedges driven in against the sides. A proof is taken at a hand-press, and this is read by a trained reader to correct any errors which the compositor may have made. These corrections are marked on the margin of the proof, and most of the signs and marks used are shown in the specimen given in the article PROOFS. When the printer's errors have been corrected by the compositor a 'clean' proof is taken for the author, and when his alterations are given effect to, the type is made into pages. If a short number of the book is required, say only a few-hundreds, it is usually printed direct from the type; but where large numbers are required, or future editions expected, it is generally either stereotyped (see STEREOTYPING) or electrotyped (see ELECTRO-METALLURGY), in either of which cases the type is not used for actual printing. In any case the type is taken from the galleys and arranged in pages, and the skill displayed by compositors in handling them without allowing any to drop out is very wonderful. The pages are 'locked' up by means of wedges in iron frames called 'chases' (Fr. *châsse*, 'a frame'), one of which with four pages is shown in fig. 4. Books are generally printed in sheets of sixteen pages, or multiples of sixteen (32, 64, or 128); in the latter case, however, they are cut into sheets of sixteen after being printed. In making up the pages to print a sixteen-page sheet, two formes, as the chases containing the type are called, are required, one for each side of the sheet. If a printed sheet of sixteen pages be opened out, the pages will be seen to be arranged in the following order:

Fig. 3.—Setting-stick.

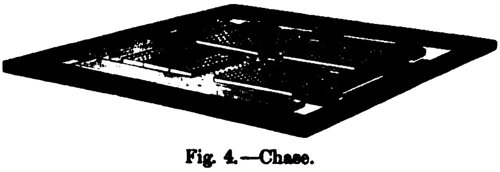
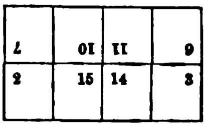
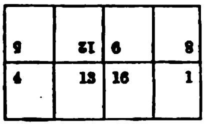


Fig. 4.—Chase.



Inside of Sheet.



Outside of Sheet.

And the pages in the chase must be so arranged, or 'imposed' as it is called, that, when printed, they will so appear. When ready for printing or stereotyping, as the case may be, another proof is read for final correction. In some cases where great accuracy is required, such as in the present work, as many as six or eight proofs are 'read' at different stages.

When the types have been printed or electrotyped and returned to the caseroom they are distributed by the compositors into the cases again for further use; and this can be done with wonderful rapidity, though great care must be used to avoid putting the letters into the wrong boxes. Several very ingenious machines have been invented for setting type (see TYPE-SETTING MACHINES) which have been more or less successful. They are worked something after the manner of type-writing machines (see TYPE-WRITER), but are too complicated to be described in detail within our limits. Several of the latest of these cast and set the type by one movement. This saves the labour of re-distributing the types, as when done with they are melted again. These machines are used for newspaper work.

In most printing-offices the men govern themselves by a voluntary association called a 'chapel,' which, although often (but not necessarily) connected with the printers' society, is independent so far as the individual affairs of the office are concerned. The office-bearers are called the 'father' and 'clerk' to the chapel, and it has elaborate sets of rules for regulating trade and personal affairs within the office.

Letterpress printing surfaces are coated with ink (see INK) by means of 'composition rollers.' These consist of cylinders of small diameter covered with composition made according to various recipes. Amongst them are glue, treacle, and Paris white; glue, sugar, and glycerine; glue, glycerine, sugar, and india-rubber, &c. These are melted, mixed together, and cast in cylindrical moulds of various diameters, according to the requirements of the machine or press. The glue and treacle composition was first used for printing by the engineers Donkin and Bacon in 1813; up to this time the types having been inked by pelt balls. The present system of inking on machines was invented by Mr Edward Cowper in 1818. Leather and other substances were tried at first, and the machines in which they were used were discarded owing to the unsatisfactoriness of their rolling or inking arrangements. A good roller must be tenacious of ink, semi-elastic, and retain its suction. It must not shrink, become hard in cold weather or soft in hot weather. The recipe for making it is varied according to the machine for which it is required—whether working on fine surfaces such as engravings, or at a high speed, as for newspaper work.

The earliest known representation of a printing-press is dated 1507, and it pictures an apparatus which is little more than a modification of the ancient wine-press. The essential feature is a flat board, since known as a platen, which is movable vertically, and presses on a forme of type laid on an unresisting hard surface parallel to it. The two, between which was the paper, were brought together by a powerful screw, and thus the paper was squeezed down on the forme. This rudimentary appliance was improved from time to time, as is shown in various pictures of printing-office interiors. The wooden printing-press was brought to its ultimate degree of perfection in the later part of the 17th century. Moxon, the first technical writer on printing, described in 1683 what he called 'a newly invented press.' This was the old wooden press as improved by Blaeu of Amsterdam (fig. 5).

This press continued to be generally used until the close of the 18th century. About 1800 Charles Mahon, third Earl Stanhope, was instrumental in producing a much improved printing apparatus. The press which bears his name was made entirely of iron, and the strength thus obtained enabled a forme to be printed on it double the size of that which could be done on a wooden press. There was a most ingenious system of links and levers, by means of which the approach to the type of the platen, and its withdrawal, were accelerated. The greatest leverage and consequently the greatest pressure were obtained when the forme and platen came into contact. These arrangements enabled the pressmen to print at the rate of 200 per hour on one side of the sheet or 100 per hour on both sides. After this several inventors turned their attention to the improvement of the hand-press. Clymer, an American, in his Columbian press, discarded the screw, the central feature of previous presses, and gained his power from a combination of powerful levers. About 1823 an excellent press, called the Albion, was brought out by Mr R. W. Cope of London, in which the pressure was gained by forcing an inclined bar of steel from a diagonal to a vertical position, forcing down the platen, the impression taking place when the piece of steel was brought into the vertical position. The Columbian and the Albion presses enabled the printer to print on one side of the paper at the rate of 250 sheets per hour. Such presses are now, except for peculiar kinds of work or when very few impressions of a forme are required, quite obsolete, being superseded by 'machines' on which the various operations of press-work are done more or less automatically.

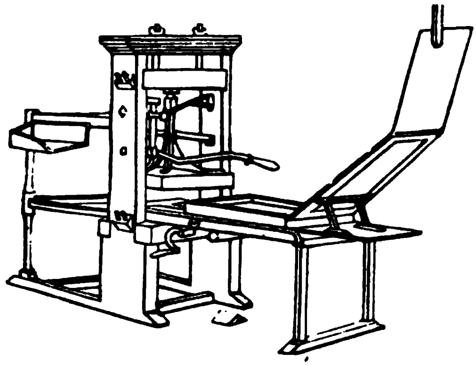


Fig. 5.—Old Common Press.

The earliest inventors of 'printing' machines coupled together the two arts of printing on paper and on calico and other textile fabrics. Adkin and Walker in 1772 patented a machine which was the type of a modern rotary letterpress machine. It was 'for stamping and printing' on paper, cotton, and other cloths, 'whereby the printing on such materials would be greatly facilitated and rendered much less expensive, and more perfect and exact.' The words fully and clearly indicate the advantages of rotary over flat platen printing. Amongst other suggestions of a cognate nature made about this time the most remarkable was that of William Nicholson of London, the editor of a scientific journal. In 1790 he took out a patent which foreshadowed nearly every fundamental improvement even in the most advanced machines of the present day. He contemplated an apparatus in which formes or plates were to be fastened to the surface of a cylinder; the inking to be supplied by a roller and distributed by smaller rollers; the impression to be cylindrical, the paper being caused to pass between the printing cylinder and one covered with cloth or leather. Nicholson never actually constructed a machine, and although his patent was a marvellous forecast of the methods soon to be adopted in letterpress printing, he cannot be awarded the honour of being the inventor of the printing-machine.

Hitherto the evolution of the type-printing machine from the calico-printing machine has been completely overlooked by historians of printing, yet the connection is almost obvious. Nicholson's apparatus belonged to the same category. The distinction of first actually making a printing-machine was reserved for a German printer, Frederick König (q.v.), who commenced experiments with the modest, and, as it proved, mistaken view of accelerating by making more automatic the ordinary hand-press. He came to London in 1806, and patented a new platen-machine. The idea was but crude, and never put into execution. It is not unlikely that about this time König became acquainted with the ideas patented by Nicholson (see Goebel, *Friedrich König und die Erfindung der Schnell-presse*, Stuttgart, 1883). At any rate König abandoned his project for accelerating flat printing. In 1811 he took out a patent for what we would now call a single-cylinder machine—i.e. one in which the impression was given by a cylinder, the inking being done by rollers, and the paper carried through the apparatus on tapes. The type bed moved to and fro, and the cylinder had an intermittent or stop motion, affording time for the feeding of the sheets. The glue and treacle composition had not been discovered, and leather inking-rollers had to be used. Mr John Walter of the *Times* was so struck with the apparent possibilities of this method of printing that he engaged König to make for him a double-cylinder machine which should print two copies of a forme of the newspaper, but on one side only of the sheet at once. This was completed in 1814, and on the 28th November of that year a newspaper was for the first time in any country printed by a machine driven by steam-power. This machine printed 1800 impressions per hour, completing 900 sheets, and it was used by the *Times* for several years. In 1818 Edward Cowper invented several important improvements, including a flat ink-distributing table, with distributing-rollers, forme-inking rollers, and ink-fountain. These principles are still to be found in single-cylinder machines. Cowper was called upon to perfect König's machine and did so, mainly by taking away the old inking-apparatus and substituting his own. In the same year König patented a perfecting machine which resembled two single-cylinder machines placed with their cylinders towards each other. The sheet was conveyed from one cylinder to the other by means of tapes so arranged that in the course of its track it was turned over and the second side presented to the second cylinder. At the first cylinder the sheet received its impression from the first forme, and at the second cylinder it received its impression from the second forme. Cowper also improved on this machine, which printed 750 sheets on both sides of the paper per hour. The principle of the first perfecting machine has not been considerably departed from in subsequent machines of the same class, but improved methods have been devised for carrying the sheet from one cylinder to the other and turning it.

Reference, extremely brief and imperfect, has now been made to the origin of two out of the three distinct classes of printing-machines at present in use. These are, first, the single-cylinder machine, printing one side of the sheet at one operation, from a forme lying on a flat bed; second, the double-cylinder or perfecting machine, printing both sides of the sheet at once, also from a forme on a flat bed. The third class comprises the rotary machines, printing both sides, but from a circular forme—the impressing surface, as well as the printing and the inking surface, being cylindrical, and capable of continuous rotation. The machines of the first and second classes are adapted for single sheets of paper; the rotary machines print reels or continuous webs, the portion forming a sheet being severed after printing. It is in this latter class of machines that the greatest improvements—amounting almost to a revolution in the art of printing—have been achieved. (For a technical account of the several classes, see *Principles and Progress of Printing Machinery*, by the present writer, Lond. 1889.) Limitations of space preclude more being given here than a bare list of successive improvements.

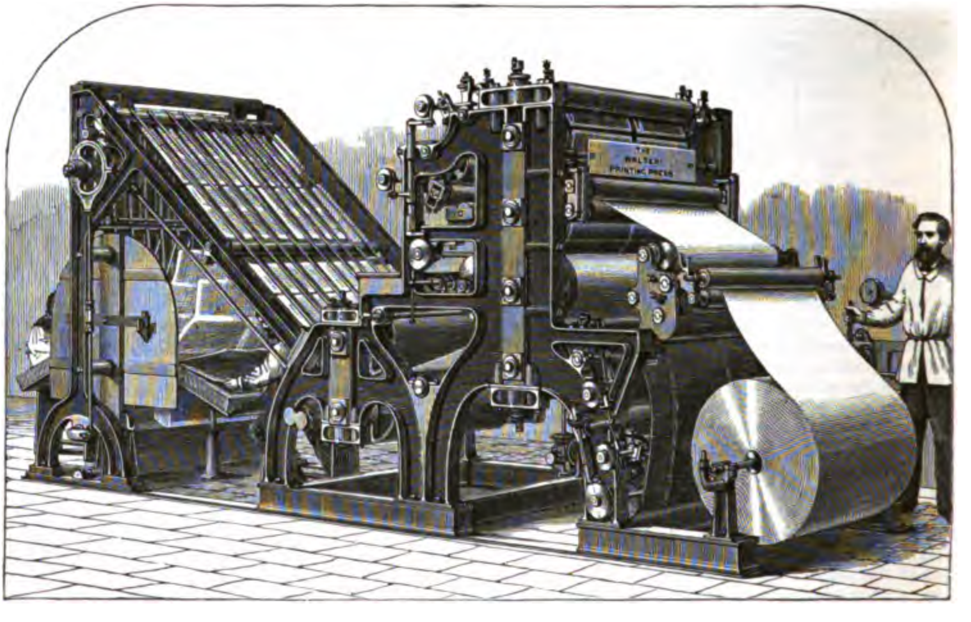


Fig. 6.—The Walter Press.

In 1790, as already mentioned, Nicholson patented a rotary machine, but he never constructed one. In 1813 Bacon and Donkin patented a machine in which the types were fixed on a revolving prism, the ink being applied by a roller, and the sheet of paper wrapped on another prism. The machine was a failure, although it embraced an important feature, the inking-roller made of composition. Three years afterwards Cowper patented a method for printing paper for paper-hangings and other purposes. This embodied another valuable feature—the taking a cast from the type and bending the cast round a cylinder. It was a far more practical idea than the subsequent one of Rowland Hill, who, to procure a curved printing surface, proposed the use of tapering types to be fixed on the cylinder. In 1848 Applegath invented a machine, the type-cylinder of which was vertical and nearly 6 feet in diameter, around it being placed eight other cylinders, containing sheets of paper to be printed. These were fed in from a horizontal position, and then brought to the vertical position. In 1857 the *Times* discarded this machine in favour of one patented by Hoe of New York, very similar in construction, but the cylinders were horizontal. It was found that the complication arising from eight or ten feeders was most objectionable, causing frequent stoppages, excessive waste of paper, and great risk to the machine and the material, while the working cost was heavy. Each of the machines printed on one side only. They were the first machines fitted with 'flyers'—a device for mechanically delivering or taking off the sheets. It was, however, considered at the *Times* office that the acme of improvement could only be obtained by constructing a machine simple in its arrangements, capable of printing both sides of the paper at one operation, and which could print, not single sheets, but continuous webs of paper, thus dispensing with layers-on. There were enormous difficulties in the way of printing, cutting, and delivering the paper, difficulties which the non-professional reader could by no means realise. In 1866 a machine of the kind was constructed under the superintendence of Mr J. C. Macdonald, the manager, and Mr Calverley, chief-engineer of the *Times*. The Walter Press, as this machine was named, has since been slightly improved, but remains practically the same, and is shown in fig. 6. The types are stereotyped by means of a papier-maché mould, which, being bent inside a hollow cylinder, produces, when cast, a stereotype which fits on the printing-cylinder of the machine. The paper, unwinding from the reel, first passes between damping-cylinders, then over the printing-cylinders, and is finally cut and delivered at the other end of the machine. Two boys and a man, who superintends the machine, supply all the manual labour required. The speed is about 10,000 perfect sheets per hour, equal to 20,000 impressions by the apparatus previously mentioned. The more recent machines have an attachment for folding, which make two, three, or four folds as required.

Mr Walter of the *Times* is entitled to the honour of being instrumental in introducing the system of rotary printing for news-work, just as his father deserves that of having introduced steam machine-printing. The Walter press was soon adopted as the pattern of a number of machines constructed in Britain and abroad. Some of these machines much developed the idea of the Walter, and embodied fresh and important improvements. In 1870 Messrs George Duncan and Alexander Wilson, of Liverpool, brought out their 'Victory' machine, which included the folding arrangement since added to the Walter press. By this apparatus newspapers of various sizes are printed, folded, delivered, and counted into quires or any portion required, at the rate of 200 per minute.

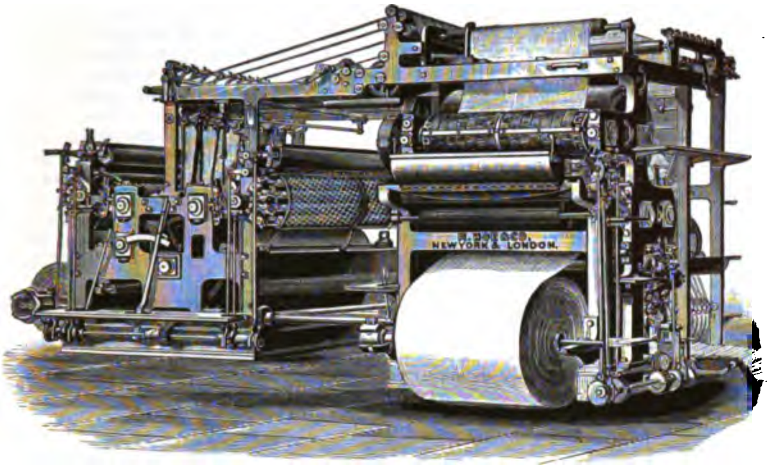

R. HOE & CO.
NEW YORK & LONDON.

Fig. 7.—Hoe Double-web Machine.

Since about 1870 the rotary system of printing has been gradually adopted in the offices of all newspapers having even moderately large circulations. Factories for producing rotary machines have been established in various parts of England, while many such machines have been imported from France, Germany, and America. The most improved and the fastest machines made up to the present time are those of Messrs Hoe & Co., of New York and London. The most improved of these machines print four or six page papers at the extraordinary speed of 48,000 per hour, or 800 per minute. Papers of eight, ten, or twelve pages can be printed at a speed of 24,000 per hour, and a sixteen page paper at 12,000 per hour. The papers can be pasted down the centre margins if required, and counted as delivered in quires of any number fixed upon. The machine delivers the papers, inset, pasted, cut top and bottom, turned out as compact as a pamphlet, and, by the addition of a device largely used in America, even folded and wrappered ready for post. This speed is effected by using a reel of paper of double width, about 8 feet wide, on which can be printed duplicate sets of plates. So greatly has the art of Stereotyping (q.v.) been improved that eight stereo-plates from one forme can now be moulded, cast, and finished ready for the machine in eight minutes. Fig. 7 shows the double-web Hoe machine.

The printing business is divided into three departments — those concerned respectively with jobbing or commercial work, with book-work, and with news-work. The improvements of late years in the mechanism and the processes of the first two are equally important with those in the last. The character of ordinary jobbing work has been greatly bettered by the liberal use and correct selection of colours, by the introduction of ground tints, and by the artistic taste infused into the design. The typefounders have provided the printer with more beautiful types and more diversified ornaments, and both pressman and compositor have utilised with intelligence and skill the materials at their command. Jobbing work is chiefly done on small platen-machines, invented by an American, G. P. Gordon, and introduced into Britain as 'Minerva Presses' in 1866. There are many varieties now made of this apparatus. Larger work is done on machines having one or two cylinders. Those of the 'Wharfedale' pattern, invented about 1860 by William Dawson and David Payne of Otley, Wharfedale, Yorks, have one cylinder, and print only one side of the paper at a time.

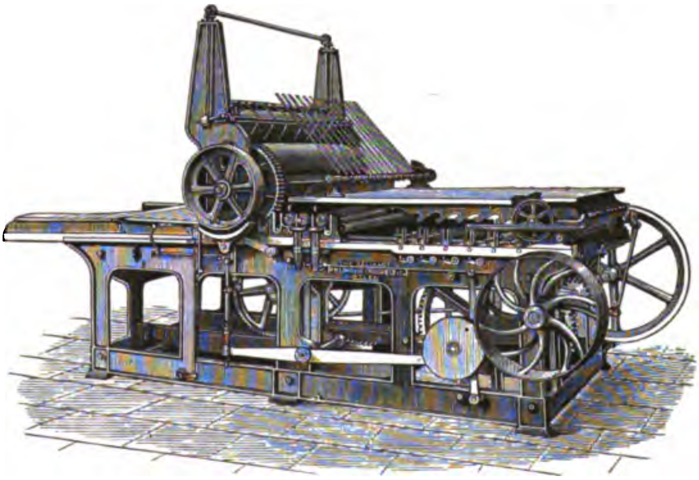


Fig. 8.—Single-cylinder Machine.

The essential parts of the single-cylinder machine (fig. 8), now constructed by engineers in Europe and America with small alterations in pattern, may be regarded as five: the impression appliances of the cylinder; the arrangements for carrying the forme of type up to and under the cylinder, by contact of which it receives the impression; the inking of the type; the laying on of the sheet; the taking off or delivery of the sheet when printed. The cylinder, which is a hollow drum, having an opening on its under side, is placed almost in the middle of the machine. The table of the machine on which the forme is placed has racks on its under surface gearing into the traverse wheels, from which it derives motion to and fro. By means of racks it also causes the rotation of the cylinder by which the impression of the forme is effected. The inking system may be thus outlined: There is at the extremity of the machine and running across it a duct or ink reservoir, with an adjustable side-piece called the knife, which regulates the outflow of ink. A composition roller in motion, called a vibrator, takes a streak of ink periodically and transfers it to the ink-table, which forms part of the table and of course moves backward and forward. The ink is evenly spread or distributed over the ink-table by 'distributors.' The table then passes under the inking-rollers which alone touch the forme and give it the proper coating of ink. The distributors and rollers are coated with 'composition,' referred to on p. 410. The feeding apparatus is also ingenious. A pile of paper is laid on to the desk-like table shown at the right-hand side of the machine, and a boy stands at the end or at the front side of it and 'strokes' the sheets down till the front edge of one comes in contact with a series of metal fingers or clutches called grippers. These open and take a sheet by its edge, and hold it secure while the cylinder is turning round, and the printing taking place. At a certain point the grippers release the sheet, which then goes into the taking-off apparatus. A second set of grippers seize it and carry it round the wooden flyer cylinder, from whence it emerges on to travelling tapes. A large comb-like appliance called the gate oscillates up and down, having the sheet in front. The pressure of the air causes the sheet to adhere to this until it assumes a horizontal position, when it drops on to the taking-off board. While the first side of the sheet is being printed, two points, by an ingenious arrangement, make small holes in the paper; and when the sheet is turned to print the second side, these holes are again placed on the 'points,' thus ensuring correct register.

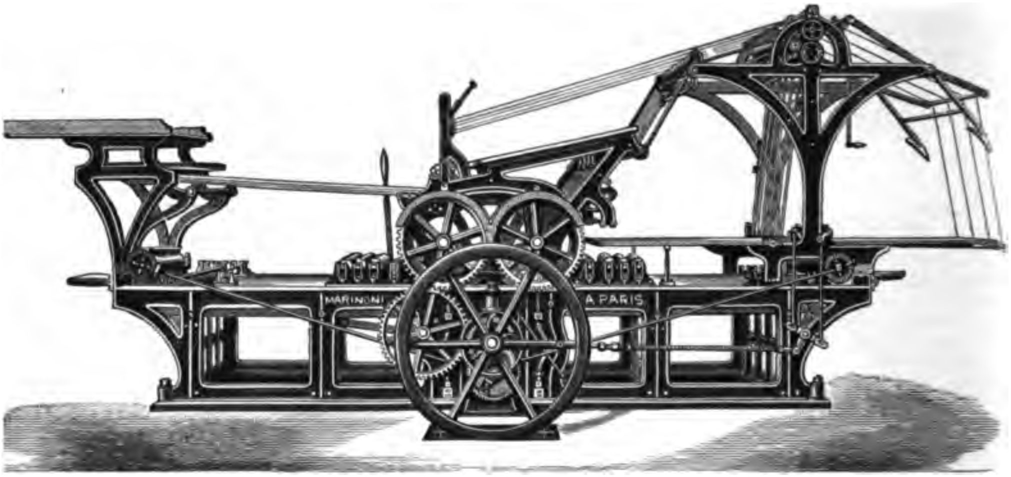


Fig. 9.—Perfecting Machine.

Machines with two cylinders are called perfecting machines because they perfect or print both sides of a sheet before delivering it. Generally they may be said to be duplicated single machines, with two printing-cylinders, two tables for type, and an inking apparatus at either end, much as described under the single-cylinder machine. The sheet is printed on one side at the first cylinder, when a set of grippers on the second cylinder take possession of it and print the second side, and it is delivered by the flyer as described. The varieties of these machines are numerous, and fig. 9 shows the *Marinoni*, a well-known type, used in the printing of the British editions of the present work. These machines can print in the very finest manner from 1000 to 1500 perfected sheets per hour, according as they may be complicated with illustrations or not.

When the types are to be printed from direct, as already mentioned, the chase containing the pages is put on the bed of the machine. When stereotype or electrotype plates are used they are carefully dressed to an exact size and thickness, the latter about $\frac{3}{16}$ths of an inch. The requisite number of wooden blocks are then put on the machine-bed, locked in a chase. These blocks are of the proper thickness to make up the plates to type-height (about 1 inch). The plates are fastened to the blocks by brass catches at the sides and ends, and when locked up are as solid as type.

Before printing, however, a laborious process called *making ready* has to be gone through. When many wood-engravings are in the pages several days may be taken up making ready a single sheet. This process is for the purpose of making the impression equal all over and properly printing the wood-engravings, and can be judged of by comparing a carefully printed book with a daily newspaper, which is printed just as it comes without any making ready. It is too technical for detailed description within our limits.

It is not long since that it was a firm article of belief among printers that fine work could not be done except on a press provided with a platen. And up to quite recently all paper was first thoroughly wetted, then printed, then dried, and then pressed to restore the surface, of which the damping deprived it, and to give it a certain gloss. Between the forme and the platen of the press or the cylinder of the machine a thick, soft, yielding blanket was placed, which was supposed to produce a better impression from the inequalities of engravings and type. There has been a radical change in opinion and practice on these important points. It has been found, since machines have been brought to their present degree of perfection, that they give far superior results to those from presses—their impression is stronger, more solid, and more uniform, and the sheets can be laid on them with a precision unattainable with hand-presses. Paper is not now made spongy and stretchable by being wetted, and the result of working it dry is that the type is brought up with greater brightness, and the delicate lines of engravings are printed finer, clearer, and cleaner. Improvements in ink-making have much conduced to this desirable result. Paper has been produced for book-printing with a specially prepared surface, which admits of a far more excellent impression than that formerly procurable. The soft blanket has been discarded, and the packing or covering of the cylinder is now generally as hard as it can be got. The aggregate results of these alterations may be seen by a comparison of the present issues of an illustrated newspaper with those of fifty years ago. Up to about 1840 there was actually no press strong enough to properly print a woodcut of 48 square inches in superficies; now, woodcuts of 2000 square inches, or 50 inches by 40, are printed in the most perfect manner. The coloured supplements of the pictorial journals are often admirable reproductions of works of high art; it is within the memory of persons of middle age that the first crude attempts were made to print such pictures.

BIBLIOGRAPHY.—*Historical:* In addition to the works referred to in the text may be mentioned Karl Faulmann, *Illustrierte Geschichte der Buchdruckerkunst* (Vienna, 1882), his *Die Erfindung der Buchd. nach der neuesten Forschungen* (Vienna, 1891); Theo. de Vinne, *The Invention of Printing* (New York, 1877); and Van der Linde, *Geschichte der Erfindung der Buchd.* (3 vols. Berlin, 1886). There is no complete history of printing in the English language, but in Bigmore and Wyman's *Bibliography of Printing* (3 vols. 1880–86) some of the most useful books will be found under the names of Ames, Arber, Blades, Dibdin, Herbert, Hansard, Humphreys, Hessels, Luckombe, Ottley, T. B. Reed, Sotheby, Timperley, and Watson.

Practical.—Southward, *Practical Printing* (2 vols. 3d ed. 1887), and *Printing Machines and Machine Printing* (1888); Waldow, *Illustrierte Encyklopädie der Graphischen Kunste* (Leip. 1884); Desormes, *Notions de Typographie* (Paris, 1888); F. J. F. Wilson, *Printing Machines* (3d ed. 1885); F. J. Jacobi, *Printing* (1890); *The American Dictionary of Printing and Bookmaking* (1891–94); Ringwalt, *American Encyclopædia of Printing* (New York, 1871). Besides, a multitude of small yet useful books have been written on separate branches, and for the use of professional students of the art. See also the articles BIBLIA PAUPERUM, BOOK, BOOK-CLUB, ILLUSTRATION OF BOOKS, LITHOGRAPHY, PAPER, PRESS (FREEDOM OF THE), PROOFS, STEREOTYPING, TYPES.

Prinzenraub. See ALTENBURG.

Prior. See MONASTERY.

Prior, MATTHEW, was born 21st July 1664. Some doubt prevails as to his birthplace; but the bulk of the evidence points to Wimborne Minster in East Dorset. His father is said to have been a joiner, who, coming to London, probably to educate his son, took up his abode in Stephen's Alley, Westminster. Young Prior went to Westminster School, then under the redoubtable Dr Busby. His father died, and, his mother being unable to pay his school-fees, he fell into the care of his uncle, a vintner in Channel (now Cannon) Row, who took him into the bar to keep accounts. Here his familiarity with Horace and Ovid attracted the attention of Charles, Earl of Dorset, and other visitors to the Rhenish Wine House, with the result that he returned to Westminster, his uncle finding him in clothes, and Dorset in books. At Westminster he formed a life-long friendship with the two sons of the Honourable George Montague, the elder of whom afterwards became Earl of Halifax. In order to follow his friends to Cambridge, Prior, against Lord Dorset's wish, accepted a scholarship from the Duchess of Somerset at St John's College. He was admitted Bachelor in 1686, and in the following year wrote with Charles Montague the clever parody of Dryden, entitled *The Hind and the Panther transvers'd to the Story of the Country-mouse and the City-mouse*, which, according to tradition, greatly annoyed Dryden. In April 1688 Prior obtained a fellowship; and his composition of the yearly college tribute to the Exeter family, a rhymed excursus upon Exodus, iii. 14, led to his going to Burleigh as tutor to Lord Exeter's sons. Lord Exeter shortly afterwards removed to Italy, and Prior applied (through Fleetwood Shepherd) to his former patron Dorset for advancement. He was, being then twenty-six, made secretary to Lord Dursley, afterwards Earl of Berkeley, then going as ambassador to the Hague. In Holland Prior remained some years, finding especial favour with King William. In 1697 he brought over the Articles of Peace at the treaty of Ryswick; and, after being nominated Secretary of State for Ireland, he was made secretary in 1698 to the Earl of Portland's embassy to France, continuing this office under the Earl of Jersey. In this capacity he found favour both with Anne and Louis XIV. In 1699 he became an under-secretary of state, the university of Cambridge made him an M.A., and he succeeded Locke as commissioner of trade and plantations. In 1701 he entered parliament as member for East Grinstead. Under Anne he joined the Tories, and in 1711 was employed in the preliminaries of the peace of Utrecht, going to Paris as ambassador in the following year. With the queen's death in 1714 came the triumph of the Whigs, and in 1715 Prior, returning to England, was impeached and imprisoned. In 1717 he was excepted from the Act of Grace, but was, none the less, subsequently discharged. The remainder of his life was passed chiefly at Down-Hall in Essex, a country-house purchased partly with the profits of a subscription edition of his poems and partly with the assistance of his friend Lord Harley, at whose seat of Wimpole he died, 18th September 1721, being then in his fifty-eighth year. He was buried in Westminster Abbey, under a monument decorated with his bust by Antoine Coysevox, given to him by Louis XIV. His portrait was painted by Richardson (National Portrait Gallery), by Belle (St John's College), Kneller, Dahl, and others.

Of Prior's abilities as a diplomatist there are diverse opinions. Pope sneered at them. But Bolingbroke and Swift extolled them; and it is stated that the archives at Paris show him to have been far abler and more resourceful than is generally supposed. As a poet, in which capacity he is now remembered, he holds a unique position. Without much real sentiment or humanity, his verses have a wit, a grace, a neatness and a finish, which link him to the lighter Latin poets on the one hand, and to the best French writers of familiar verse on the other. Cowper praised his 'easy jingle,' Thackeray 'his good sense, his happy easy turns and melody.' He collected his poems, described by himself as consisting of 'Publick Panegyrics, Amorous Odes, Serious Reflexions, or Idle Tales' (many of which had been contributed to Dryden's and other miscellanies), in 1709, and again, in extended form, in 1718. By this latter issue he made £4000. His more ambitious pieces, *Solomon on the Vanity of the World* and a paraphrase of the old ballad of the *Nut Brown Maid*, are not now thought to be his best, although they had considerable popularity with the readers of the 18th century. But a third long poem, *Alma; or, the Progress of the Mind*, an imitation of Butler, is full of wit and waywardness. His *Tales* resemble the French *contes* too much in their objectionable qualities to be palatable to the English taste. He survives mainly by his purely playful efforts, his lyrics and his epigrams, not a few of which are unsurpassable. In the kind of piece known to the French as *vers d'occasion* he is unrivalled, and his beautiful stanzas to *A Child of Quality* have been as fortunate as Gray's *Long Story* in setting the tune to a host of versifiers. In 1740, long after his death, two volumes were published, one containing alleged *Memoirs*, in which there is little of his, and the other a number of posthumous verses, among which are some of his best. These are included in Evans's two-volume edition of 1779. Thackeray wrote admirably of Prior in his *English Humourists* (1853). See his *Selected Poems*, edited by the writer of this notice (Parchment Library, 1889); an article by Mr G. A. Aitken in the *Contemporary Review* for May 1890; and the edition of Prior's works by R. Brimley Johnson (2 vols. 1892).

Priscian (Lat. *Priscianus*), surnamed CÆSARIENSIS, born or educated in Cæsarea, is in point of reputation the first of Latin grammarians; his treatise was in universal use as a text-book during the middle ages. Priscian flourished in the beginning of the 6th century: Paulus Diaconus calls him a contemporary of Cassiodorus (468–562 A.D.). He taught Latin at Constantinople, and enjoyed a government salary. The work which has preserved his name is his *Commentariorum Grammaticorum Libri XVIII.* The first sixteen books treat of the different parts of speech; the remaining two, of syntax. The work shows great learning and good sense, and contains quotations from many Greek and Latin authors no longer extant. Priscian also wrote six smaller grammatical treatises, and two hexameter poems of the didactic sort, *De Laude Imperatoris Anastasii* and a free translation of the *Periegesis* of Dionysius. The best edition of the grammatical works is that by Hertz and Keil in Keil's *Grammatici Latini*, vols. ii. and iii. (1855–60); of the poems, by Bährens, in *Poetæ Latini Minores*, vol. v. (1883).

Priscillian, the chief propagator of the doctrines professed by the sect known from his name as Priscillianists. They spread widely in Spain during the last third of the 4th century, and lingered there till the middle of the 5th century. The first seed of their doctrines is said to have been carried into Spain by a Memphian named Marcus, whose earliest disciples were Agape, a Spanish lady, and Helpidius, a rhetorician. Priscillian was a man of noble birth, pious and well educated; and his eloquence and nobility of character soon gathered round him a group of devoted followers, including two bishops, Instantius and Salvianus. From their hands he received episcopal ordination, and he established his see at Avila (*Abila*). Hyginus, bishop of Cordova, was the first to take alarm, but his measures were so gentle that he himself was covered with reproaches by the ultra-orthodox and fanatical. Priscillian's most determined enemies were Idacius, bishop of Emerita (*Merida*), and Ithacius, bishop of Sossuba. He was condemned and excommunicated at the synod of Saragossa (381), with three others of the leaders of the party. They next went to Rome to clear themselves before the pope, but were denied audience, and at Milan on the return journey they met as little sympathy from Ambrose. Under the vacillating rule of Gratian, however, they prospered, but their hopes were dashed to the ground by the usurpation of Clemens Maximus. From the judgment of the synod of Bordeaux (384) Priscillian appealed like Paul to Cæsar, and was at length summoned to appear at Treves. Martin of Tours was in favour of tolerant measures, but after his departure the fanatical party prevailed, and Priscillian, with others of the party, was condemned and put to death—the first who suffered death for heresy (385). Many Priscillianists recanted after the synod of Toledo (400), and soon after that of 447 they disappear altogether. Their doctrines contained Manichæan and Gnostic elements, strange cosmical speculations based on primitive dualism, the doctrine of emanations and astrological fatalism. They practised rigid asceticism, and eschewed marriage and the use of animal food. One damning blot on their morals was that absolute veracity was only obligatory between themselves. Graver charges still were made against their morality; but it should be remembered that the only accounts we have are those of bitter enemies, and their principles, originally obscure enough, have been made darker by a cloud of calumny. 'If the Priscillianists violated the laws of nature,' says Gibbon, 'it was not by the licentiousness but by the severity of their lives.'

See Mansel's *Gnostic Heresies* and Neander's *Church History*; also Mandernach's *Geschichte des Priscillianismus* (Treves, 1851). Schepps claims to have discovered some of his writings; these he edited in vol. xviii. of the *Corpus Scriptorum Ecclesiasticorum Latinorum* (Vienna, 1888).

Prism, in Geometry, a solid figure which can be most easily conceived of if we imagine a number of plane figures (triangles, quadrilaterals, &c.) exactly similar in form and size to be cut out of paper or any thin plate, and piled one above the other, and then the whole pile to become one body. It will thus be seen that the top and bottom of the prism are similar, equal, and parallel to each other, and that the sides are plane figures, rectangular if the prism be 'right' (i.e. if in the above illustration the pile of plane figures be built up perpendicularly), and rhomboidal if the prism be 'oblique' (i.e. if the pile slope to one side); but under all circumstances the sides of a prism must be parallelograms. The top and bottom faces may be either triangles, squares, parallelograms, or quadrilaterals of any sort, or figures of five, six, seven, &c. sides, provided only both are alike; and the number of sides in the plane figure which forms the top or bottom of course determines the number of faces of the prism; thus, in a triangular prism, there are five faces in all (three sides and two ends); in a quadrangular prism, six faces (four sides and two ends), &c. If two prisms, one being 'right,' and the other 'oblique,' have their bases of equal area, and be of the same vertical height, their solid content is the same, and is found by multiplying the area of the base by the vertical height. The parallelopiped is a quadrangular prism, and the *cube* is a particular case of the parallelopiped.

PRISM, in Optics, is a triangular prism of glass or other transparent substance, its two ends being isosceles triangles, and having most frequently a very acute vertical angle, which gives the prism the appearance of a long wedge. The prism is a most important instrument in experiments on the refraction of light, and, in the hands of the most eminent optical philosophers, has been the means of largely adding to the science of optics. See OPTICS, REFRACTION, SPECTRUM.

Prisoners of War are those who are captured from the enemy during naval or military operations. By the laws or recognised principles of war, the entire people of a vanquished town, state, or nation become the absolute property of the victors. In ancient times the treatment of prisoners of war was very severe. In the Greek wars it was no uncommon thing to put the whole adult male population of a conquered state to the sword, while the women and children were enslaved. Although the putting to death of prisoners became less frequent, they and their families were commonly reduced to slavery to as recent a period as the 13th century. The act of Napoleon in putting to death the Turkish prisoners of war at Jaffa in 1799 was universally condemned, and is probably the last instance of such barbarity. By degrees the more humane custom of exchanging prisoners came into practice, those not exchanged being kept in confinement on very poor fare. Notwithstanding frequent exchanges, large numbers of prisoners accumulate during war. In 1811 about 47,600 French were prisoners in England, while 10,300 English languished in the prisons of France. By the end of the Franco-German war of 1870–71 about 300,000 French troops had been sent to Germany as prisoners of war, many of the officers being released on Parole (q.v.).

Prisons. It is only within recent times that imprisonment has been studied as a scientific process by means of which certain high objects are to be attained, and which therefore ought to be conducted according to a defined system founded on recognised principles. It used to be believed that nothing more was required than to ensure the security of the victim or culprit, by chains and fetters if necessary, unless it were to inflict on him some further bodily pains and penalties, the smallest of which was to feed him with 'the bread of affliction and the water of affliction' ordered by Ahab for the prophet Micaiah. Imprisonment was not mentioned in the Anglo-Saxon laws as a punishment, but was enforced when an offender could not find a surety. In course of time, however, it was authorised by the common law as a punishment, as well as specified by statute for particular offences; nevertheless gaols were actually used more for securing the persons of those committed to them than as places of punishment. Under the common law all gaols belonged to the king, and by 5 Hen. IV. chap. 10 it was enacted that none but the common gaol should be the place of committal for offenders brought before a justice of the peace. But there were many 'franchise' gaols owned by great persons, or by towns and liberties under their charters, which were lawful places for carrying out imprisonment ordered by the persons or bodies to whom these privileges were granted as a part of the criminal jurisdiction placed in their hands. In many cases these bodies had the power of life and death.

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In the reigns of Edward VI. and Queen Elizabeth a new description of place of confinement was introduced—viz. the 'bridewells' and 'houses of correction' for vagabonds, &c. By James I. chap. 4, every county was required to provide such an establishment with suitable instruments and appliances in it for setting idle people to work. Another sort of prison is of quite recent introduction—viz. the reformatory and industrial school, institutions which are under private management, but derive the greater part of the funds by which they are maintained from public sources, and are subject to certain general rules and conditions intended to secure efficiency and to prevent abuse, compliance with which is ensured by government inspection. These institutions are for the reception of juveniles whom modern philanthropy has rightly and successfully contended should not be confined in the same establishments as adults, nor treated in the way which is most appropriate for the latter. Reformatories are places of punishment for juveniles under sixteen years of age who are convicted of crime, and sentenced to ten days' imprisonment or more. Industrial schools are not places of punishment at all, but are intended to prevent children becoming criminals through parental neglect or misconduct. A child must be under fourteen years of age to justify his being sent to an industrial school. There are therefore (1) prisons to which adults are sent for punishment and reformation; (2) prisons to which juveniles are sent for punishment and reformation, called reformatory schools; (3) prisons or places of compulsory detention to which juveniles are sent as a preventive measure, called industrial schools. To the first of these are sent also persons who are charged with a crime to await their trial, and persons committed by county courts for refusing to pay debts which they have means to pay, or by other courts if they cannot find sureties when ordered for any reason to do so. The course of events has led to the prisons of the first of these three classes being separated into two divisions which have a distinct history. One of these comprises the prisons which are governed by the laws relating to places in which criminals sentenced to penal servitude may be confined; the other comprises the ordinary prisons in which all sorts and classes of prisoners may be confined, but in which, as matters now stand, prisoners under sentence of penal servitude pass only the first few months of their sentences. The former are generally designated convict prisons; the latter are now styled local prisons.

The punishment of penal servitude had its origin in the system of transportation, and transportation itself had its origin in banishment or exile. This was expressly forbidden by Magna Charta, but existed nevertheless as a practice, because a criminal who had incurred the sentence of hanging and had taken sanctuary to avoid his fate was permitted in some cases to escape his punishment if he exiled himself. In course of time the privilege of sanctuary was abolished by law (though its practice existed notwithstanding for some time afterwards), and consequently the system of self-banishment which grew out of it; but before then —viz. in the thirty-ninth year of Queen Elizabeth's reign—banishment had been legally established by the Vagrancy Act, which gave quarter sessions the power of transportation.

Transportation was sanctioned by law in the reign of Charles II. as a mode of dealing with incorrigible rogues, vagabonds, and sturdy beggars, as a punishment for attending an illegal prayer-meeting after a previous conviction of that offence, and to put down the moss-troopers of Northumberland and Cumberland. The transportation was not at first enforced by any direct action of the government, but those sentenced to it were left to carry out their sentences by removing themselves to the West Indies or elsewhere under penalty of hanging if they failed to do so; but in course of time the process became more systematised, and in 1718 it was found necessary to deliver them over to a contractor who engaged to take them to His Majesty's colonies and plantations in America on condition of his having property and interest in their services for a specified term of years. They were given over to slavery in fact, and the contractor at the termination of the voyage put them up to auction and sold their services to the highest bidder. In 1776 it became no longer possible to send these outcasts to America. Some of the colonies had for years past continually protested against the system; but the war of independence left no alternative but to put an end to it, and the government had to find some other mode of disposing of these criminals, estimated in 1778 at 1000 annually. This difficulty originated the practice of confining prisoners in hulks in the Thames or in the harbours of Portsmouth, Chatham, &c.

This was intended only as a temporary expedient pending the execution of an act devised by Blackstone, Eden (Lord Auckland), and Howard, for the building of penitentiaries in England, which were intended to provide a separate cell for each of the inmates, who were during their imprisonment to be employed on useful labour. Chap. 74 of the 19th Geo. III., after reciting that 'the punishment of felons and other offenders by transportation to His Majesty's Colonies and Plantations in America is attended with many Difficulties,' and enacting that such offenders might be transported elsewhere, and that offenders who might be sentenced to be burned in the hand might instead be fined or whipped, proceeds to say that 'whereas, if many offenders convicted of crimes for which Transportation hath usually been inflicted were ordered to solitary imprisonment accompanied by well-regulated labour and religious instruction, it might be the means under Providence not only of debarring others from the commission of the like crimes, but also of reforming the individuals and inviting them to habits of industry, it shall be lawful to appoint supervisors who shall erect penitentiaries where such persons may be ordered to imprisonment and hard labour.' The first hulks were established in 1778; and this fatal temporary expedient serves to illustrate the sarcasm as to the superior permanency of temporary expedients, for the last hulk was not closed until a fire destroyed it in 1857; and in fact they had a perfect representative in Gibraltar prison, which was constructed on the model of a hulk and developed all the iniquities of these establishments, and which was only closed in 1875 after strenuous opposition to its abolition by the local naval and military authorities. Many years were destined to pass before the permanent penitentiary system became a fact. Great efforts were made to revive the transportation system, and in 1787 a new penal colony was founded in Australia. This with the hulks continued to form the punishment next in gravity to capital execution until the last hulk was closed in 1857 and the last batch of convicts was sent to Western Australia in 1867. It is not necessary to describe the hulk system, if system that can be called in which the inmates were herded together in unchecked association, where 'vice, profaneness, and demoralisation' developed, as might be expected, among persons of the basest character, of whom the worst and the most demoralised were likely soon to take the lead, and reduce all down to their own level. They were described by a committee of the House of Commons in 1832 as 'well fed, well clothed, indulging in riotous enjoyment by night, with moderate labour by day, so that life in them is considered "a pretty jolly life."' But the hulks flourished in full vigour for many years after this date; and in fact no attempt was then made to abolish them, which was the only way to put an end to the evils so forcibly commented on.

The history of the phases through which the control and supervision of the hulks passed is, however, of consequence, as it explains the present administration of the convict prisons and shows what methods failed, and furnishes warnings against adopting certain suggestions that are made from time to time. The hulks were at first, like all other prisons, placed under the management of the local justices, who appointed the overseer, and the overseer appointed the officers; the justices also made the overseer contractor for the maintenance of the prisoners, and as it was obviously his interest as contractor to cut short the supplies of food and clothing for the prisoners, they therefore by this measure contrived that his interest should be diametrically opposed to his duty and to the welfare of the prisoners in his charge. The supervision of the hulks resided in the Court of King's Bench, who steadily neglected their duty, and the inspector provided for by parliament was not appointed. In course of time and by degrees the Home Secretary usurped power over these establishments, and his action was endorsed by parliament in 1815; and their connection with the King's Bench was severed in 1825. An inspector was appointed, and after that a superintendent; and after some other changes the control and administration of the hulks was in 1850 vested in the Board of Directors of Convict Prisons, with whom it now rests. The control of Millbank Prison, Pentonville Prison, and Parkhurst Reformatory was confided to the same body.

Transportation to Australia, which was commenced in 1787, for many years provided for only a small part of the persons subjected to that sentence or whose capital sentences were commuted for transportation. Until 1816 an average of only 474 prisoners was transported annually to Australia, after that the average rose to 3000, and in 1834 amounted to 4920. Transportation in its most flourishing days was characterised by evils which rivalled if they did not sometimes surpass those of the hulks.

Whilst, however, it was in full vigour a step was taken, feebly and slowly indeed, towards the creation of the penitentiaries intended in 1776 to form a permanent substitute for transportation to America. Millbank Prison (q.v.) provided means for the confinement of every prisoner in absolute separation, according to the modern doctrine, and it was intended that his treatment should be on the most advanced reformatory system; but this experiment went no further at this time. In 1838 the existence of the terrible evils which attended the transportation system were formally established by the report of a commission, who said that the system was unequal, without terrors to the criminal class, corrupting to both convict and colonist, and very expensive, and they recommended punishment in penitentiaries instead.

Various improvements in the Millbank system were introduced after this, and finally in 1842 it took the form of passing the convicts through two stages of discipline in certain prisons at home before sending them to complete their sentences in one of the colonies. The first of these stages was passed in a prison in which each inmate was kept in complete separation and brought under influences by which it was hoped to lay the foundation of a reform in his character; the second in a prison in which he was employed in useful public works in regulated association, but confined in a cell by himself by night and at all times when not at work or in chapel. The complete efficiency of this stage was at first marred by a certain number of convicts being placed in association at night, but for some time past the separation has been thoroughly carried out, the only exception being in the cases of prisoners who on medical grounds cannot properly be left alone. The first stage was regulated according to the system adopted, first experimentally, at the new model prison at Pentonville which had been erected in 1842. When the experiment had been proved to be successful, convicts were sent to undergo it at Millbank Prison and at other prisons of which the construction was suitable.

In those early days of the formation of the convict system the confinement of prisoners in complete separation was regarded with great prejudice. This arose from the reports of its results in certain prisons in America, where it had been some years before carried out with the accompaniments of darkness, absolute solitude, absence of any employment, and unwholesome sanitary conditions. It was therefore decided after some experiments, and as a sort of compromise with the prejudices above referred to, that the period of separation should be limited to nine months. Since the date when this decision was arrived at much greater experience has been gained, and the unsoundness of the grounds on which this limitation was founded has been fully demonstrated (see the Report of the Directors of Convict Prisons, 1887–88, and the accompanying report of an inquiry into the subject by the medical inspector). The whole of the prisons in the United Kingdom where sentences up to two years are carried out have gradually been remodelled on the separate system; and laws enacted recently in several foreign countries, after full investigation, permit of the isolation of prisoners under proper conditions for much longer periods. There is, therefore, no reason why the separate stage of a sentence of penal servitude should not endure for a period equal to that which may be passed in that condition under a sentence of imprisonment.

The second or public works stage was carried out in prisons like Portland, which was constructed for the purpose in 1847. Dartmoor Convict Prison was opened in 1850 for the same purpose, Portsmouth Prison in 1852, Chatham in 1856, &c. In these the convicts have been employed in large public works, in farming, &c. The breakwater at Portland, the fortifications of that island, the large extension of the dockyards at Chatham and Portsmouth, the forts which protect Chatham, and various other military and naval works, besides the construction of large prison establishments, attest the advantages of the system, which also enables the prisoners to gain a useful knowledge of trades by which they can obtain employment on their release, and affords a most useful reformatory influence in accustoming the prisoners to habits of industry.

From 1844, and more rapidly after 1852, the number of prisoners actually transported gradually diminished; most of those who received that sentence being discharged on free pardon in Britain after serving from half to two-thirds of their sentences. In the course of time the opposition of the Australian colonies to the continuance of transportation led to the abandonment of the system altogether, and since 1867 no convicts have been sent to those colonies. The punishment of penal servitude was by various acts passed between 1853 and 1864 substituted for transportation. These acts introduced certain notable modifications in regard to sentences of the next degree of gravity to capital punishment. When transportation was in force a prisoner on whom such a sentence was passed might be treated in any of three different ways. Commencing his sentence in the local prison, where he remained until it was thought proper to remove him, he might be transferred either (1) to Australia, from which in all probability he never returned, whatever the length of his sentence; (2) to Gibraltar or Bermuda, from which he was brought back to England when he had served a certain portion of his sentence, and there discharged; or (3) to the hulks, or to the 'public works' prisons substituted for them. If he went to Australia he was in the early days assigned as a servant to some free settler, and so at once ceased to be actually a prisoner; but in later years a system was established under which all prisoners first passed a certain time in a convict establishment and then were discharged conditionally to find employers for themselves. It also became the practice ultimately to retain all prisoners sentenced to transportation for a certain time in a prison in England, conducted on the separate system, from which they might be sent either to the hulks or to the 'public works' convict prisons which replaced them, or to one of the convict establishments abroad. If sent to the hulks or 'public works' prisons they might either remain there till discharged, or be drafted off to one of the convict establishments in the colonies. Whichever of these modes of disposing of the convicts was followed, in none of them did they pass the whole of their sentences in the condition of prisoners, a most important consideration to bear in mind. Those who were sent to Gibraltar or Bermuda, as well as those who did not leave the country at all, but were confined in the hulks, were released on free pardon after they had passed about half of their sentences or a little more. Those who went to Australia were released even sooner, but in their case only on certain conditions, by which a hold over them was maintained.

When the objections of the Australian colonies to the continuance of transportation thither made it necessary to adopt some other plan for disposing of these prisoners, the Penal Servitude Act, 1853, was passed in order to carry out a system founded on that which had been followed with regard to prisoners sentenced to transportation, but which provided for the large majority being retained at home. Under this act a sentence of transportation could not be passed for less than fourteen years, and a sentence of penal servitude was substituted for all lower terms. But the sentences of penal servitude permitted by this act were shorter than the sentences of transportation assigned to various crimes under the old acts, because it was intended that the whole of the sentences of penal servitude should be passed in confinement; the terms were therefore fixed so as to correspond with the periods which had actually been passed in prison by convicts who had been sentenced to transportation but not actually sent out of the country. For seven years' transportation or less was substituted four years' penal servitude; for over seven but not over ten years' transportation was substituted not under four years and not over six years; for over ten but not over fifteen years' transportation was substituted not under six years and not over eight years; for over fifteen years' transportation was substituted not under six years and not over ten years. No difference was made in life sentences. Power was taken in this act to release convicts in the United Kingdom conditionally or on ticket-of-leave, instead of releasing them as formerly on free pardon. It was not intended that this power should be exercised in the case of sentences of penal servitude, as they had already been shortened to the terms actually served in prison under the sentence of transportation, but only in the case of prisoners sentenced to transportation who were not actually sent out of the country. The convict prisons therefore contained inmates serving under different conditions: those under sentence of transportation might have a remission of part of their sentences if well conducted, those under sentences of penal servitude could get none.

Before long it was found that great disadvantage in training and reforming the convicts, and in managing them by appealing to better feelings than those of mere fear, arose from the absence in the case of prisoners sentenced to penal servitude of the hope of gaining a remission of sentence; and the comparison in this respect between these prisoners and others in the prisons who were under sentence of transportation gave rise to great discontent among the prisoners. The consequence was that in 1857 another act was passed which made the length of sentences of penal servitude the same as former sentences of transportation, and thus facilitated the application of the system of remission to sentences of less than fourteen years as well as to those above that term. The House of Commons Committee (1856), on whose report this course was adopted, also recommended the introduction of a shorter term of penal servitude intermediate between the highest term of imprisonment then in ordinary use and the lowest term of transportation or, as it had become, penal servitude. Accordingly the Act of 1857 authorised a sentence of not less than three years' penal servitude for any offence which might be punished by seven years' transportation. In carrying out this act prisoners were allowed to gain remission of a portion of these short sentences as well as all the others.

About this time very warm discussions were being carried on on the subject of penal systems, originating partly no doubt in the great change necessitated by the gradual abolition of transportation; and about 1861–62–63 those who attacked the system which had actually been introduced were able to point to a recent increase of crime as a justification of their attacks on it, more particularly on the ticket-of-leave system. Great point was given to this feeling, and it was much intensified, by an outbreak of crimes of violence in the metropolis (garrotting), of which the number rose to eighty-two during the six months beginning June 1862, having been only sixteen in each six months from the beginning of 1860 to June 1862. The result was that a Royal Commission was appointed to report on the Penal Servitude Acts and the system adopted to carry them out. In consequence of the report of this commission in 1864 another Penal Servitude Act was passed, in which the government did not fully adopt the recommendations of the Royal Commission as above set forth, but they raised the minimum term of penal servitude from three years to five years, except in the case of those who incurred a second sentence of penal servitude, in whose cases seven years was the minimum term permitted. This latter provision was repealed by the Prevention of Crimes Act, 1879.

A review by the light of later experience of the grounds on which the recommendation of the Royal Commission was made cannot but lead to the opinion that the experience of the Act of 1857 had been too short to justify the formation of any sound opinion of its effects. As regards the outbreak of violence in the metropolis, this was without doubt, as subsequent events showed, the work of a small number of men who adopted that form of robbery (a very common feature in the history of crime), and when these men were arrested and received exemplary sentences the crime ceased altogether. The remarkable feature of the figures for 1856–63 was not that they were especially high in 1862–63, but rather the extraordinarily low level to which they had suddenly fallen in 1860, and from which they rebounded.

The directors of convict prisons in their recent annual reports had more than once referred to the anomaly peculiar to the United Kingdom by which no sentence was possible between two years—which was practically the limit of a sentence of imprisonment—and five years, which is the shortest legal sentence of penal servitude, and had expressed their opinion that it was desirable to re-introduce the power of sentencing to penal servitude for terms as low as three years, which existed from 1857 until the Act of 1864, and was abolished by that act in consequence of the report of a Royal Commission, founded, as the directors showed, on erroneous deductions from imperfect data. In 1891 an act was passed to allow of the sentence of three years being imposed in future. By the Act of 1857 power was given to the Secretary of State to release convicts conditionally before the expiration of their sentences. This system, known as the ticket-of-leave system, was at the time strenuously attacked, under the erroneous supposition that it first introduced a system of releasing prisoners before they had served their full sentences; but this, as has been already stated, they never actually had done. On the contrary, under the ticket-of-leave system they were in point of fact detained to serve in prison a larger part of their sentences than had been customary before. Moreover, under the new system, instead of being absolutely pardoned when released, they were subject to revocation of their licenses if they did not conduct themselves well, by which their abstention from crime was materially guaranteed.

The principle on which the system of punishment is founded is that those who are subject to it should suffer discipline of such degree of severity as may act as a deterrent to them and to others who might be tempted to become criminals, but that they should at the same time be brought under the reformatory influences of religious teaching, good example, and such training in self-control as can be given by offering certain advantages to industry and good conduct, as well as inflicting suitable punishment for the reverse. Every effort is made to prevent that mutual contamination which was such a serious blot on prisons of the old type, and those prisoners who have not been previously convicted and are on inquiry found clearly to be only beginners in crime are formed into a separate body, who, from the badge by which they are distinguished, are called the Star class, and who are kept strictly apart from all others. The mode of carrying out the sentence of penal servitude is as follows: Every convict who receives this sentence is placed for the first nine months in a prison in which his whole time is passed in a separate cell, except, of course, the time devoted to public worship, necessary exercise, &c.; but at all times he is so far as possible isolated from his fellows. The remainder of his time in prison is passed in one of the large establishments in which useful work is carried on in a regulated association, and he is able by industry combined with good conduct to earn a remission of nearly one-fourth of his sentence, besides gaining certain privileges in regard to letter-writing, visits from his friends, and such like indulgences, and a gratuity to be paid to him on his discharge. The practice which existed until 1864 of encouraging industry and good conduct by certain increases in the diet was discontinued from that date, as it was held that to allow a prisoner more or better diet than absolutely necessary led to undesirable contrasts with poor but honest folk who could afford no such indulgences; and it will easily be seen that this principle, which is of course applicable to other things besides diet, makes it very difficult to devise a suitable system of rewards for prisoners while retaining the necessary penal or restrictive conditions of prison life.

At the head of every convict prison is the governor, whose duty it is to administer and supervise all branches of the prison. He is assisted by a staff who have to control and regulate the discipline and employment of the prisoners, and a staff of clerks, who keep a record of all matters relating to the prisoners and their sentences, their conduct, &c.; and also by a steward or storekeeper, with a staff of clerks, who has the charge of stores and accounts. The chaplain conducts divine service, visits and advises the prisoners. He has under him schoolmasters, who conduct their education. A Roman Catholic priest is appointed to some prisons, and in them are collected all the prisoners of that communion. The medical officer has charge of matters relating to the health of the prisoners. The hospital is constructed on the most modern principles, and provides accommodation for some patients in separation and for the association of those for whom the medical officer thinks it necessary. To control and supervise these convict prisons a body called the Directors of Convict Prisons was created for England and Wales by statute in 1850, whose powers unite those of visiting justices of ordinary prisons with those of various bodies which had been created by parliament from time to time to govern the various institutions thenceforward placed under their management—viz. Millbank Penitentiary, Pentonville Model Prison, Parkhurst Reformatory, the hulks, and the convict prisons at Portland, &c., by which the hulks were superseded. A similar body was created for Ireland in 1854, and there a system founded on and closely resembling that which had been developed in England was created; but until 1888 (when a convict prison was established at Peterhead in connection with the convict labour at the harbour-works) all male convicts sentenced in Scotland served the greater part of their sentences in convict prisons in England. The convict prisons are visited frequently by one or more of the directors, whose duty it is to see that the governor and the other officers of the prison are doing their duty, to hear and determine reports of misconduct of prisoners of such gravity that the governor cannot deal with them under the powers vested in him, and to hear and determine any reports against the prison officers. To directors also the prisoners can complain or appeal if they consider they are not fairly treated, or bring forward any requests they have to make, but which the governor has no power to comply with. A body of gentlemen from among the magistrates is also appointed by the Secretary of State to act as independent visitors, and so form a further guarantee against abuses in the prison, and a channel by which any grievances felt by any prisoner can be brought forward.

Each day marks are awarded to every prisoner according to his industry, and these marks measure daily his progress towards attaining that remission of about a quarter of his sentence which he is allowed to earn, as well as towards his promotion to a higher class, in which he may enjoy certain privileges before referred to. The punishments inflicted on those prisoners who misconduct themselves consist of close confinement, sometimes in a semi-darkened cell, reduction of diet, and forfeiture of the privileges already earned, such as gratuity to be paid on discharge, periodical letters, visits from friends, &c., and forfeiture of remission, flogging with a 'cat' or a birch, which is awarded only in the gravest cases, such as assaults on warders, &c.

The cessation of transportation in 1867, and the consequent accumulation in the United Kingdom of all prisoners discharged on expiration of their sentences or on conditional license, instead of in a distant colony, might reasonably have been expected to increase the amount of serious crime, by the return of many of them to their former habits of life. As a matter of fact no such result has followed. On the contrary, the various influences which have been at work to check and repress crime, among which a well-regulated prison system may claim its due share, have enormously reduced the number of convicts under sentence.

About the beginning of the reign of Queen Victoria, when the population of England and Wales was about fifteen millions, there were 43,000 convicts in New South Wales and Van Diemen's Land, besides others in the colonial penal settlements, in the hulks at home about 3000 or 4000, several hundreds at Millbank, about 900 each at Bermuda and Gibraltar, or about 50,000 in all. By 1869 this large number was represented by 11,660 prisoners under sentence of penal servitude, of whom 9900 were males and 1760 females, and this number had been further reduced on March 31, 1891, to 4978—viz. 4654 males and 324 females. In Ireland there were 922 males and 403 females in 1869, and 434 males and 26 females in 1891.

The number of persons who have received sentences of transportation or penal servitude has diminished enormously. In the year 1837, 3785 persons were sentenced to transportation, and 4068 actually transported; in 1842, 4481 were sentenced and 4166 transported. In 1869 the number of persons in Great Britain whose crimes were so grave as to justify their being sentenced to penal servitude was 2219; this number has continuously fallen, till in 1889 it was only 1039, and in 1890 only 828; yet during the interval the population of Great Britain has risen from 25,529,184 to (1891) 37,740,283. In Ireland, with a population of about 5,500,000, in 1869 there were 191 sentences of penal servitude, and in 1889, with a population of about 4,700,000, there were 83 such sentences. Of the present convict prison population in England and Wales, 515 have been placed on the Star class. These are found practically to be of an entirely different stamp from the habitual prisoners. They are more easy to manage, more willing and industrious, and experience shows that but few of them come back to a convict prison on reconviction after their discharge.

As regards the health of the prisoners in convict prisons, the statistics show that the favourable conditions under which they are placed on account of the great attention to sanitary requirements, the regularity of their lives, and the constant medical care taken of them result in a low mortality of 10·5 per 1000 in an average of years; and this result is brought about in spite of a large proportion of the inmates of prisons being persons of low type, who have led dissipated and irregular lives. The conduct of the prisoners is, as a rule, very good, the result of a steady system of control under which exact discipline is enforced, and, while good conduct and industry are encouraged, misconduct is surely punished. The greater number of prisoners conform to the regulations so readily that either they do not incur any report or punishment of any kind, or at most commit some trifling breach of regulations; and in fact the great bulk of the prison offences are committed by a few habitual offenders against the rules.

The prisons in which sentences of imprisonment are carried out have a separate history from that of those which have been described. There were so far back as two centuries ago occasional protests against the abuses and cruelties practised in prisons, and a notable parliamentary inquiry into the misconduct of a gaoler named Bembridge was held in 1730; but until the last quarter of the 18th century the idea that prisoners had any claim for humane treatment had hardly made any way beyond the circle of a few philanthropic reformers; any attempt to use the period of imprisonment to improve the nature of the criminal was almost unknown. The way to better things was undoubtedly opened by Howard's visits of prison inspection about 1776, and in following years, and by his reports on the condition of the prisons he visited, followed as they were by proposals for reform and improvements which were enjoined and encouraged by acts of parliament. Solitary confinement with labour and instruction was approved by statute in 1774, and in 1784 general regulations were formed for the treatment of prisoners, among which a proper classification of prisoners according to the gravity of their offences was enjoined. In 1791 justices were enjoined to visit and inspect these prisons three times in each quarter, and to report on them to quarter sessions. In 1814 the appointment of chaplains was made compulsory. But compliance with these statutory reforms did not immediately follow, for indeed it was a long time before they passed into the stage of practical fact. In 1818 there still remained 518 prisons in the United Kingdom, to which more than 100,000 prisoners were committed in the year, and only twenty-three of these had been subdivided so as to enable the above classification to be carried out. In fifty-nine of them the males were not divided from the females (and in fact there was no statutory injunction to this effect until 5 Geo. IV. chaps. 65 and 85). In 445 prisons there was no employment of any kind for the prisoners; in 100 of the gaols overcrowding was excessive; no less than 13,057 prisoners were crowded into the space which, according even to the moderate demands of those days, was fit for only 8545. The prisons were in many cases so ill-regulated that they became scenes of abandoned wickedness. In 1835 and 1839 most important legislative steps were taken. Further rules of administration were laid down in the acts passed in these years, and inspectors of prisons were appointed to see that they were carried out. By the latter act also the vital importance of a suitable design and construction for gaols as an aid to good prison management was recognised by the creation of the office of Surveyor-general of Prisons to advise in these matters.

Howard had advocated the complete separation of prisoners by placing each of them in a cell alone, and this was provided for in the Penitentiary Act, 1778. The practice was adopted in a few county prisons, and it was again enjoined together with daily divine service and the absolute separation of males from females in 5 Geo. IV. chaps. 65 and 85, but the expense of building these cells fortified a prejudice against the 'solitary' system, which was largely increased by the too thorough mode in which it had been carried out in America. A commission which was sent in 1834 to America to inquire into the matter, however, reported entirely in favour of the principle of separation if judiciously carried out. Their recommendation was followed in the construction of Pentonville Model Prison in 1842, and the success of the system led to an extensive reconstruction of county prisons on the same plan, finally resulting in that system being adopted to the exclusion of any other.

Although some progress in other respects followed the Acts of 1835 and 1839, there was still so much imperfection and such want of uniformity in rules, diet, labour, &c., that further reforms and stronger pressure on the local authorities in whom the management of the prisons was vested was urgently called for. These were provided by the Prison Act, 1865, which enacted a code of rules for all prisons, and required that each male prisoner should be provided with a separate cell.

In 1878 a further and most important step was taken by the transfer of the control and pecuniary charge of all the local prisons to the government, represented in each member of the United Kingdom by a body of commissioners appointed by royal warrant. This measure was justified by the impossibility of ensuring due uniformity in the treatment of prisoners in all gaols so long as they remained in the hands of so many independent local authorities, by the great difficulties, amounting to impossibility, in getting some of the local authorities to provide proper prison buildings, and by the unnecessary costliness which resulted from the existence of so many small and independent prisons; for there were still no less than 113 of these establishments in England and Wales, 57 in Scotland, and 38 (besides 95 bridewells) in Ireland. The consolidation which has resulted from them has made a very large saving in the cost of prisons. There are now only 58 local prisons in England and Wales, 15 in Scotland, and 22 in Ireland. In Scotland the geographical conditions have led to the adoption of a system of licensed cells under charge of the police, where prisoners under sentence not exceeding fourteen days may be retained. These are allowed in twenty-eight places to avoid the necessity of sending such prisoners long distances to serve a short sentence. The population of these little prisons is for the most part from one to two. In the years 1876–77, the last in which the prisons were under the local authorities, their cost in England, exclusive of new buildings and interest on loans, &c., was £495,068; in 1889–90 it was £320,381; and it has since fallen still further. The diminution would have been larger but that in various ways the service has been improved. Roman Catholic priests are now generally appointed and paid for their services; the clerical work formerly largely done by prisoners is performed by paid clerks; attention is more generally paid to the schooling, and more money expended on schoolmasters. These acts have also ensured substantial uniformity of treatment throughout the United Kingdom, because all rules are now made by the Secretary of State or Lord-lieutenant of Ireland.

Prisoners before trial form a separate class in the prisons, and are now subjected to no more inconvenience than is necessary to ensure security and due order and discipline in the prison. They may wear their own clothes and supply their own diet if they choose, have full opportunities of receiving visits from their friends and corresponding with them, and are not obliged to perform any unaccustomed or menial labour for themselves if they will pay for assistance.

Debtors also are kept apart from other prisoners. The rules made in the Prisons Act, 1865, with regard to this class of prisoner were no doubt framed in view of the practice of imprisonment for debt which had not then been abolished by law. But the act subsequently passed in 1869 made it possible to imprison only those debtors who refuse to pay when they have the means, and as this is a species of fraud they hardly deserve the consideration which, under the rules, is accorded to them. They are under no obligation to work, are allowed to lounge about in association, may provide their own clothing, bedding, and food, which may include wine and beer, and are allowed more frequent visits and letters from their friends than criminal prisoners.

The Prisons Act, 1865, also allowed the creation of a class of misdemeanants of the first division, who might be put in that class by the sentencing court; and the special sympathy accorded to sedition and seditious libel led to persons found guilty of these crimes being, by the law of 1877, secured in the privileges of this class. They are allowed a specially furnished room, and may provide their own clothing, bedding, and food, the services of an assistant to clean their rooms, and, on payment, full use of books, newspapers, &c., and certain privileges as to additional letters and visits at the discretion of the visiting committee. They are not considered criminal prisoners. Doubts have sometimes been expressed whether the power of making a distinction of this sort in the punishment awarded to different offenders has been wisely exercised. It would recommend itself to most people that such an offender as a clergyman, who is imprisoned for not conforming to the rubric, should suffer little or no punishment beyond the deprivation of liberty, but a fraudulent bankrupt, or one who committed a criminal assault, or who incited others to crime and violence, is not necessarily a proper object for similar consideration on the ground of his social position being higher than that of an ordinary typical criminal.

To pass from these special classes to the ordinary prisoners, the general rule is that after sentence every prisoner is permitted to raise himself progressively by industry, combined with good conduct, through four stages, in each of which he gains some amelioration of his treatment. Commencing with penal or first-class hard labour—with sleeping on a wooden bed on which there is no mattress, and with great restrictions as to books, letters, and visits—he gradually gains an improvement in each of these matters, and in each stage accumulates a small sum, larger in the higher stages than in the lower, which is either given him or laid out for his benefit on his discharge. If in spite of these encouragements he still fails to conduct himself in conformity with the regulations, he may be subjected to punishment by deprivation of diet, confinement in a cell which is nearly dark, and in case of violence corporal punishment with a birch or a cat-of-nine-tails. The necessity for these punishments has, however, very largely diminished—a result of the system of progressive stages; for if ill-conducted or idle his progress into the higher stages is delayed, or he may be degraded into a lower stage after attaining to a higher. Comparing the number of dietary punishments in 1877 (the last year before the prisons were brought under the government) with the number in 1890, it is found that while the prison population has diminished by one-third, this form of punishment is less by one-half. Certain powers for the infliction of punishment reside with the governor, but corporal punishment or heavier sentences than he is empowered to award can only be inflicted by order of the magistrates who form the visiting committee of each prison, or by a commissioner.

The visiting committee are appointed every year by quarter sessions, about twelve to each prison. Their duty is to visit the prison periodically, to hear any complaints of the prisoners, to deal with reports made of the misconduct of any prisoners, and to fulfil certain other functions more particularly laid down in the rules made by the Secretary of State; but they have no authority over the officers. In fact, whereas up till 1878 the local authorities managed the prison, and the government inspected it, the position is now reversed, the government manages and the local justices inspect. A cardinal principle of the prison system is that every prisoner under sentence should be fully employed, but the description of employment varies in the different stages of the sentence. On first reception, and for a month at least, hard penal labour is exacted from everybody sentenced to hard labour, according to their strength and capacity. The tread-wheel or crank is the typical form of this ‘first-class hard labour,’ as it is called; stone-breaking, oakum-picking, and some other forms of labour are enforced in the case of prisoners who are unfit for the tread-wheel. After this industrial labour is allowed, according to the capabilities of the prisoner, and forms a relief from the dull monotony of the first-class hard labour. A large proportion of the prisoners supply the wants of the prison population by weaving, tailoring, &c., and the list of trades followed or articles made in the prisons enumerated in the annual reports reaches to about 150; but, as may be imagined, there is a large number of prisoners who know of no industry which can be followed in a prison cell, and great difficulty is found in providing them with work, for they do not generally stop long enough to learn a trade to any good purpose. Mat-making and matting-weaving, which was, it is believed, introduced many years ago as a prison industry, is a trade which is very easily learned; but the same reason which recommends it for prison purposes makes it appropriate for many charitable institutions, such as blind schools, &c., and enables free persons who are incapacitated for other work to find employment at it. These latter are naturally anxious to diminish the competition of prison labour in their trade, though it forms now an exceedingly small part of that which they have to contend with, for the product of machinery and foreign and colonial labour, besides the introduction of rival materials to serve the same object, far exceeds the output from the labour of prisoners in this country. The number of prisoners employed in this industry has, however, by the efforts of the prison authorities, been diminished from nearly 3200 to 747, whose work is, for the reasons given above and because of the necessary conditions of prison labour, probably not more than that of one-fourth or one-fifth the same number of free labourers.

Every prison has its medical officer, and a well-regulated and well-constructed infirmary. The death-rate has decreased from 10·8 per 1000 to 8·2 per 1000 in prisons in England and Wales. The absence of all diseases due to insanitary conditions is the main reason of the healthy condition of the prisoners; and no doubt the strict temperance—for no alcoholic liquors form part of the dietary—and the regular life contribute to this result.

In order that the standard of efficiency may be maintained in all the prisons, and that opportunities may be given to both officers and prisoners to communicate any complaints they may have to make, inspectors are appointed to visit each prison at least monthly, and to report to the commissioners on any point which may require their intervention. From the time when the prisons were taken over by the government in 1878 there has been a very large and almost uninterrupted diminution in the number of prisoners, who form the prison population. In June 1878 there were 21,030 prisoners, and the average number during that year was 19,818; in the prisons in England and Wales in June 1890 there were 14,122, and the average number of prisoners during the year 1890 was 13,495. It would be absurd to claim this result as all due to any change of prison management, but there can be no doubt that this has had its share in the result, just as in former years bad prison management was a potent cause of the increase of crime.

The indication of the diminution of crime which is afforded by these prison statistics is fully corroborated by those which are derived from other sources. It is found that during the fifteen years 1875–90, while the population has increased by about 25 per cent., the number of convictions for what is in ordinary language considered a crime—i.e. offences involving dishonesty, violence, &c.—instead of increasing in proportion with the population, has progressively diminished by about 12½ per cent.; there were 238,680 convictions, summary and on indictment, for such crimes in 1873–74, and only 203,808 in 1887–88. Convictions for drunkenness are also much fewer —185,730 in 1873–74 and 166,366 in 1887–88; and if it were not for the increase in the number of commitments for offences against the education acts—for breach of bylaws and the like, which are rather offences against social discipline than crimes—the total number of commitments would have very largely diminished. The police returns show too that the number of the criminal classes has decreased by about 22 per cent., and the number of disorderly houses has shown a corresponding diminution.

The design and construction of a prison is, as may be supposed, a feature of the very first importance. Security is of course one of the essentials, but there are others almost as important. In looking over old prisons one cannot but be struck with the massiveness of construction of many of them —the huge bars and bolts, the large clumsy locks, the ponderous grated doors, and, sometimes chained to the wall, the heavy fetters with which the prisoners were loaded. In the old prison at York, built under the inspiration of the Rev. Sydney Smith, part of which still exists, security is provided for by making the walls of the cells of a rough stone, some 6 feet square and 2 or 3 feet thick, and grated windows of massive iron exclude the light. By such means as this it was intended to ensure the safe custody of the prisoners without constant personal watchfulness and supervision by the prison staff. All this is changed in the prisons of more recent date, but the security is even greater than before, because in a prison of modern construction the supervision can be more thorough. In a prison of modern construction the site is surrounded by a wall about 18 feet high, outside of which, unless a road or street runs along the boundary, a margin of about 20 feet is left unbuilt on as a precaution against the facilities which buildings against a wall may give for scaling or breaking through it.

The prison is entered through two pairs of double gates, having a space between them sufficient for a wagon to stand in, so that the solid outer gate may be shut before the grated inner gate formed of iron bars is opened. At the side of the gate is the porter's lodge, and perhaps certain waiting accommodation and rooms in which the prisoners may, under supervision, receive visits from their friends. These gates give admission to the outer court of the prison. Opposite the gate is probably the entrance of the main building; the offices of the governor, chaplain, &c. are placed here. After passing these the buildings occupied by prisoners are arrived at.

Every prisoner occupies a cell measuring 13 feet by 7 feet, and containing 800 cubic feet of air, with a grated window, part of which is made to open; in the wall are inlets from a channel for fresh air, warmed when necessary by hot water pipes, and outlets for foul air drawn out through flues which communicate with a furnace and tall chimney in the roof. On shelves in the wall are the books and the small utensils provided for the prisoner's use. The furniture consists of a stool to sit on, a fixed table, a wooden bed board and a coir pillow, sheets, blankets, and rugs, and a mattress for the prisoners who have passed the first stage. In some cells a crank, or a loom, or such other fixed means of employment, is provided, and a bell-pull, by means of which a warder's attention can be called when necessary, and an eye-hole in the door through which the warder can inspect the prisoner.

Rows of cells such as this are arranged alongside each other, and on opposite sides of a corridor about 16 feet wide, which is open to the roof; and there may be above the ground-floor two or three tiers of cells, access to which is given by iron stairs and a gallery off which the cells open. There are possibly some cells on a lower level, where usually the heating apparatus and sometimes the cook-house, bakehouse, workshops, and stores are situated; but in the most recent constructions it is thought better to place these latter in separate buildings outside the block of cells. A hospital for sick patients is provided, and a separate block of cells in which prisoners are placed on first reception, and where they are cleansed and examined by the doctor, and their private property and clothes taken from them, the latter being replaced by a prison suit if the prisoner is convicted, or if before conviction he prefers not to wear his own clothes. There is a tread-wheel house in many prisons, and often a mill, which is worked by the tread-wheel, and which supplies flour or water for the prisoners' use. The department for females is put distant from that for males, and no male officer is allowed into the female division unless he is accompanied by a female warder or matron. Storerooms are provided where it may be most convenient, for the provisions, clothing, materials for manufacture, &c. The chapel is a prominent feature in the prison, for prayers are read before all the prisoners who can attend every morning, and on Sunday there are morning and evening services. In prisons built on this model towards the middle of the century the chapel was divided into little boxes, so as to isolate prisoners completely from each other. This construction has for some time been abandoned; it failed in its object, and in fact helped to prevent detection of an offender, while it was thought to diminish the influence of the minister and the effect of the service.

In connection with the offices is a library of selected books for issue to the prisoners, which is under the control of the chaplain. In some part of the cell block is a bath-house, where prisoners are required to wash themselves periodically; and in connection with the female side of the prison is a laundry for the washing of the prisoners' clothing, sheets, &c., and in which also sometimes washing is done for people outside on payment. There are also workshops in which carpenters, smiths, &c. can carry on their trades for the benefit of the prison. Large airy yards surround the blocks in which the prisoners live. In these they take their daily exercise under supervision of warders, pacing round and round a ring, separated by such an interval from each other as may prevent oral communication. Part of the space inside the walls is often cultivated for vegetables for consumption by the prisoners.

Since 1869 a new feature has been developed in controlling the criminal class. By an act passed in that year and revised in 1871, the latter being called the Prevention of Crimes Act, any person convicted on indictment a second time may be subjected to 'supervision' by the police for seven years after the expiration of his sentence. During this period he is required to report himself to the police once a month, and to keep them informed of his residence; he is also required to prove his innocence if certain suspicious circumstances are brought against him. If he fails to comply with the obligation to report himself he may be imprisoned for a year with hard labour. The convict released conditionally before the termination of his sentence is subject to similar obligations, and if there are reasonable grounds for believing that he is leading a criminal life, or showing himself unworthy of the freedom conditionally granted him, or if he should be actually convicted of crime, he may be returned to prison to undergo the whole of that part of his sentence which was remitted.

To aid in the work of detecting criminals an Habitual Criminal Register has been established, in which the names, descriptions, photographs, and criminal career of all persons who are proved to have been twice convicted on indictment are recorded. This register is printed and circulated to all police forces and prisons, and thus these authorities have at their command means of establishing the identification of any prisoner who comes into their custody, who is suspected to be an habitual criminal, and can ascertain what prison should be applied to for further evidence on the subject. In order to supply means of ascertaining whether any person in custody is on the register of habitual criminals, in cases where no special identity is suggested, a Distinction Marks Register has been established, in which all the peculiar marks, or other remarkable personal peculiarities of those who have been registered, are classified and recorded.

It will readily be understood that it would not accord with the modern theory of punishment combined with reformation to turn any prisoner adrift at the prison gate on completing his sentence, to seek for means of earning an honest livelihood with all the disadvantages which his connection and imprisonment obviously entail upon him. The first statutory recognition that it was right and expedient to make some provision for prisoners on discharge was in 32 Geo. III. chap. 45, by which justices might convey any such person by pass back to his parish; and at the opening of the chapel of the New House of Correction for Middlesex, the chaplain, the Rev. Samuel Glasse, pointed out that, the discipline and training of the prison having it might be hoped supplanted the prisoners' habits of idleness and profligacy by habits of industry, the magistrates might be able to speak of them according to their merit or demerit to the parish officers. He observed, however, that this would not provide for the cases of Irish delinquents who had no settlement in the United Kingdom, but who were not few in number, as indeed they are not at this present day, when they furnish to British gaols an entirely disproportionate number of inmates. He thus showed the necessity for doing what in more recent times has been undertaken by societies for the aid of discharged prisoners. In 1823 the Gaol Act enabled a moderate sum of money to be paid for the benefit of discharged prisoners out of the rates, or from public benefactions belonging to the gaol, in order that they might resort to any place of employment or honest occupation. In 1862 societies for the aid of discharged prisoners received statutory recognition, and the money awarded by the justices for the assistance of any prisoner, to an amount not exceeding £2 per head, might be handed over to these societies for their benefit. This act was obviously a recognition of societies which already existed, but it afforded a great stimulus to the formation of others. The earliest of the existing societies, according to the list published by the Reformatory and Refuge Union, was the Hampshire Society, which dates from 1802; Dalston Female Refuge dates from 1805; the Sheriffs' Fund, which deals with City cases, from 1807. When the prisons were handed over to the government in 1878 there were about 30 discharged prisoners' aid societies acting in connection with the prisons, then 113 in number, and still numbering 66, even after the reduction which took place in the first two years.

The transfer of all prisons to the government in 1878 had a most important effect in adding to the number of those societies. The Prisons Act had been passed partly to ensure uniformity of treatment of prisoners in all localities, and those who advocated the claims of the discharged prisoner were not slow to perceive that the same principle might be made to apply to the system of helping them to obtain honest employment on completion of their sentence; and, further, that the difficulty they had met with in inducing many of the local authorities to provide funds, or in raising private subscriptions, might be overcome, now that the government was responsible, because they were virtually bound to continue the grants which had been made by many local authorities, and could not refuse to make similar grants in places where the local authorities had hitherto failed to do so. In connection with this the Commissioners of Prisons took action with a view to securing the proper appropriation to this purpose of many charities and benefactions devoted in former times to the assistance of prisoners, but the exact objects of which were no longer applicable to existing circumstances. These funds were more or less within the cognisance of the Charity Commissioners, and some of the largest of them had already been diverted to objects quite disconnected from prisons or prisoners; but by means of an act passed in 1882 steps were taken by which most of these funds have been appropriated for the benefit of discharged prisoners through the agency of the above-named societies. The government makes to each society a grant each year proportioned to the number of prisoners to be relieved, in supplement of any of their charitable funds; but, as it is necessary to the object of the society and of its work that local aid and local interest should be excited in the work, it is made a condition that private subscriptions should be given at least equal in amount to the sum the government are prepared to allow. Besides the grant of money handed over directly to the society, the gratuity earned by a prisoner during his sentence may be paid him through the agency of the society, who thus have command over all the funds available for setting the prisoner out again in a fresh career, and can take care that it is not wasted in the indulgence to which a man or woman is naturally tempted on first release from the restraint and privation of prison life. The result of this encouragement has been that there are now seventy-three societies in active operation in England, besides many homes and refuges chiefly devoted to helping women. There are nine discharged prisoners' aid societies in Scotland, and only three in Ireland. It is difficult, of course, to exhibit by any precise statement the results attained by these societies, but there can be no sort of doubt that they do admirable work. It is not, however, by any means those who spend most money who produce the best results. Money, no doubt, is an absolute necessity, but what is even more important is personal care and interest in the person who has fallen into crime, perhaps from weakness of character, from bad bringing up, from misfortune, from evil connections, or whatever the cause may be, and who, after the experience of prison life and the teaching he has received, may desire to enter upon a new career.

United States.—In the early part of the 19th century the most advanced examples of prison discipline and construction were to be found in the United States, and although in the second half of the century this prominent position has not been maintained, the importance of the improvements initiated in America cannot be forgotten. Following closely on Howard's report, the 'Philadelphia Society for Assisting Distressed Prisoners' was founded in 1776—the first of the kind in the world; and, though dissolved during the war, was reorganised in 1787, and is still at work. Large measures of reform were quickly secured: by 1790 the principle of separation was recognised, and in 1794 all convicts were separated and secluded; in the latter year, also, capital punishment was abolished in Pennsylvania for all crimes but murder in the first degree. It thus became necessary to devise some substitute for capital punishment. At the Eastern Penitentiary at Philadelphia, opened in 1829, the so-called 'Pennsylvania System' of permanent seclusion of convicts was carried out; the evil effects arising from the rigorous application of this principle have been already referred to in this article, and even at Philadelphia the system is not now strictly enforced, whilst in all the other American prisons what is known as the 'Auburn System'—silent labour in association by day, and separation by night—has been adopted. In the southern states prisoners are leased out to the highest bidders for the term of their sentences; but this system, which condemns the convicts to a slavery that is not modified even by considerations arising from personal ownership, is gradually being abandoned. The first place of detention for juvenile delinquents was opened at New York in 1825; the first reformatories on the cottage or family system were established in Ohio—for boys at Lancaster in 1858, for girls at Delaware in 1878.

In 1877 the Elmira (New York) Reformatory was opened, at which a now famous system has been adopted for the treatment of first offenders under thirty years of age; the principal features are indeterminate sentences, the classification of prisoners into three classes under the marks system, and discharge upon probationary parole, under supervision. The prisoners enjoy a luxurious dietary, and many indulgences are granted to induce them to work, so that the penal element of a sentence of imprisonment is entirely absent.

A grave defect alleged by American critics is that in the county gaols and other places of detention for those awaiting trial all such prisoners are compelled to associate in a common hall, with all the evils which follow as a necessary result. It is said also that politics to a large extent determine the selection of prison officials, many of whom are appointed simply for services rendered to their party; and that the interference of labour organisations has had a considerable effect in the direction of putting a stop to contract labour—in New York, to labour of any kind—in the prisons. It may be added that crime has increased in the United States in a ratio far in advance of the growth of population; in 1850 the prisoners represented 1 in 3442 of the population; in 1880 they were 1 in 855. In a country where so many earnest and capable penologists are at work, however, there is every reason to hope for an ultimate return to better methods.

See the articles BECCARIA, BENTHAM, CAPITAL PUNISHMENT, CRIMINAL LAW, EXECUTION, FRY, HOWARD, POLICE, REFORMATORIES, ROMILLY; those on crimes such as ARSON, ASSAULT, BURGLARY, FORGERY, MURDER, RAPE, THEFT, &c.; also works by such as Pike, *History of Crime in England* (1873–76); Farrer, *Crimes and Punishments* (1880); Perry, *Prison Labour* (Albany, 1880); Wines, *The State of Prisons in the Civilised World* (Cambridge, U.S., 1880); Havelock Ellis, *The Criminal* (1889); *Punishment and the Prevention of Crime*, by the present author (1885); Major A. Griffiths, *Secrets of the Prison House* (1893); the *Bulletin de la Société Générale des Prisons*; and German works by Holtzendorff and Jägemann (1886), Genzmer (1881), Aschrott, Prins, &c.

Prisrend, a town of Albania, 72 miles E. by N. of Scutari, is one of the richest and most industrious towns in Turkey. Pop. 39,000.

Pristina, a town of European Turkey, 59 miles by rail N. of Üsküb. Pop. 8000.

Pristis. See SAWFISH.

Privateer, a ship owned by a private individual, which, under government permission, expressed by a Letter of Marque (q.v.), makes war upon the shipping of a hostile power. To make war upon an enemy without this commission, or upon the shipping of a nation not specified in it, is piracy. Privateering was abolished by mutual agreement among European nations, except Spain, by the Declaration of Paris in 1856; but the United States of America refused to sign the treaty, for reasons which are given in the article Paris (q.v.). It is doubtful, however, how far that abolition would stand in a general war, for privateering is the natural resource of a nation whose regular navy is too weak to make head against the maritime power of the enemy, especially when the latter offers the temptation of a wealthy commerce. It was usual for the country on whose behalf the privateers carried on war to take security for their duty respecting the rights of neutrals and allies, and their observing generally the law of nations. While not considered Pirates (q.v.) by the law of nations, they were looked upon as little better during the great wars at the end of the 18th and the beginning of the 19th century, and as a rule received but scant mercy at the hands of the regular services. In the wars of 1793–1814 many English privateers were afloat. But in the same period no less than 10,871 English ships, with over £100,000,000, were taken by French 'corsairs;' the Breton privateer Surcouf took, in two months of 1807, prizes worth £291,250. At the American Revolution the new republic fully realised the advantage of its position in preying on the mercantile marine of Great Britain; and in the war of 1812 British commerce suffered severely at the hands of American privateers, of which it was computed that some 250 were afloat. During the American civil war the Confederate cruisers were at first regarded in the north as mere pirates; and the Alabama Claims originated in the charge against Britain of allowing the departure of privateers from British ports. In 1870 Prussia made a decree in favour of creating a 'volunteer navy.' See ENEMY, NEUTRALITY, ALABAMA, BUCCANEERS, CORSAIR, PIRACY, PRIZE; and, for the French privateers, Norman, *The Corsairs of France* (1887).

Privet (*Ligustrum*), a genus of plants of the natural order Oleaceæ, containing a number of species of shrubs and small trees with opposite leaves, which are simple and entire at the margin; the flowers small, white, and in terminal panicles; the calyx slightly 4-toothed; the corolla funnel-shaped and 4-cleft; the stamens two, projecting beyond the tube of the corolla; the berries 2-celled. Common Privet (*L. vulgare*) is a shrub growing in bushy places and about the borders of woods in the middle and south of Europe, and in some parts of Britain, now also naturalised in some parts of North America. It has half-evergreen, smooth, lanceolate leaves; and berries about the size of peas, black, rarely white, yellow, or green. The flowers have a strong and sweetish smell; the leaves are mildly astringent, and were formerly used in medicine. The berries, which hang on the shrub during winter, have a disagreeable taste, but serve as food for many kinds of birds; they are used for dyeing red, and, with various additions, green, blue, and black. A rose-coloured pigment obtained from them is used for colouring maps. The wood is hard, and is used by turners, and by shoemakers for making wooden pegs. Privet, although not spiny, is much used for hedges, often mixed with some spiny shrub, or with beech. It bears clipping well, and grows well in the smoke of towns, also under the shade of trees. A number of species of privet are natives of different parts of the East, and some of them are now to be seen in shrubberies in Britain. Most kinds of privet grow readily from cuttings, but some of the more ornamental kinds are increased by grafting them upon the common or other more vigorous species. It has now been proved that the shrub the white wax insect of China deposits the wax on is *L. lucidum*. See WAX INSECT.

Privilege. For the privileges of counsel, see BARRISTER; for the privileges of parliament, see PARLIAMENT; for those of peers and ambassadors, see NOBILITY, AMBASSADOR; for privileged communications, see CONFIDENTIALITY, LIBEL; for the sacredness of the confessional, see CONFIDENTIALITY; see also ARREST, DEBT, SANCTUARY, SOVEREIGN.

Privy-council. Wherever a feudal system of government has prevailed it has been customary for the sovereign to summon, from time to time, a council of his barons or nobles to advise him in matters of state. This practice was adopted by feudal monarchs rather as a privilege than as a duty, since it gave them the means of enforcing from powerful feudatories an acknowledgment of their sovereign rights. The attendance of a baron at the court of his lord was a tacit admission of the suzerainty of the latter.

Under the early English kings the royal council was styled the *Aula* or *Curia Regis*. It consisted of the Chancellor, the Justiciary, the Lord Treasurer, the Lord Steward, the Chamberlain, the Earl Marshal, the Constable, and any other persons whom the king chose to appoint; the two archbishops belonged to it as of right; and the Comptroller of the Household, the Chancellor of the Exchequer, the Judges, and the King's Serjeants were occasionally present at its meetings. The authority of the curia was originally co-extensive with that of the king, in whom all the powers of government, judicial and administrative, were united; but its constitution gradually underwent a complete change. In the first place, a distinction came to be drawn between the body of the curia—the *magnum* or *commune concilium*, which was the germ of the modern parliament—and the *concilium assiduum*—a permanent committee of the curia, which was constantly and closely attached to the person of the king. Then the two councils were themselves subdivided. The Court *ad scaccarium*, or Court of Exchequer, which sprang from the *concilium assiduum*, took cognisance of affairs of finance, then of actions affecting the revenue, and lastly of civil suits generally. The Courts of King's Bench and Common Pleas—descended from the *magnum concilium*—respectively acquired their separate jurisdictions. These changes had been accomplished by the end of the reign of King John. They were merely successive delegations of the royal authority, and left the king's prerogative as the fountain of law unaffected. In spite, therefore, of the establishment of regular tribunals, the sovereign still continued to exercise judicial authority, if not personally, at least through the agency of his chancellor and of the council, whose jurisdictions, afterwards so clearly distinguishable, were originally united. In the time of Edward III., however, the Chancery was rapidly becoming a separate tribunal; and by the end of the reign of his successor its establishment as the great court of equity had been effected. The *concilium assiduum*, also, had become a separate assembly of royal officials, bound by a particular oath and paid a regular salary, equally distinct from the courts of law and equity and from the *magnum concilium*, and regarded with no little jealousy by them both.

From the accession of Richard II. to the end of the reign of Henry VI. the Privy-council were not merely the servants but the ministers of the crown, and acted as a check upon the royal authority. While in theory the king could choose and dismiss the members of the council at his pleasure, the exercise of this prerogative was in fact subject to various restrictions. Some of the officers of the state were members of the council *ex officio*. The two archbishops claimed to belong to it as of right. The presence of other ecclesiastics, with whom the papal was a higher authority than the royal, introduced a further element of independence, and the occasional efforts of parliament to wrest the appointment of privy-councillors from the king made his influence over the council still weaker. The Privy-council exercised its control over the royal authority in two ways. Sometimes it merely advised and recommended. A more powerful kind of check was the refusal of the chancellor to affix the Great Seal to any royal grant of which the council disapproved. The English sovereigns endeavoured to defeat the operation of this check by the use of a privy-seal, and by retaining the Great Seal in their own hands. But the privy-seal passed into the custody of a separate official, and by the middle of the 15th century the council had succeeded in bringing every royal grant under its own notice at each stage in the procedure necessary for obtaining it. In the time of Henry V. the council assumed the name of Privy-council, by which it is now generally known. Its functions were then partly administrative and partly judicial. The former included the control of matters of finance, the establishment of *staples*—i.e. markets in which alone certain commodities could be exposed for sale—the regulation of the statutes which limited freedom of commerce between different parts of England, and the preservation of the peace. The latter cannot be better defined than in the words of Mr Dicey: 'Whenever, in fact, either from defect of legal authority or from want of the might necessary to carry their decisions into effect, the law courts were likely to prove inefficient, then the council stepped in by summoning before it defendants and accusers.'

In the third or modern period of its history, which commenced when the Wars of the Roses were drawing to a close, the character of the Privy-council has undergone a variety of changes. The destruction of the feudal system, and the overthrow of the old ecclesiastical supremacy, reduced it to a position of absolute dependence on the crown. At the same time the power of the council as regards the people was greatly increased (1) by the subjection of particular places to its control—e.g. Ireland under Poynings' Act (1494), and the Channel Islands; (2) by the exercise of the right to issue proclamations; (3) by the erection of new courts under its supervision—e.g. the High Commission and the Court of Requests; and (4) by the extension of its judicial authority in the Court of Star-chamber (q.v.). The judicial powers of the Privy-council were, however, restricted by the Long Parliament (16 Car. I. chap. 10, sect. 3), and in the 17th and 18th centuries its functions as the adviser of the crown in matters of government and state policy were gradually usurped by the Cabinet (q.v.).

Present Constitution and Functions.—The list of privy-councillors now includes the members of the royal family, the Archbishops of Canterbury and York, the Bishop of London, the great officers of state, the Lord Chancellor, the Lord Chief-justice of England, the Lords Justices of the Court of Appeal, the President of the Probate, Divorce, and Admiralty Division, the law officers of the crown, the members of the Judicial Committee (see below), several of the Scotch judges, the Speaker of the House of Commons, the Ambassadors, some of the Ministers Plenipotentiary and Governors of Colonies, the Commander-in-chief, the First Lord of the Admiralty, the Vice-president of the Board of Trade, the Paymaster of the Forces, &c., and necessarily all the members of the cabinet. Members of the council are in their collective capacity styled 'His [or Her] Majesty's Most Honourable Privy-council;' individually each member is styled 'Right Honourable.' (The Lord Mayor of London, although styled 'Most Honourable,' is not a privy-councillor. See *Notes and Queries*, first series, iii. 496; iv. 9, 28, 137, 157, 180, 236, 284; ix. 137, 158.) Under the authority of letters-patent dated 28th May, 10 James I. 1612, privy-councillors take precedence after Knights of the Garter. Amongst themselves they take rank according to seniority of appointment when no other principle of classification is applicable in the individual instances. Privy-councillors are appointed by the sovereign without either patent or grant, and are subject to removal at his discretion. By the common law, the Privy-council, as deriving its whole authority from the sovereign, was dissolved *ipso facto* upon the demise of the crown; but, in order to prevent the inconvenience of having no council in being at the accession of a new prince, it was enacted (6 Anne, chap. 7, sect. 8) that the Privy-council shall continue for six months after the demise of the crown, unless sooner determined by the successor of the deceased sovereign (cf. Stephen, *Comment.* vol. ii. p. 491). It is now understood that no members attend the deliberations of council except those who are specially summoned. In ordinary cases only the ministers, the great officers of the Household, and the Archbishop of Canterbury are summoned; but on some extraordinary occasions summonses are sent to the whole council. (Thus, on November 23, 1839, the whole of the Privy-council were summoned to Buckingham Palace to receive the Queen's announcement of her intended marriage with Prince Albert.) Meetings of council are usually held at intervals of three or four weeks at the sovereign's residence; and six privy-councillors at least, with one of the clerks of council, constitute a meeting of council.

A privy-councillor must be a natural-born subject of Great Britain. His duties are defined by the oath of office as follows: (1) to advise the king to the best of his cunning and discretion; (2) to advise for the king's honour and good of the public, without partiality through affection, love, need, doubt, or dread; (3) to keep the king's counsel secret; (4) to avoid corruption; (5) to help and strengthen the execution of what shall be resolved; (6) to withstand all persons who would attempt the contrary; and (7) to observe, keep, and do all that a good and true counsellor ought to do to his sovereign lord. The personal security of a member of the Privy-council was formerly safeguarded by several statutes repealed by 9 Geo. IV. chap. 31. Immediately on the decease of the sovereign the Privy-council assembles and proclaims his successor, the Lord Chancellor affixing the Great Seal to the proclamation. The members of the Privy-council are then re-sworn as council of the new sovereign, after which a privy-council is held, and the sovereign makes declaration of his designs for the good government of the realm, and subscribes the oaths.

The functions of the Privy-council in modern times depend on a great variety of statutes, and it is only possible here to give a brief and very general survey of the whole field. The subject is one full of confusion, partly because of the vast mass of detail which it involves, and partly because the long historical development which the Privy-council has undergone has borne its natural crop of legal fictions, anomalies, and technicalities. It will be convenient to divide our observations under four heads:

(1) *The Privy-council as synonymous with the Executive Government.*—It is a commonplace of constitutional law that the cabinet, which is the organ of the executive government, is quite unknown to the law. In theory the cabinet is only a committee or inner circle of the Privy-council, and the Privy-council is still the only instrument through which the sovereign can exercise his prerogative. But the theory no longer corresponds with the facts; the power is exercised by the cabinet alone, and the Privy-council is never consulted. This is the sense which must be attached to the statements that the 'sovereign in council' has wide authority in the colonies, can make and enforce laws in such colonies as have no representative assemblies, and can allow or disallow the legislative acts of such as do possess them. The case is the same with orders in council relating to blockades, reprisals, or embargoes. And, in harmony with these expressions, it is the regular course in acts of parliament conferring specific powers on the executive government to confer them in terms on the 'sovereign in council.' In such cases the mention of the council is purely formal, and if the power is exercised it will be by the ordinary government (cf. also 13 and 14 Vict. chap. 59, sect. 30). It may be added that, as the executive power is thus dependent on the authority of the legislature, so no executive act can be done, and no order in council can be made, which an act of parliament cannot override.

This is now a recognised mode in which the legislature delegates defined legislative functions to the executive; and it is on this principle that the Board of Trade, for example, can make regulations for carrying out the provisions of an act of parliament, though the act may simply state, 'It shall be lawful for Her Majesty by order in council' from time to time to make such regulations.

(2) *The Privy-council as a separate Department of State.*—As the *aula regis* was the mother of parliament and of the various courts of law, so the Privy-council has given being, in quite recent times, to several administrative bodies (such, for instance, as the Board of Trade and the Local Government Board), to which many of its own administrative powers have been transferred. The different stages or methods in this process of differentiation are curious. The Board of Trade, established on its present basis in 1782, was at first, and still is in name, a committee of the Privy-council; it is defined in the Interpretation Act, 1889, sect. 12, as 'the Lords of the Committee for the time being of the Privy-council, appointed for the consideration of matters relating to trade and foreign plantations.' But for all practical purposes it is a distinct department of state, controlled by a president, who is a member of the government. The Board of Health, created 1848, was ten years later superseded partly by the Home Office, partly by the Privy-council. In 1871 the Local Government Board was created, in succession to the Poor-law Board, and to it were transferred many duties formerly exercised by the Privy-council in relation to the public health, such, for example, as the appointment and control of public medical officers and the carrying out of the Vaccination Acts. In 1889 a new Board of Agriculture was established, and took over the powers of the Privy-council in connection with the Destructive Insects Act and the Contagious Diseases (Animals) Acts. Neither the Local Government Board, nor the Poor-law Board (which, created in 1847, ceased to exist, as we have already mentioned, in 1871), nor the Board of Agriculture was ever formally a committee of the Privy-council, but in each case a portion of the administrative functions of the council was transferred to the new department, and the historical connection is illustrated by the fact that in all these cases the Lord President of the council is named first in the list of *ex officio* members. The Committee of Council on Education, established in 1839, remains in a different position. It has not been completely detached from the Privy-council and erected into a distinct department of the administration; and the member of the government who presides over it is still known as the Vice-president of the Council on Education. But it is commonly called the Education Department, and its complete detachment would require little more than a change in the designation of its chief, and a clear delimitation of the power and responsibility of the Lord President and the Vice-president of the Council. The Vice-president of the Council is already virtually minister for Education.

In 1885 the Secretary for Scotland Act further transferred to the new secretary the powers and duties of the Privy-council in connection with the Board of Manufactures and the Public Health Acts so far as Scotland is concerned. The Secretary for Scotland was also entrusted with control over Scottish education, under the title of Vice-president of the Scotch Education Department, which is still nominally a standing committee of the Privy-council.

With regard to the administrative business which remains with the Privy-council as a separate department of state it must be remembered as a general principle that the work is actually done by permanent government officials, under the control of the Lord President of the Council, who is responsible to parliament and to the country. It is believed that this is substantially the case even when special committees are appointed by act of parliament for special administrative purposes. That the members of such committees are little more than advisers results naturally from the modern doctrine of ministerial responsibility. With this limitation, committees of the Privy-council exercise in many cases a delegated legislative power. For example, in the grant of charters to boroughs under the Municipal Corporation Act, 1882, every petition for a charter is referred to a Committee of Council, which has power to consider it, and to settle a scheme for adjusting the rights and liabilities of the existing local authority. Under the Medical Acts the Privy-council is entrusted with the supervision of the qualifications and the registration of medical practitioners; and kindred powers are conferred by the Pharmacy Act, 1868, and the Veterinary Surgeons Act, 1881. For the Committee of Council on Education, see EDUCATION. A Universities Committee of the Privy-council was constituted for England in 1877, and for Scotland in 1889 (see UNIVERSITIES).

The style under which administrative duties are imposed on the Privy-council varies. Sometimes it is referred to simply as the Privy-council; occasionally a clause is added that 'all powers vested in the Privy-council by this act may be exercised by an order in council made by two or more of the Lords and others of H.M. Most Honourable Privy-council' (Veterinary Surgeons Act, 1881, sect. 18). Sometimes the duty is laid upon 'the Lords and others of H.M. Most Honourable Privy-council, or any three or more of them of whom the Lord President of the Council, or one of H.M. principal secretaries of state for the time being, shall always be one' (9 and 10 Vict. chap. 96).

(3) *The Privy-council in its widest Comprehension.*—The Privy-council, as a body, has in modern times no regular duties at all, administrative or judicial. Membership of it is a coveted honour, conferring rank, precedence, and titular dignity. It cannot, however, be fairly described as obsolete or dead, and on rare and abnormal occasions it has exercised powers not falling strictly within the sphere of ordinary legislative or judicial authority. Thus, the Privy-council in 1788 took on itself the duty of inquiring into the sanity of George III. and receiving the reports of the royal physicians. In 1821 it determined the constitutional question of Queen Caroline's right to be crowned as Queen Consort. But in general it is a force kept permanently in reserve, apart from the working elements of the constitution. And, as the character of British constitutional growth has ever been the adaptation of old expedients to newly felt needs, the possibility remains that some unforeseen constitutional convulsion may recall this ancient and honourable body from its merely nominal dignity to at least temporary life and usefulness.

(4) *The Judicial Committee of the Privy-council.*—The most important of all the offshoots of the Privy-council is the Judicial Committee. Officially it is merely a committee. In essence it is a court of law, possessing a wide and (indirectly owing to its connection with the Privy-council) a peculiarly elastic jurisdiction, which includes appeals from the ecclesiastical courts, petitions for the extension of letters-patent for inventions, and, above all, appeals from Indian and colonial courts of law. The history of this last branch of the appellate jurisdiction of the Privy-council is exceedingly complicated, and we cannot enter upon it minutely here. Three distinct and conflicting theories have been promulgated upon the subject. (1) According to Pownall (*Administration of the Colonies*, 1774), when the necessity for an appeal from the decisions of the colonial governors, who, although not properly qualified lawyers, were yet called upon to preside in the courts of law, was clearly apprehended, the one precedent of a judicature within the realm possessing foreign jurisdiction which presented itself to the minds of the English sovereign and his advisers was that of the jurisdiction of the Privy-council over the Channel Islands. Since the time of King John (1204) appeals from the royal courts in Jersey and Guernsey—with the latter of which Alderney and Sark were for judicial purposes united—had been brought before the king and his council in England. Now the English sovereign claimed—a claim which the colonials acquiesced in, and which the House of Commons itself had tacitly admitted—that his colonial settlements and possessions were the demesnes of the crown, lying quite beyond the jurisdiction or cognisance of the state. The historical relation between the feudal duchies of King John and the royal plantations and possessions abroad being so intimate, no great effort of administrative imagination was necessary to make the analogy complete. Thus it came to pass that appeals from the courts constituted in the various colonies were taken not to the House of Lords, nor to the courts of law and equity, but to the king in council. (2) A second theory is suggested by Macqueen—viz. that the Privy-council originally entertained colonial petitions under the authority of a reference from the peers, and that, when the intervals, gradually becoming longer, between the sessions of parliament rendered this mode of redress unsatisfactory, the council came to discharge in their own right those functions which would have been delegated to them by the peers if parliament had been summoned. (3) The statute 25 Hen. VIII. chap. 9 appears to suggest a third explanation of the origin of the appellate jurisdiction of the Privy-council. Under that act, a subject aggrieved by the decision of any court in any part of the king's dominions might appeal to the king in chancery. Every such appeal was referred by commission under the Great Seal to the Court of Delegates, the decisions of which were, in spite of a distinct prohibition in a statute of Elizabeth, reviewed upon petition by the Privy-council. These theories relate to different periods of time, and thus, although apparently conflicting, are not necessarily irreconcilable. One central fact, the right of the sovereign to entertain an appeal from any colonial court, is undisputed and indisputable. We know that, in less than a century, the body to which the crown entrusted the *administration* of colonial affairs was repeatedly reconstituted, and there is no reason why the *judicature* for colonial appeals may not have undergone similar changes in the course of three centuries. The modern history of the judicial committee is well known. The statute 2 and 3 Will. IV. chap. 92 transferred to the king in council the jurisdiction of the Court of Delegates; 3 and 4 Will. IV. chap. 41 formally created the judicial committee, and vested in it all the judicial authority of the Privy-council, the Commissioners of Appeals in prize causes, and the Court of Delegates. The judicial committee comprises the Lord President of the Council, the Lord Chancellor, the Lords Justices, and such other members of the Privy-council at large as shall hold or shall have held certain judicial or other offices enumerated in the acts. By 34 and 35 Vict. chap. 91 Queen Victoria was empowered by order in council to appoint by warrant under her sign-manual four additional

paid judges, each being, or having been, a judge of one of the superior courts at Westminster or chief-justice of Bengal, Madras, or Bombay, to act upon the judicial committee. Under the Appellate Jurisdiction Act, 1876 (sect. 14), provision was made for the substitution of two additional 'lords ordinary of appeal' for the four paid judges appointed under 34 and 35 Vict. chap. 91, and thus for the ultimate merging of the judicial committee in the House of Lords.

The conditions of appeal from colonial courts to the Privy-council are prescribed, sometimes in the charters of justice constituting such courts, sometimes by colonial acts, usually by orders in council. The customary conditions are that the amount at stake should exceed a certain sum in value, that leave to appeal should be asked from the court below within a certain time after the date of the judgment appealed against, and that proper security should be found. It is, however, the inherent prerogative right, and on proper occasions the duty, of the King or Queen in council to exercise an appellate jurisdiction over *all* colonial courts and in all colonial cases, civil as well as criminal. In the exercise of this jurisdiction, and in the absence of any charter or statutory right, the Sovereign in council may grant special leave to appeal in *civil* cases of substantial, general, or constitutional importance, where the judgment appealed against was plainly wrong or attended with sufficient doubt to justify the judicial committee in recommending that it should be reviewed. The Sovereign in council will not, however, review or interfere with the course of *criminal* proceedings, unless it is shown that, by disregard of the forms of legal process, by some violation of the principles of natural justice, or otherwise, grave and substantial injustice has been done.

The decisions of the judicial committee are pronounced by one member of the committee only, and not, according to the usual practice in divisional courts, the court of appeal, and the House of Lords, by each of the presiding judges. The student of the Privy-council reports is unable, therefore, to tell whether or not their lordships are unanimous, and, if not, who constitute the majority.

The Lord President of the Council is the fourth great officer of state, and is appointed by letters-patent under the Great Seal. The office is very ancient, and was revived by Charles II. in favour of the Earl of Shaftesbury in 1672.

Scotland once had a Privy-council of its own, but it was merged in that of England by 6 Anne, chap. 6. There is a separate Privy-council for Ireland, which in 1891 consisted of fifty-eight members, who are sworn pursuant to a sign-manual warrant directed to the Lord-lieutenant.

See Dicey's *Privy-council* (1860; new ed. 1887); Hearn's *Government of England* (ed. 1887); Macpherson's *Practice* (1860; new ed. 1873); Macqueen's *Appellate Jurisdiction of .... the Privy-council* (1842); *Juridical Review*, vol. i. 287; *Conditions of Appeal from the Colonies to the Privy-council* (1888).

Privy-seal. See Seal.

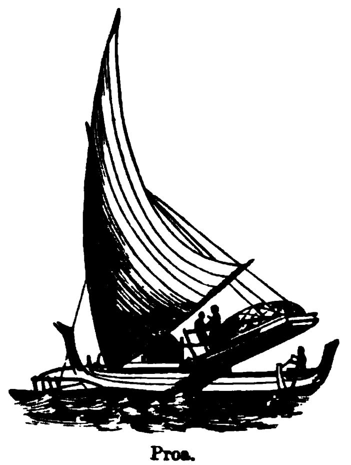
Prize, Prize-money, property captured from an enemy; but the term is generally applied exclusively to property taken at sea. As between the belligerent powers themselves the property in a ship or other thing captured passes at once by the mere capture to the captor. Up to the close of the Crimean war all property of an enemy even when carried in a neutral ship was liable to capture, as also was the property of a neutral if captured on board a belligerent ship. This involved a claim to the right of searching neutral ships, a claim which Britain was only able to enforce during the great war with France in consequence of her mastery of the sea; it was a right, however, which was continually being disputed, and the enforcement of it in the case of American ships led repeatedly to difficulties with the United States. When the treaty of Paris was signed in 1856 it was universally agreed that private property in neutral bottoms so long as it is not contraband of war should no longer be liable to capture (see Neutrality, Enemy, Blockade). Military prizes and their distribution to the army are described under Booty. It remains to notice the procedure taken in respect to vessels and property captured by the navy. On a ship being taken, she must be sent to a port belonging to the capturing power, where the Court of Admiralty, on full evidence, adjudicates whether she be lawful prize or not. If the decision be affirmative the prize is then sold; or, if a ship-of-war, a certain allowance is granted by the state. The produce of the sale or grant is lodged in the hands of the Accountant-general of the Navy, for distribution to the officers and men who assisted at the capture. The net produce of the sale or grant is first divided rateably among any ships (if there be more than one) concerned in the capture. If under the orders of a flag-officer, he receives one-thirtieth part of the whole; the commanding officer then receives one-tenth part of the remainder, or of the whole if no flag is present; or, if there is more than one ship present, one-tenth part is divided between the commanding officers. After provision has thus been made for the flag (if any) and for the portion of the commanding officer or officers, the remainder of the proceeds is so distributed that each officer, man, and boy shall receive shares or a share: commanders and officers of similar rank receive forty-five shares each; lieutenants and officers of similar rank, from forty shares to thirty according to seniority; sub-lieutenants, &c., twenty shares each; midshipmen, &c., twelve shares; naval cadets, ten shares; chief petty officers, twelve shares; first-class petty officers, ten shares; second-class petty officers, seven shares; able seamen, four shares; ordinary seamen, two shares; and boys, one share each. Warburton's *Prince Rupert* (vol. iii.) gives an interesting distribution of prize-money in the 17th century.

Prize-court. See Admiralty Courts.

Prize-fighting. See Pugilism.

Prjevalski. See Prejevalski.

Proa (Malay *prahu*), sometimes known as the 'flying proa,' is a peculiarly-shaped canoe in use by the natives of the Malay Archipelago, and on the China Seas, especially by the Ladrone islanders. It is about 30 feet in length by 3 in width, and has the stem and stern equally sharp, so as to sail backward or forward without being turned round. One side is flat, and in a straight line with the stem and stern; the other side is rounded, as in ordinary boats. This peculiar formation would make it liable to be easily upset, were it not for a framework which projects



Proa.

to windward, supporting a weight which counterbalances the pressure of the wind on the sail. The sail resembles the ordinary lug-sail, and is formed of mat. Slight variations from this form are found, but the principle of construction is the same.

Probabilism. See CASUISTRY.

Probabilities, CHANCES, or the THEORY OF AVERAGES. To assign a number which measures the probability of a future event may at first seem impossible; and yet the whole business of many large companies instituted in every civilised country for the 'insurance' or 'assurance' of lives, &c. is mainly based upon the methods of assigning such a number. When it is certain that a future event will take place, or will not take place, a fixed number is selected for each case to indicate that then the probability amounts to certainty: and these two measures are the limits of our scale. Will the sun rise to-morrow morning in the east? Probability = 1, certainty in favour. Will full moon be seen to-morrow morning in the east? Probability = 0, certainty against. Between these two limiting numbers, 0 and 1, lies the number (a proper fraction) which measures the probability of any undecided event. The number, then, by which we mark the chance, or expectation, or probability of anything occurring in the future, must be a fraction like $\frac{3}{4}$, $\frac{6}{13}$, $\frac{113}{355}$, or ·273, and can never be so large as 1, which was fixed as the higher limit, certainty: and by the fractional number assigned to any event we can readily compare its probability with those of other future occurrences.

To assign the proper fraction to any future event will, in general, imply knowledge of a large number of similar events. Thus, in January, what is the probability that on next 12th April the sun will rise bright and unclouded? Relying on the constancy of nature and the doctrine of averages, we consult the calendars and weather-notices of the last 50 years, say, and find that in 17 of these the result was favourable and in 33 unfavourable. On these data the probability required is $\frac{17}{50}$, rather over $\frac{1}{3}$. In other words, the odds are nearly 2 to 1 against the event. The fraction $\frac{33}{50}$ measures or shows the probability that the event will *not* happen. More generally, if any future event may occur in 12 ways and fail in 15 ways, then the probability of its occurring is $\frac{12}{12+15} = \frac{4}{9}$; and the probability of failure, $\frac{15}{12+15} = \frac{5}{9}$. In such a case the 27 ways are supposed to have each the same chance of occurrence: and, since the event must either happen or fail, the sum of the two probabilities = certainty—i.e. $\frac{4}{9} + \frac{5}{9} = 1$. Thus, if $\frac{4}{9}$ is the chance of an event, $1 - \frac{4}{9}$ = chance that it will not occur. In a certain town only 4 days of May—taking the average of many years—are rainless: what will be our chance of finding next 15th May rainless? Chance = $\frac{4}{31}$: and $1 - \frac{4}{31}$ = chance of having rain. The principle involved in such simple solutions is the foundation of the mathematical treatment of chance or probability. Of all the occurrences, all equally possible, which relate to a future event, if a are favourable and x unfavourable, then $p = \frac{a}{a+x}$, where p stands for probability of the event occurring. Sometimes it is easier to find the probability of the event failing, and subtract that result from 1 as in the examples just given.

Out of 100 sailors who mutinied there were 10 ringleaders. If 2 are selected by lot for capital punishment, find the chance that both will be ringleaders. The total number of pairs is $\frac{100 \,.\, 99}{1 \,.\, 2}$, and the number of pairs among the ringleaders is $\frac{10 \,.\, 9}{1 \,.\, 2}$. Hence chance required $= \frac{10 \,.\, 9}{1 \,.\, 2} \div \frac{100 \,.\, 99}{1 \,.\, 2} = \frac{1}{110}$; i.e. the odds are 109 to 1 against the event. A bag contains 5 sovereigns and 4 shillings: if a child is asked to draw three coins at random, what is the probability that 2 will be sovereigns and 1 a shilling? Here the total number of groups of 3 which can be formed out of all the 9 coins is $\frac{9 \,.\, 8 \,.\, 7}{1 \,.\, 2 \,.\, 3}$, or 84, which forms our denominator. Of the sovereigns there are $\frac{5 \,.\, 4}{1 \,.\, 2} = 10$ pairs, each of which may be drawn with each of the 4 shillings, giving 40 groups of 3, which forms our numerator. Hence chance required is $\frac{40}{84} = \frac{10}{21}$; i.e. the odds are 11 to 10 against the event.

Sometimes actual trial seems to throw discredit on the mathematical measure of a chance. Thus, if a die be thrown, the chance of a 5 or any other number turning up must be $\frac{1}{6}$ by our definition: whereas a person may cast a die, say 20 times in succession, with the result: ace, 4 times; 6 and 4, each 3 times; 2 and 3, each 5 times; 5 not at all. How then explain the mathematical estimate? Simply that 20 is much too small a number to take an average from, and the result 'chance = $\frac{1}{6}$ for each side of the die' refers to the most general case possible—i.e. a very large number or even an infinite number of throws. Register for 10,000 throws, then for 100,000 or 1,000,000, and the results would more and more approximate to the mathematical result, and prove that each side has chance = $\frac{1}{6}$—the die being of course a perfect cube.

An important extension of the theory is that the probability of two independent events *both* occurring is measured by the product of their separate probabilities. Thus, if A's chance of passing a certain examination is $\frac{4}{9}$ and B's $\frac{15}{16}$, then (1) the chance that *both* will pass is $\frac{4}{9} \times \frac{15}{16} = \frac{5}{12}$—i.e. the odds are 7 to 5 against; (2) the chance that *both* will fail is $(1 - \frac{4}{9})(1 - \frac{15}{16}) = \frac{5}{144}$; (3) the chance that A passes and B fails is $\frac{4}{9}(1 - \frac{15}{16}) = \frac{1}{36}$; and (4) the chance that A fails and B passes is $(1 - \frac{4}{9})\frac{15}{16} = \frac{25}{48}$. By comparing these four results we see that the last event is the most probable of all, the odds being 25 to 24 in favour of it. Moreover, these results exhaust the possible alternatives of double event, therefore the four probabilities should together amount to certainty: and $\frac{5}{12} + \frac{5}{144} + \frac{1}{36} + \frac{25}{48} = \frac{144}{144} = 1$, *Q.E.D.*

By the same principle we solve many useful and curious problems. A town-council of 20, 12 Liberals and 8 Conservatives, have to choose a deputation of 5 by ballot: find the probability that it will contain 3 Liberals and 2 Conservatives. Total number of groups of 5 is $\frac{20 \,.\, 19 \,.\, 18 \,.\, 17 \,.\, 16}{1 \,.\, 2 \,.\, 3 \,.\, 4 \,.\, 5}$, or 19 . 3 . 17 . 16, which forms our denominator. Number of groups of 3 from the Liberals is $\frac{12 \,.\, 11 \,.\, 10}{1 \,.\, 2 \,.\, 3}$, or 2 . 11 . 10, and number of pairs of the Conservatives is $\frac{8 \,.\, 7}{1 \,.\, 2}$, or 4 . 7; therefore, multiplyings 2 . 11 . 10 . 4 . 7 = total number of groups of 5 which fulfil the conditions; and required probability is $\frac{2 \,.\, 11 \,.\, 10 \,.\, 4 \,.\, 7}{19 \,.\, 3 \,.\, 17 \,.\, 16}$, or $\frac{385}{969}$. In other words, the odds are 584 to 385, or more than 3 to 2 against the event.

When a person buys lottery tickets his chance of success is found as in our opening paragraphs, and if multiplied by the value of the money attainable the product is called his 'expectation.' In this connection may be noted an important distinction between the moral and mathematical values of 'expectation,' owing to the assumption that in such speculations the loss of money paid for tickets is not to be regarded. If one man of moderate means risks £500 in order to gain £5 when the odds are 100 to 1 in his favour, and another risks £5 to gain £500 when the odds are 100 to 1 against, the speculation in the former case appears much more reckless and immoral than in the latter, although in both cases the stake is exactly equal to the expectation.

We now reach the most important of all the applications of the theory of probability, its use in the calculation of life insurances and annuities. During the early part of the 18th century the celebrated London mathematician De Moivre constructed a formula of great simplicity which is still available, although largely superseded by elaborate 'tables of mortality' which have since been compiled in all commercial countries. By De Moivre's hypothesis, out of 86 children born at the same time 1 dies every year until all are extinct. Thus, for a man 40 years old, 86 − 40 = 46, 46 years on an average are still before him and 45 others; and his chance of life is the average number between 0 and 46—i.e. $\frac{1}{2}$ × 46 = 23. Generally a person's probability of life or expectation is $\frac{1}{2}(86 - n)$, where n is the present age. Actuarial writers have found that this simple formula agrees with their official tables, except in the case of young children and aged persons. The tables are based upon long-continued observations of the mortality in the class of persons dealt with, and from them the theory of probability is easily applied in calculating annuities, reversionary payments, and other results.

For ascertaining the various life contingencies the Institute of Actuaries employ a table giving all the ages from 10 upwards, and, beginning with 100,000 persons alive at the age of 10, place opposite each succeeding age the number of survivors, till at 98 years none are left. At 40, survivors = 82,284; at 50, survivors = 72,726; therefore the chance that a man of 40 shall live to 50 is 72,726 ÷ 82,284 = ·884. The Belgian tables give ·832 for the same event in the case of a married man living in town; and if his wife is 30 years old her chance of surviving for ten years is ·862. These data give the following calculation of the chances of the four double events occurring 10 years hence:

Both being alive	$\cdot832 \times \cdot862 = \cdot717$
Both dead	$(1 - \cdot832) \times (1 - \cdot862) = \cdot023$
Husband alive only	$\cdot832 \times (1 - \cdot862) = \cdot115$
Wife alive only	$(1 - \cdot832) \times \cdot862 = \cdot145$

As we have seen already the sum of these four probabilities must = 1, which verifies the reckoning. The chance of both these persons being alive is evidently more than $\frac{7}{10}$—i.e. the odds in favour are better than 7 to 3.

Some of the higher applications of the doctrine of probability require a knowledge of the infinitesimal calculus, and are of interest only to experts. It is proved, for example, by integration and the theory of averages that the mean latitude of *all* places north of the equator is 32·704°; and when four points in the circumference of any circle (radius = r) are taken at random, the mean area of the quadrilateral so determined is $\frac{3r^2}{\pi} = r^2 \times \cdot955$.

There are works on the subject by De Morgan (1837), Boole (1854), Todhunter (1865), Venn (1866), Whitworth (1886), and Procter (1887).

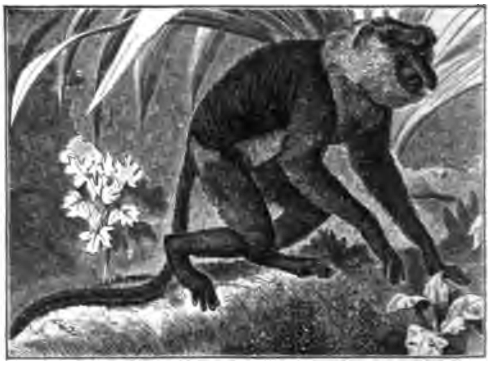
Probang, an instrument of various shape and material, for pushing obstructions down the œsophagus of a choking animal. See CHOKING.

Probate Court, a court created in England in 1858, in lieu of the old Prerogative Courts, to exercise jurisdiction in matters touching the succession to personal estate. Since the Judicature Acts of 1873–75 the Probate Court is included in the Probate, Divorce, and Admiralty Division of the High Court of Justice. If a man at his death leaves a will, then it must be produced and verified so as to prove that it is an authentic will, duly executed and signed in presence of witnesses, and therefore that the right to the personal estate is vested in the executors named by the will. The will is proved in common form by depositing it in one of the registries of the court, by making affidavit of the amount of the property, and by paying the probate duty (varying from £1 per £50 to £3 per £100, according to the amount of the property). The executors receive a copy of the will, accompanied by a grant of administration; and this probate copy is usually shown to bankers, &c. when the executors lay claim to the property of the deceased. If the authenticity of the will is disputed it must be proved by witnesses in court. If there is no will the personal estate devolves on the next of kin and widow, if any; and it is necessary that an application be made to the court to appoint an administrator. This is called taking out administration, and the act of the court appointing administrators is called letters of administration. See Dixon on *Probate* (2d ed. 1885).

Probationer, one who is on probation; especially, in Scotland, a divinity student who, having completed his studies and performed the prescribed exercises, is licensed to preach by the presbytery, and is entitled to become a candidate for a pastoral charge.

Proboscidea. See ELEPHANT, Vol. IV. p. 291.

Proboscis Monkey (*Nasalis larvatus*), a native of Borneo, one of the dog-like (Cynomorph) Catarrhines, nearly allied to the genus Semnopithecus. The nose is very long, especially in the old males, and is mobile and retractile like a proboscis. In the young monkeys it is short and blunt. There are bushy whiskers, which, with the long hair on the back of the head, encircle the neck. The colours—brown, red, yellow, and gray—are bright. The adult males are about 3 feet in height; the body is lank, and the tail is very long. In habit these animals are arboreal and gregarious.



Proboscis Monkey (*Nasalis larvatus*).

Probus, MARCUS AURELIUS, emperor of Rome, was born at Sirmium, in Pannonia, early entered the army, and had the good fortune to attract the favourable notice of the Emperor Valerian. His subsequent conduct justified his rapid promotion, for he greatly distinguished himself on the Danube, and in Africa, Egypt, Asia, Germany, and Gaul. By the Emperor Tacitus he was appointed governor of the Asiatic possessions of Rôme; and such was the zealous attachment evinced for him by his soldiers that on the death of Tacitus they forced him to assume the purple; and, his rival Florianus having been removed, Probus was enthusiastically hailed emperor by all classes (276 A.D.). His brief reign was signalised by brilliant and important successes; the Germans were driven out of Gaul, and the Barbarians from the Rhætian, Pannonian, and Thracian frontiers; and Persia was forced to agree to a humiliating peace. The external security of the empire being established, Probus devoted himself to the development of its internal resources. But fearing that the discipline of the army would be deteriorated by inactivity, he employed the soldiers as labourers in executing various extensive and important works of public utility. Such occupations, considered as degrading by the soldiers, excited among them the utmost irritation and discontent; and a large body of troops engaged in draining the swamps about Sirmium murdered their excellent emperor in 282.

Process Engraving. See Illustration of Books, Photography.

Procession of the Holy Spirit. See Spirit, Creeds.

Processions, as solemn and religious rites, are of very great antiquity. With the Greeks and Romans they took place chiefly on the festivals of Diana, Bacchus, Ceres, and other deities; also before the beginning of the games in the Circus; and in spring, when the fields were sprinkled with holy water, to increase their fertility. The priests went at their head, bearing images of the gods and goddesses to be propitiated, and started either from certain temples or from the Capitol. Among the Jews certain processions around the altar were—and still are to a certain extent—usual on the Feast of Tabernacles; and from them the Mohammedans have adopted their mode of encompassing the sanctuary seven times at Mecca. Processions also form a prominent part of the Buddhist worship. The practice was early introduced into the Christian church, but seems to have been adopted by Chrysostom at Constantinople to counteract the influence of the Arian processions through the streets to their churches outside the walls. Ambrose speaks of them as ancient in his day. During the middle ages processions were arranged on a scale of great magnificence, as at the Corpus Christi Festival. Since the Reformation they have been much less elaborate, especially in mixed countries; but at Vienna, and still more at Munich, the Corpus Christi procession is still magnificent. Processions are either Supplicatory processions or Cross processions, and are either directed to a certain distant place, to some miraculous image or object, or they are confined to the streets of the cities and the churches. Banners, crosses, and images are generally carried in front; the clergy follow; and the people make up the rear, singing hymns or reciting prayers. Processions to beseech the special mercy of God are variously to be described as *Litaniæ*, *Rogationes*, *Stationes*, *Supplicationes*, and *Exomologeses*; and again, they are to be distinguished as being with or without the Blessed Sacrament, relics, or images of the Virgin or Saints. Some are extraordinary and specially arranged; others are ordinary and fall under the common ritual, as those on Candlemas, Palm Sunday, St Mark's Day, three Rogation days, and at funerals. The Processional is the service-book containing the prayers, hymns, and ceremonial of processions. There is no doubt that, whatever their general intrinsic value, they offer in many instances one of the most strikingly picturesque features of the Roman faith, and that they answer a certain instinctive craving of the multitude. Processions through the streets are frequent in modern life as political and social demonstrations, as during strikes and the like, and, when not decreed dangerous to order or obstructive to traffic, are claimed as a privilege of free-born citizens; and they have been introduced to break the quiet of many English towns and villages as part of the peculiar warfare of the Salvation Army. For extensive pilgrimages, as such, their history and rites, see Pilgrim, Mecca, Festivals, &c.

Prochein Ami. See Infant.

Pro'cida, an islet of Italy, between the island of Ischia and the mainland (Cape Miseno), 50 miles W. by S. of Naples. Area, 1½ sq. m.; pop. 13,131. On its shores is the city of the same name, with a harbour, a royal palace, a state-prison, and a marine school. The people fish coral, tunny, and sardines, and grow fruits, wine, and oil. The island was occupied by Britain on two or three occasions between 1799 and 1813.

Proclamation, a public notice given by the sovereign or governing power to the people. The power of issuing proclamations is part of the prerogative of royalty as the fountain of justice. They sometimes consist of an authoritative announcement of some matter of state, or act of the executive government affecting the duties and obligations of subjects. The demise of the crown, and accession of a new sovereign, a declaration of war, and the issue of new coin are all occasions on which a royal proclamation is issued. In time of war, the crown by a proclamation may lay an embargo on shipping, and order the ports to be shut. But the most usual class of proclamations are admonitory notices for the prevention of offences, consisting of formal declarations of existing laws and penalties, and of the intention to enforce them; such as the proclamation against vice and immorality, formerly read at the opening of courts of assize and quarter sessions in England. In Scotland proclamations summon the Scottish peers to elect representatives to the House of Lords.

Proclamations are binding when they enforce the execution of laws already in being. Towards the end of Henry VIII.'s reign it was enacted that the king's proclamation should have the same force as an act of parliament; but this ill-judged law was repealed in the first year of Edward VI. It is now clear that the sovereign can neither make a new law, nor dispense with the existing law, unless by consent of parliament. A meeting which is proclaimed is not thereby rendered illegal; the proclamation is only a notice that, in the opinion of the government, the meeting is likely or certain to assume an illegal character. Proclamations are issued under the Great Seal, and are read aloud by heralds or other royal officers in the three capital cities of the United Kingdom; the reading is prefaced with the cry of 'O yes' (Fr. *oyez*, 'hear').

Proclus, the Neoplatonist, called the Successor (*Diadochos*), i.e. of Syrianus, as the head of the Athenian school, was born in Constantinople about 411 A.D. He was of Lycian origin, and received his first instruction at Xanthus, in Lycia. He then studied at Alexandria under Arion, Leonaras, Hero, and especially under Heliodorus, with whom he applied himself chiefly to Aristotelian and Platonic philosophy. From thence he went to Athens, where a certain Plutarch, a philosopher, and his daughter, Asclepigeneia, a priestess of Eleusis, became his instructors, chiefly in theurgic mysteries. The vivid imagination and enthusiastic temperament which in his childhood already had led him to believe in apparitions of Minerva and Apollo, naturally convinced him, when all the influences of the mysteries were brought to bear upon him, still more of his immediate and direct intercommunication with the gods; and he came to distinctly believe himself one of the few chosen links of the Hermaic chain through which divine revelation reaches mankind. His soul had, he thought, once lived in Nicomachus the Pythagorean, and, like him, he had the power to command the elements to a certain extent, to produce rain, and to temper the sun's heat. The Orphic Poems, the writings of Hermes, and all the mystical literature of that occult age were to him the only source of true philosophy, and he considered them all more or less in the light of divine revelations. That same cosmopolitan spirit in religious matters which pervaded Rome towards her end had spread throughout all the civilised pagan world of those days, and Proclus distinctly laid it down as an axiom that a true philosopher must also be a hierophant of the whole world. Acquainted with all the creeds and rites of the ancient Pantheons of the different nations, he not only philosophised upon them in an allegorising and symbolising spirit, as many of his contemporaries did, but practised all the ceremonies, however hard and painful. More especially was this the case in the severity of his fasting in honour of Egyptian deities—a practice, which, if it fitted him more and more for his hallucinations and dreams of divine intercourse, on the other hand more than once endangered his life. Of an impulsive piety, and eager to win disciples from Christianity itself, he made himself obnoxious to the Christian authorities in Athens, who, in accordance with the spirit of religious intolerance and fanaticism which then began to animate the new and successful religion against which Proclus waged constant war, banished him from this city. Allowed to return, he acted with somewhat more prudence and circumspection, and only allowed his most approved disciples to take part in the nightly assemblies in which he propounded his doctrines. He died in 485, in his full vigour, and in the entire possession of all those mental powers, for which he was no less remarkable than for his personal beauty and strength.

As to his system, some modern philosophers have exalted it to an extent which his own writings scarcely warrant. Victor Cousin holds that he has concentrated in it all the philosophical rays which emanated from the heads of the greatest thinkers of Greece, such as Pythagoras, Plato, and Aristotle. The predominant law of development is *triadic* in character. The existence of what is produced in that which produces it, its emergence from it, and its return to it (*μονή, πρόοδος, ἐπιστροφή*) are the three moments, by the continued repetition of which the totality of things is developed from their origin. The final source of this development is the original essence, elevated above all being and knowledge, between which and the intelligible there intervenes an intermediary member—the absolute unities (*αὐτοτελεῖς ἑνάδες*), together forming the single supernal number. Next to this comes the three spheres of the intelligible, the intellectual-intelligible (*νοητὸν ἅμα καὶ νοερὸν*), and the intellectual. The chief property of the first is being; of the second, life; of the third, thought. Of these spheres the first two are again divided into three triads each, and the triad again into hebdomads, each separate member regarded as a divinity. The soul is made of three kinds of part-souls—divine, demonic, and human. Of these the divine fall into three orders: the four triads of hegemonic gods, an equal number of gods free from the world (*ἀπόλυτοι*), and the gods within the world, who are divided into star-gods and elementary gods. The demons are divided into angels, demons proper, and heroes. The soul enters temporarily into the material body, but it does not create matter, which comes directly from the unlimited —with the limited and the mixed, the components of the first intelligible triads. Space he considers as a body consisting of the finest light, which body penetrates that of the world. He distinguishes the principle of unity or divinity in the soul from thought or reason. It is capable by divine illumination of mystic union with the Deity. Indeed, faith alone is essential to the attainment of Theurgy, which, comprising mantic and supernatural inspiration, is preferable to all human wisdom; and in this Proclus chiefly differs from Plotinus, with whose system he agrees in most other respects.

There is no edition of the complete works of Proclus, but that of Victor Cousin (6 vols. 8vo. Paris, 1820) contains the *Commentaries* on the *First Alcibiades* and the *Carmenides*, and the treatises *De Libertate, Providentia, et Malo* (in a Latin translation); his second edition (1 vol. 4to, 1864) contains in addition to these the *Hymns*. Thomas Taylor, 'the Platonist,' published in 1788–89 translations of the *Commentary on Euclid*, with the Life by Marinus; the Six Books on the *Theology of Plato* in 1816; the *Commentaries* on the *Timæus* in 1820; the *Fragments* on the Lost Writings in 1825; *On Providence*, and *On Evil*, in 1833. The *Commentarius in Platonis Timæum* (ed. by Schneider, Breslau, 1847) was the one among his treatises that Proclus esteemed most highly. See Zeller's *Philos. der Griechen* (3d ed., 1881, iii. 2), and other books named under NEOPLATONISM.

Proconsul, a Roman magistrate not holding the consulship, who was invested with powers nearly approaching those of a consul, not, however, extending over the city and its vicinity. The proconsul was, at first, one who had held the office of consul, whose *imperium* was prolonged to enable him to bring an unfinished campaign to a close. The duration of the office was a year. During the later period of the republic, when the consuls were expected to spend the year of their consulate at Rome, they were generally appointed at its close to undertake, as proconsuls, either the conduct of a war in some province, or its peaceful administration. Occasionally the office of proconsul, with the government of a province, was conferred on a person who had never held the consulship. Under Constantine parts of certain dioceses came to be governed by proconsuls.

Procop, ANDREW, the Hussite leader, was born in 1380. Originally a monk, he served under Ziska, and on Ziska's death became commander of the Taborites. It was under his command that the fearful raids into Silesia, Saxony, and Franconia were carried out (see HUSSITES), and he repeatedly defeated German armies. He and his colleague, Procop the Younger, headed the internal conflict of the Taborites with the more moderate Calixtines: and in the battle with the Bohemian nobles at Lipau, near Böhmischbrod, on the 30th May 1434, both the Taborite commanders fell.

Procopius, the most eminent of the Byzantine historians, was born at Cæsarea, in Palestine, towards the close of the 5th century, and, having studied law, was taken by Belisarius in his train when he led the Roman armies against the Persians (526 B.C.), the Vandals in Africa (533), and the Ostrogoths in Italy (536). He appears to have displayed remarkable practical as well as literary talent, for he was on two occasions placed at the head of the commissariat. Returning to Constantinople shortly before 542, he was highly honoured by Justinian, and appointed prefect (if it was this Procopius) of the metropolis in 562. His death occurred, it is thought, about three years later. Procopius's principal works are his *Historiæ* in eight books (two on the Persian war, from 408 to 550; two on the war with the Vandals, from 532 to

546; and four on the Gothic war, going down to 552); *De Ædificiis*, or six books on the buildings executed or restored by Justinian; and *Anekdota*, or *Historia Arcana*, a sort of *chronique scandaleuse* of the court of Justinian, in which the emperor, his wife Theodora, Belisarius, *his* wife Antonina, and other distinguished persons, are depicted in the darkest colours. The most valuable of these productions is undoubtedly the first, in which Procopius writes with the clearness and fullness of knowledge that might be expected of a man who had been an eye-witness of much of what he narrates, and who had occupied a position that fitted him to thoroughly understand what he had seen. He is the principal authority for the reign of Justinian. The best edition of his complete works is that by Dindorf (3 vols. Bonn, 1833–38). See an article by Renan in his *Essais de Morale et de Critique* (3d ed. 1867).

Procrustes (Gr. *Prokroustēs;* from *prokrouein*, 'to beat out,' 'to stretch out'), the surname of a celebrated robber of Attica, named Damastes, or Polypemon. All who fell into his hands he placed on a bed which was either too long or too short for them, but to which he adjusted them either by racking or by amputation till they died. This he continued to do until Theseus overpowered him, and made him suffer the tortures he had inflicted on others.

Procter, BRYAN WALLER ('Barry Cornwall'), was born in London, 21st November 1787. Educated at Harrow, with Byron and Peel for schoolfellows, he was articled to a solicitor at Calne, about 1807 came to London to live, and in 1815 began to contribute poetry to the *Literary Gazette*. In 1816 he succeeded by his father's death to about £500 a year, and in 1823 married Basil Montagu's stepdaughter, Anne Benson Skepper (1799–1888). He had meanwhile published four volumes of poems, and produced a tragedy at Covent Garden, whose success was largely due to the acting of Macready and Kemble. He was called to the bar in 1831, from 1832 to 1861 was a metropolitan commissioner of lunacy, and died 4th October 1874.

His works, issued under the pseudonym 'Barry Cornwall' (a faulty anagram of his real name), comprise *Dramatic Scenes* (1819), *A Sicilian Story* and *Marcian Colonna* (1820), *The Flood of Thessaly* (1823), and *English Songs* (1832), besides memoirs of Kean (1835) and Charles Lamb (1866). The last is always worth reading; but his poems may be safely neglected by the student of poetry, for they rarely are more than studied if graceful exercises, harmonious echoes of bygone and contemporary singers; in Mr Gosse's words, 'his lyrics do not possess passion or real pathos or any very deep magic of melody, but he has written more songs that deserve the comparative praise of *good* than any other modern writer except Shelley and Tennyson.' Yet 'Barry Cornwall' will be remembered as the man whom every one loved—that every one including a hundred of the greatest of the century: Lamb, Wordsworth, Coleridge, Leigh Hunt, Keats, Landor, Scott, Tennyson, Browning, Matthew Arnold, Swinburne, Hazlitt, Macaulay, Carlyle, Dickens, and Thackeray were only a few of his numberless friends and acquaintances.

See *Bryan Waller Procter: an Autobiographical Fragment* (1877), edited by Coventry Patmore; an article thereon in the *Edinburgh Review* for April 1878; the critical introduction by Mr Gosse in Ward's *English Poets* (2d ed. 1883); and a long obituary of Mrs Procter in the *Academy* for 17th March 1888.

ADELAIDE ANNE PROCTER, Barry Cornwall's daughter, was born in London, 30th October 1825, and died there 3d February 1864, having in 1851 become a Roman Catholic. By her *Legends and Lyrics* (1858–60), first written some of them for *Household Words*, she won no small poetical renown.

Proctor, or PROCURATOR, one who acts for another. This name was formerly given to a class of practitioners in the English Admiralty and ecclesiastical courts; but proctors are now merged for almost all purposes in the general body of solicitors. The King's or Queen's Proctor is an officer (now the Solicitor to the Treasury) who intervenes to oppose a petition for divorce if he has reason to suspect fraud or collusion. The clergy appoint proctors to represent them in the convocation of their province.

In each of the universities of Oxford and Cambridge there are two proctors, whose duties are to preserve the peace of the university, to repress disorders among the students, and inflict summary academical punishment. They have the command of the academical constabulary, and have also an extensive police jurisdiction in the town. They patrol the streets after dark, attended by officers popularly known as 'bull-dogs.' The proctors must be Masters of Arts, and are chosen by the colleges according to a certain rotation. They nominate two pro-proctors to be their deputies and assistants. The summary authority of the proctors extends both to undergraduates and Bachelors of Arts. They vote in the election of some of the professors and other officers. At Durham also there are two proctors, who, however, do not personally patrol the streets, and have command over only the university police.

Proctor, RICHARD ANTHONY, astronomer and popular author, was born at Chelsea in March 1834. He was educated first at King's College, London, and then at St John's, Cambridge, where, however, he devoted himself chiefly to athletics. He graduated in 1860 as twenty-third wrangler. His first literary venture was, in 1865, an article on 'Double Stars' in the *Cornhill Magazine*, and from that time he devoted himself to astronomy. In 1866 he was elected an F.R.A.S., and in 1872 its honorary secretary, but he retired in 1873 to make a lecturing tour in America. About this time he communicated to the R.A.S. some important papers on 'The Construction of the Milky Way,' 'The Transit of Venus,' 'Star Distribution,' &c.; and his name is associated with the accurate determination of the rotation of the planet Mars, and with the theory of the solar corona. One of his undertakings was the charting of the 324,198 stars contained in Argelander's great catalogue. His science magazine *Knowledge* was founded as a weekly in 1881, and became a monthly in 1885. He died at New York, September 12, 1888. He was a man of untiring energy, and, although the author of fifty-seven books, he found time to cultivate music, and was a great chess and whist player. As an author and lecturer he succeeded in interesting in astronomy a large public in America and the colonies as well as in England. In 1890-91 a memorial teaching observatory was erected in his honour near San Diego, California.

Among his works are *Saturn and its System* (1865), *Handbook of the Stars* (1866), *The Constellation Seasons* (1867), *Half-hours with the Telescope* (1868), *Other Worlds than Ours* (1870), *Star Atlas* (1870), *Light Science for Leisure Hours* (1871), *The Sun* (1871), *The Orbs around Us* (1872), *Essays on Astronomy* (1872), *The Expanse of Heaven* (1873), *The Moon* (1873), *The Borderland of Science* (1873), *The Universe and the coming Transits* (1874), *Our Place among Infinities* (1875), *Myths and Marvels of Astronomy* (1877), *The Universe of Stars* (1878), *Treatise on the Cycloid* (1878), *Flowers of the Sky* (1879), *The Poetry of Astronomy* (1880), *Mysteries of Time and Space* (1883), *The Universe of Suns* (1884), *The Seasons* (1885), *Other Suns than Ours* (1887), *Old and New Astronomy* (nearly completed in MS. at his death, and published 1888–90).

Procurator-fiscal, a legal officer in Scotland at whose instance criminal proceedings are taken in the local and inferior courts. He is appointed by the sheriff with the approval of one of the principal secretaries of state, and is not removable from office except for inability or misbehaviour, on a report by the Lord President and the Lord Justice-clerk. His business is to take the initiative in the prosecution of crimes. There being no coroner's inquest in Scotland, he does the work which that functionary does in England by way of inquiry into the cause of deaths occurring under circumstances of suspicion. Whenever he has reason to believe a crime has been committed his duty is to apply for a warrant to arrest the alleged criminal, to summon and precognosce witnesses, and to bring the case to trial. If the procurator-fiscal is informed of a crime which he thinks was either not committed, or of which there is no evidence satisfactory, he gives his concurrence merely to the private party who suggests it, but does not himself initiate the proceeding. When the procurator-fiscal takes the precognitions of the witnesses, he sends a copy of them to the crown counsel, of whom the Lord Advocate is the chief; and if these counsel think the evidence is strong enough, and warrants more than suspicion, the prosecution is proceeded with to trial.

Procyon. See RACCOON.

Prodigy. See OMEN.

Producer Gas. See GAS-LIGHTING, p. 104.

Product. See EDUCT.

Professional. See AMATEUR.

Professor, an officer in a university, college, or other seminary, whose duty it is to instruct students, or read lectures on particular branches of learning. In the early times of universities the degrees conferred on students were licenses to act as public teachers; and the terms Master, Doctor, and Professor were nearly identical in signification. As, however, the body of graduates ceased in the course of time to have any concern in public teaching, a separate class of recognised teachers sprang up, paid sometimes with salaries, in other instances by fees from their hearers. These were called professors; and in the German and Scottish universities they became the governing body, and sole recognised functionaries for the purpose of education. In the universities in which collegiate foundations prevailed, as Oxford and Cambridge, they became, on the other hand, only secondaries or auxiliaries, attendance on their lectures not being generally deemed indispensable, and the necessary business of instruction being carried on by the functionaries of the several colleges. See UNIVERSITIES, and the articles on the several universities.

The word professor is occasionally used in a loose way to denote generally the teacher of any science or branch of learning, without any reference to a university. It has been assumed as a designation not only by instructors in music and dancing, but by conjurors, athletes, and the like.

Profit-sharing was defined in a resolution of the Paris International Congress on Profit-sharing in 1889 as 'a voluntary agreement under which the employé receives a share, fixed beforehand, in the profits of a business.' It is argued and held to be proved by those in favour of the system, that profit-sharing advances the prosperity of an establishment by increasing the quantity of its product, by improving its quality, by promoting greater care of implements and economy of material, and lessens the risk of strikes, labour disputes, and the antagonism generally between capital and labour. Upwards of fifty British firms with 11,000 employés had by 1890 adopted some method of profit-sharing. Over eighty-one industrial establishments in France, Alsace, and Switzerland are working on a somewhat similar principle. Upwards of twenty-nine firms in the United States have also tried the experiment. In some of the native banks at Shanghai, every employé down to the lowest coolie has a share in the annual division of profits. Profit-sharing has been tried by firms of painters and decorators; paper, cotton, and woollen factories, &c.; and the famous *Bon Marché* in Paris. The additional fund thus coming to the workman may be paid to him directly in cash, or it may be put to his credit with a view of securing him a share in the capital of the firm, or it may be a deferred benefit for sickness and old age. The management of the business, as a rule, still remains in the hands of the capitalists.

Turgot in 1775 recognised a principle of profit-sharing, but Edme-Jean Leclaire (q.v.), a successful Parisian painter and decorator, was the first to carry it to a practical issue. He began by paying extra wages to his work-people, bonuses were then given to a few, a provident society was established which was succeeded by a distribution of profits. Leclaire by wonderful energy and capacity had risen to the front rank in his trade, and became a large employer of labour. For the benefit of his workmen he had established a mutual aid society in 1838, which he found to be 'a powerful means of moralisation and a living course in public law.' Having thus provided for the sick, as a master who had himself been a workman he remembered their hopeless condition when too old for work. He read everything he could lay his hands upon which tended to help him to improve the social condition of his workmen. M. Frégier in 1835, when making inquiries as to the condition of his workmen, suggested the participation of the workmen in the profits of the master as an expedient for doing away with the antagonism between capital and labour. There is evidence that M. Frégier did not afterwards believe in his own solution. Leclaire himself at first rejected it, and it was much later, he says, 'through cudgelling my brains, that in 1842 the thing appeared to me possible and one of the simplest to put into practice.' He had endeavoured gradually to educate his workmen up to the same point, and in January 1842 he pledged himself to this course. The men were still sceptical as to Leclaire's intentions, until an object-lesson in the shape of a bag containing £490 in coin was thrown on a table before them in February 1843. In the years 1842–47 an average of £750 was annually divided amongst eighty persons. The sum received was in proportion to annual earnings. In 1869 a deed was drawn up which stipulated that the net profits of the business should be divided into a certain fixed proportion between the managing partners, mutual aid society, and the regular workmen. Between 1842 and 1872 the mutual aid society and his workmen had received £44,000; down to 1882 the sum had reached £133,045. In 1870 the number who participated was 758, the dividend to workmen being £2465, or 14 per cent. on annual wages; in 1882 the sum of £9630 was divided amongst 998 persons. In 1884 the number was 824, the sum distributed being £9200, or about 24 per cent. on wages; in 1889 the amount was £9120. Five per cent. on the capital of 400,000 francs is, like the wages, deducted from the gross profits in order to find the net profits. Of the net profits 50 per cent. goes to labour in cash, 25 per cent. to management, and 25 per cent. to the provident society, which has now become half owner of the capital of the firm. The effect of all this on the workmen has been to make them sober, thrifty, and industrious. Other painters and decorators in Paris followed suit. When called a philanthropist, the founder said: 'I am simply a business man. I would rather gain 100,000 francs and give away 50,000 than gain 25,000 and keep the whole for myself.'

The Co-operative Paper Works, Angoulême, founded by M. Laroche-Joubert, adopted a system of profit-sharing in entire independence of Leclaire. The dividend is payable in cash; provision is made for the admission of workmen shareholders, and by 1890 one-fourth of the shares were in their hands. The workmen have no part in the management. In the years 1879–88 the sum distributed over and above wages was £44,880.

In Messrs Godin's iron-foundry, Guise, employing about 1600 hands, the workmen's share of profits accumulates towards the purchase of shares in the firm. The first method adopted was that of the bonus; then the system of benefit societies; and for many years payments in cash. In 1880 the sum paid in interest on workmen's capital was £9200, and in wages £75,000; the number of workmen participating was 550; in 1889 the number was 961. M. Godin said that 'ever since the system was established the workmen are interested in improving the output; they are quick at pointing out sources of loss and defect, and they exert themselves to make new suggestions.' Mr Lowry Whittle, in his report to the Board of Trade, says that out of a squalid, ignorant peasantry M. Godin has produced an industrial community with the discipline of a regiment and the commercial alertness of the market-place. Since 1881 M. Piat, of the iron-foundries at Paris and Soissons, has distributed a portion of net profits. In M. de Courcy's plan 5 per cent. of the profits are set aside every year to form a fund upon which every employé, after twelve months' service, has a claim in the proportion of his year's salary to the total amount of profits set aside.

But those who have tested any system of profit-sharing declare that it requires much time and pains to produce substantial results; and a difficulty in working the system is that profit-sharers are not unfrequently unwilling to share the losses of the concern. In France there was founded in 1878 a society for facilitating the practical study of the different kinds of profit-sharing, which issues a quarterly *Bulletin de la Participation aux Bénéfices*. Both on the Continent and in America there have been experiments made in co-operative farming, fishing, market-gardening, and co-operative workshops. Alfred Dolge, of Dolgeville, New York state, a Saxon by birth, the largest manufacturer of felt shoes and piano felt, &c., in the United States, has in operation a system of what he calls earning (not profit) sharing amongst his employés, which originated in the conviction that in the creation of wealth certain of the employés contribute a larger share than is represented by their wages, and are entitled to something more than the wages proper. These real earnings can be determined by book-keeping, irrespective of any market-rate of wages. He claims that it is the selfish interest of every employer, as a means of actual ultimate gain, to find out what the earnings of each of his workmen are. The main features of the Dolge scheme are: a pension scheme, insurance endowment, and various benevolences. (1) Under the pension scheme a workman over 21 years of age, and under 50, after ten years' service, in case of partial or total inability to work, is entitled to a pension at the rate of 50 per cent. of wages earned during the year preceding; rising to 100 per cent. after twenty-five years' service. The pension fund is paid from yearly contributions set aside by the firm on behalf of each workman, and in 1891 it was reported that it would soon be self-supporting. (2) Fifteen years of service entitles to three insurance policies of $1000 each: 75 policies of a value of $138,000 were existing in 1891. Over $20,000 had been paid in premiums by the firm. (3) The endowment money is the sum credited each year on account of more work done than has been paid for in wages; the endowment account begins after five years' service, and is payable at the age of 60 or at death. Mr Dolge, for the benefit of his work-people, has given a park of 400 acres, assisted in building houses, maintains a club-house and free library, and pays $5000 a year to the school society. Strikes and labour disputes are reported as unknown at his factories.

In Great Britain any system of profit-sharing is not of such long standing as in France. The system adopted at the Whitwood Collieries of Messrs Briggs, Yorkshire, lasted beneficially from 1864 to 1875, when it ceased on account of the participation of the workmen in a strike against reduction of wages. During that time £34,000 had been distributed in percentage on wages. This percentage was paid when the net profits exceeded 10 per cent. on the capital embarked, one-half going to the work-people in proportion to earnings. Provision was also made for the work-people securing shares when the concern became a limited liability company.

The method of profit-sharing employed by many British firms may be gathered from the first rule which is generally adopted. 'From and after the 1st of September 18— the surplus (if any) of the clear profits of the business, beyond such definite sum as is for the time being reserved to the firm for their own benefit, shall be divided into two equal parts; one thereof to be distributed (not of legal right, but gratuitously) as a bonus to the employés in the manner defined by these rules, and the other to be retained by the firm.'

See Leroy-Beaulieu, *Répartition des Richesses* (1881); Hart's *Maison Leclaire* (1883); Taylor's *Profit-sharing* (1884); Wright's *Profit-sharing* (Boston, 1886); Böhmert's *Participations aux Bénéfices* (1888); Gilman's *Profit-sharing* (1889), which contains a full bibliography; Bushill's *Profit-sharing Scheme*, with list of British profit-sharing firms; *Die gerechte Verteilung des Geschäftvertrags* (1891); Rawson's *Profit-sharing Precedents* (1891); articles by Schloss in *Contemporary Review* for 1890; *The Just Distribution of Earnings*, an account of Dolge's scheme (1890); the report to the Board of Trade by J. Lowry Whittle (1891); Bushill's *Profit-sharing and the Labour Question* (1892); and the articles CO-OPERATION, SOCIALISM.

Prognostications. See ALMANAC, and METEOROLOGY, Vol. VII. p. 155.

Programme Music. See MUSIC, Vol. VII. p. 360.

Progreso, the port of Merida, in Yucatan, from which it is 25 miles N. by two lines of railway. It stands on an open bay, exposed to every wind, and is one of the worst harbours in the world; but it has a very large export trade in heniquen (Sisal hemp).

Progression, in Arithmetic, is the succession, according to some fixed law, of one number after another. A series of numbers so succeeding one another is said to be 'in progression.' Progression may be of various kinds, but the three forms of most frequent occurrence are *Arithmetical Progression* (q.v.), *Geometrical Progression* (q.v.), and *Harmonical Progression*. If the terms of an arithmetical progression be inverted they form a series in harmonical progression; thus, 1, 2, 3, 4, 5, 6, &c. is an arithmetical progression; and 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, &c. is a harmonical progression. This series is principally important in connection with the theory of music, in determining the length of the strings of instruments. See HARMONICS.

Progression, MUSICAL. The regular succession of chords or the movement of the parts of a musical composition in harmony, where the key continues unchanged, is called Progression; where a new key is introduced it is not progression, but Modulation (q.v.).

Prohibition. See LIQUOR LAWS, and TEMPERANCE.

Projectile is the name given to any mass thrown so as to describe a path in air near the earth's surface. The path described is called the trajectory. The importance of the subject springs from its close connection with Gunnery (q.v.). Any mass projected into the air is under the action of two forces: first, its weight, acting downwards and practically constant; second, the resistance of the air to motion through it, which resistance is a function of the speed, and depends also on the form, size, and mass of the projectile.

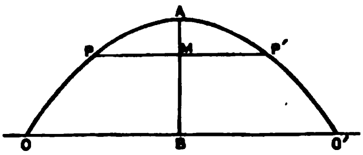


Fig. 1.

If we consider the action of gravity alone, the problem is a very simple one. Since the force of gravity is always vertical, there can be no change in the value of the horizontal component of the velocity. The projectile, projected from any point O (see fig. 1) at any inclination, will some time or other reach the highest point A. At this point the vertical velocity will be zero; and, if the horizontal velocity were here suddenly reversed, the projectile would travel back along the same trajectory to O. As it is, the projectile proceeds along the path AO′, which must be exactly similar to AO. In short, the trajectory is symmetrical about the vertical line drawn through the highest point A. Reckoning from A, let us suppose the projectile to reach P′ after *t* seconds. Then, if the horizontal velocity is *v*, the distance of P′ from the vertical line AB—P′M namely—is measured by the product *vt*. But the projectile in falling through the height AM has acquired a vertical velocity *gt*, where *g* is the acceleration due to gravity. Thus the space fallen through, being measured by the product of the average speed and the time, is

$$AM = \tfrac{1}{2}gt^2 = \tfrac{1}{2}g\mathrm{MP}'^2/v^2 = \tfrac{1}{2}g\mathrm{MP}^2/v^2.$$

The trajectory is therefore a Parabola (q.v.) with its axis vertical.

If we suppose the projectile to be projected with a velocity whose vertical and horizontal components are respectively u and v, then the angle of projection has its trigonometrical tangent equal to u/v. The time taken to reach the highest point is u/g; and the total range on the horizontal plane is

$$OO' = 2.OB = 2\,vu/g.$$

If we interchange v and u so that the tangent of the angle of projection becomes v/u, instead of u/v, we get still the same range. Generally, then, a given point, O′, can be reached by two trajectories with the same initial speed of projection. It is easy to show that the two corresponding directions of projection are equally inclined to the line that makes 45° with the horizontal; and the range is greater according as the components u and v of the given initial velocity are less unequal in magnitude. The greatest range is attained when $u = v = V/\sqrt{2}$, V being the total velocity of projection—i.e. when the angle of projection is 45°. In this case the range is V^2/g. Thus, to throw a ball to a distance of 100 yards or 300 feet it is necessary to project it with a velocity of at least 100 feet per second (nearly). Practically, however, because of the atmospheric resistance, it would need a distinctly greater speed of projection than that just given to attain the desired range.

A very simple observation suffices to show that the parabolic trajectory is only approximately realised in air. A well-driven cricket or golf ball will be seen to a spectator suitably placed to describe a trajectory which is distinctly asymmetrical about a vertical line through the highest point. The path will be found to be less curved during the ascent than during the descent; while the highest point is considerably nearer the end than the beginning of the trajectory. In fig. 2 the general character of a real trajectory, AB′, is compared with the parabolic trajectory, AB, which would have been described if the air had offered no resistance. AT shows the direction of the initial projection. The same features causing deviation from the parabolic form are still more characteristic of the long flat trajectories of cannon-balls. These, projected with very high speeds, have their approximately horizontal velocities rapidly cut down in the earlier stages by the resistance of the air.

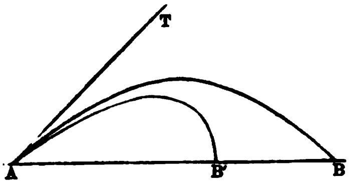


Fig. 2.

The first approximately accurate ideas of the resistance presented by the air to bodies moving through it at high speeds were obtained by Robins (see BALLISTIC PENDULUM). In our own times Bashforth, by means of his electric chronograph, has elaborately investigated the subject (see his *Motion of Projectiles* and *The Bashforth Chronograph*, 1890, the authoritative treatises on this branch of gunnery). Bashforth's results indicate that up to velocities of from 800 to 900 feet per second Newton's theoretic law that the resistance varies as the square of the speed holds practically true. The same law (but with a different coefficient) holds for all measured velocities above 1300 feet per second; but between the limits named the resistance depends on higher powers of the speed. Between the velocities of 1000 and 1100 feet per second—the velocity of sound in air, in fact—the resistance grows very rapidly, varying for a certain interval as the *sixth* power of the velocity. The resistance also depends on the form of the projectile, a spherical shot being nearly twice as much resisted as an ogival-headed shot of the same diameter and weight. For different sized projectiles of the same form the retardation due to the resistance is directly as the square of the diameter and inversely as the weight. It is usual to express the diameter in inches and the weight in pounds; and the following numbers are for an ogival-headed projectile, whose weight in pounds equals the square of its diameter in inches. The first line gives the velocity and the second the corresponding resistance-acceleration (negative):

Velocity.........	1500	1200	1100	1000	900	800	400
Acceleration	318	183	143	79	54	39	10

For a sphere of same weight and size, the resistance-acceleration for speeds lower than 850 feet per second is given by the formula $1{\cdot}183 \times 10^{-8}v^2$, where v is the velocity. From this it may be shown that such a sphere falling in air can never attain a velocity of 522 feet per second. If projected downwards with a greater velocity it will be retarded, since the resistance due to the atmosphere is greater than the weight of the body. If projected upwards with a speed of 800 feet per second it will reach a height of only 5112 feet instead of nearly 10,000, and will return to earth again with a velocity of 351 feet. These results show why a meteoric stone never reaches the earth's surface with a velocity of more than a few hundred feet per second. It matters not with what relative speed the meteor may meet the earth. Once it gets into the atmosphere its kinetic energy is rapidly dissipated in heat, and much of its substance volatilised at the high temperature that results. Our atmosphere, in fact, acts as a practically perfect shield to meteoric bombardment.

For projectiles discharged from firearms, see the articles on Bullet, Cannon, Cartridge, Firearms, Gun, Rifles, Shell, Shot.

Projection is the representation on any surface of objects or figures as they appear to the eye of an observer. It thus includes Perspective (q.v.), and is most simply illustrated by the shadow of an object thrown by a candle on a wall; the shadow being the projection and the place of the light the position of the eye. The theory of projections is of great importance, both in mathematics and geography, being, in the former case, perfectly general in its application, while in the latter only the projection of the sphere is required. Projections of the sphere are of various kinds, depending upon the position and distance of the eye from the sphere, and the form of the surface on which the projection is thrown; thus we have the *orthographic*, *stereographic*, *globular*, *conical*, and *cylindrical or Mercator's* projections, all of which are treated of under the article MAP. Another projection frequently employed is the *gnomonic*. In the gnomonic projection the eye is supposed to be situated at the centre of the sphere, and the surface on which the projection is thrown is a plane surface which touches the sphere at any one point (called the *principal point*). It is evident that a map constructed on the gnomonic projection is sensibly correct only for a circular area whose circumference is at a small angular distance from the principal point. From the position of the eye in the gnomonic projection (which is not suited for representing large portions of the earth's surface) it follows that all great circles or portions of great circles of the sphere are represented by straight lines, for their planes pass through the eye. The gnomonic projection derives its name from its connection with the mode of describing a gnomon or Dial (q.v.). The gnomic and stereographic projection of crystals is described and illustrated at CRYSTALLOGRAPHY.

Prolapsus Ani is a common affection of the termination of the intestinal canal, and consists in an eversion of the lower portion of the rectum, and its protrusion through the anus. It may depend on a naturally relaxed condition of the parts, as in infancy, or may be caused by violent straining in cases of costiveness, piles, &c. Whenever it occurs the parts should be washed, and if possible replaced by careful pressure with the hand; and if they do not easily return the forefinger should be oiled and pushed up into the anus, and it will convey the protruded intestine with it, after which the patient should retain the recumbent position for some hours. If it cannot be returned by the above means surgical assistance should be at once sought. In order to remove the tendency to prolapsus the patient should regulate his bowels so as to avoid costiveness, should sponge the parts after every evacuation with cold water or soap and water, and if necessary use astringent injections, as, for example, a weak solution of sulphate of iron, 1 grain to the ounce. In young children the power of straining, and therefore the tendency to the occurrence of the protrusion, may be much diminished by preventing their feet from resting on the ground during defecation. Dr Druitt (in his *Surgeon's Vade Mecum*) recommends a plan first suggested by Dr M'Cormac—viz. that when the stools are passed the skin near the anus should be drawn to one side with the hand so as to tighten the orifice. If after the adoption of these means the bowel continues to descend certain surgical means must be resorted to, as destroying a portion of the relaxed mucous membrane by the application of nitrate of silver or nitric acid, or removing a part of the loose skin surrounding the orifice, with or without portions of the mucous membrane as well.

Prolapsus Uteri. See WOMB.

Proletariate, a term used to denote the lowest and poorest classes of the community. It is derived, through the French, from the Latin *proletarii*, the name given in the census of Servius Tullius to the lowest of the centuries, who were so called to indicate that they were valuable to the state only as rearers of offspring (*proles*). The word has come much into use in the literature of Socialism (q.v.); see also MARX.

Prologue, a preface or introduction to a discourse or poem, as the *prologue* to Chaucer's *Canterbury Tales;* but more especially the discourse or poem spoken before a dramatic performance, corresponding to the Epilogue (q.v.) at its close. This usually stands outside the action of the piece, an external adjunct to it, being, indeed, a mere address to the public occasioned by the play. The introduction proper, again, belongs to the action itself, and this we find provided for in the prologue of Euripides, spoken by one of the characters, in narrative form, half within and half without the action; in the separate *induction* of many old English plays; and in the preludes and prologues of modern dramas like *Faust.*

Prometheus, a great culture-hero of Greek mythology, the son of the Titan Iapetus and of Clymene, brother of Atlas, Menœtius, and Epimetheus. Hesiod tells his history as follows: Once, under the reign of Zeus, when men and gods were disputing with one another at Mecone as to which portions of the victims at sacrifices were to be given to the gods, Prometheus, to outwit Zeus cut up an ox, and placed on one side the best parts covered with offal, on the other the bones covered with fat. Zeus was asked to choose, but, finding the deceit practised upon him, avenged himself on the mortals by withholding from them the fire necessary for the cooking of the meat; whereupon Prometheus stole it in a hollow fennel-stalk, and brought it to them. Zeus next caused Hephæstus to mould a virgin of wondrous beauty, Pandora (q.v.), whom Epimetheus was unwise enough to receive as a present from Hermes, and thus brought through her all imaginable ills upon humanity. Prometheus himself was chained to a rock, and an eagle sent to tear his liver by day, while Zeus caused it to grow anew during the night. At length Hercules killed the eagle, and by the permission of Zeus delivered the suffering Prometheus. Thus far Hesiod's legend. In the splendid tragedy of Æschylus, the *Prometheus Vinctus*, Prometheus is an immortal god, a friend of the human race, who does not shrink from opposing the evil designs of Zeus against mankind, and even from sacrificing himself for their salvation. He is the long-suffering hero, who, although overcome by Zeus's superior might, yet does not bend his mind. He takes from man the evil gift of foreseeing the future, but gives him the two infinitely superior gifts of hope and of fire; and he is the inventor of architecture, astronomy, writing, figures, medicine, navigation, the mystery of prophecy, the arts of metal-working, and all other arts which embellish and adorn life. For these boons conferred on the human race he is by Zeus's order chained to a rock in Scythia by Hephæstus, who fulfils this task reluctantly. Here he is visited by the Oceanides, by Io, and by Hermes, who endeavours to find out that which Prometheus alone knows, who will be the son of Zeus and his successor. Refusing to divulge this secret, he is struck by Zeus's lightning and hurled into Tartarus, whence he only re-issues after a time to undergo new sufferings. He is now fastened to Mount Caucasus, and the eagle, an offspring of Earth and Tartarus, comes to torment him daily. Cheiron the Centaur at last offers himself to supply the place of Prometheus in Hades—for on no other condition was he to be liberated than that some other immortal should offer himself in his stead. Cheiron, incurably wounded by Hercules, is accepted by Zeus. Other legends give a varying account, and make Prometheus the creator of man out of earth and water. Many have been the explanations of this myth, as that it represents the human mind in the consciousness of its own power, refusing to obey implicitly the will of Zeus. There can be no doubt that Prometheus is a culture-hero, analogous to the Maori *Mani*, and the Finnish *Wainamoinen*. The possession of fire to early man was a matter of enormous importance, and the legend of its being originally stolen from heaven by a primeval hero is very widely spread over the world. The Greek name means 'fore-sight;' Epimetheus ('after-thought') is obviously its opposite; and the beautifully ingenious identification of the solar mythologists with the Sanskrit *Pramantha*, the fire-stick of the Hindus, may be disregarded in the face of the existence of the myth far beyond the possible range of Aryan influence.

See the article FIRE, p. 630; E. B. Tylor's *Researches into the Early History of Mankind* (1865), and Kuhn, *Die Herabkunft des Feuers* (2d ed. 1886); older books on the myth by Weiske (1842) and Lasaulx (1843), and monographs by Holle (Berl. 1879) and Milchhöfer (Berl. 1882).

Promise. See CONTRACT, MARRIAGE.

Promissory-note, a written promise by one person (the maker) to pay another (the payee) or bearer a sum of money either on demand or on a future day. It is in the following form:

£100. LONDON, *1st January* 189-.

Three months after date I promise to pay to Mr William Smith or order One Hundred Pounds for value received.
JOHN BROWN.

With certain necessary exceptions, such as the rules regarding acceptance, the law of a Bill of Exchange (q.v.) applies equally to notes.

Promotion in the commissioned ranks of the British army, since the abolition of the purchase system in 1870, is obtained by seniority to fill a vacancy, by selection or by brevet for distinguished services. First appointments are as a rule obtained from the militia or through the Military Colleges (see MILITARY SCHOOLS). But three commissions, one in the Royal Artillery, one in the Royal Engineers, and one in the Cavalry, are given each year to cadets of the Royal Canadian Military College, and about ten second-lieutenants' commissions in the cavalry and line to sergeants who are specially recommended and hold first-class certificates of education. Besides these last all the officers of the Coast Brigade Royal Artillery (about 48), and of the Coast Battalion Royal Engineers (12), as well as all the quartermasters (about 315) and riding-masters (about 45) in the service, are commissioned as lieutenants from the ranks. Quartermasters and riding-masters receive honorary commissions, and are promoted honorary captains and majors for length of service or distinguished conduct in the field. Other officers are usually promoted, in their regiments, when senior of their rank, on a vacancy occurring, provided that they are well reported on and have passed the necessary examinations; but to equalise promotion a step is sometimes given out of the regiment. The highest rank of regimental officer is that of lieutenant-colonel. The succeeding steps of colonel, major-general, lieutenant-general, and general are given to officers specially selected to fill some appointment carrying those ranks. The seniors have the preference if otherwise eligible and not above the age limits, which are fifty-five, sixty-two, and sixty-seven years respectively. Field-marshals, not exceeding six, are specially selected from amongst the most distinguished generals. The *brevet rank* of major, lieutenant-colonel, or colonel may be given to any officer above the rank of lieutenant, and a lieutenant may be given a captaincy in another regiment for distinguished services. By this means a young and promising officer may be brought forward and placed in an important command. Thus, a major and brevet-colonel is eligible for promotion to major-general, thereby passing over many who are senior to him in length of service; but while serving with his regiment he does duty as a major only. Such an officer must, however, have been exceptionally fortunate to have obtained at least two brevets—viz. lieutenant-colonel and colonel, for only one step is given at a time. The rules governing promotion are constantly altered by royal warrant. The above rules were dated 1889. Non-commissioned officers are promoted by selection—the seniors, if otherwise qualified, having the preference—or for distinguished service. See also COMMISSIONS (ARMY), RANK.

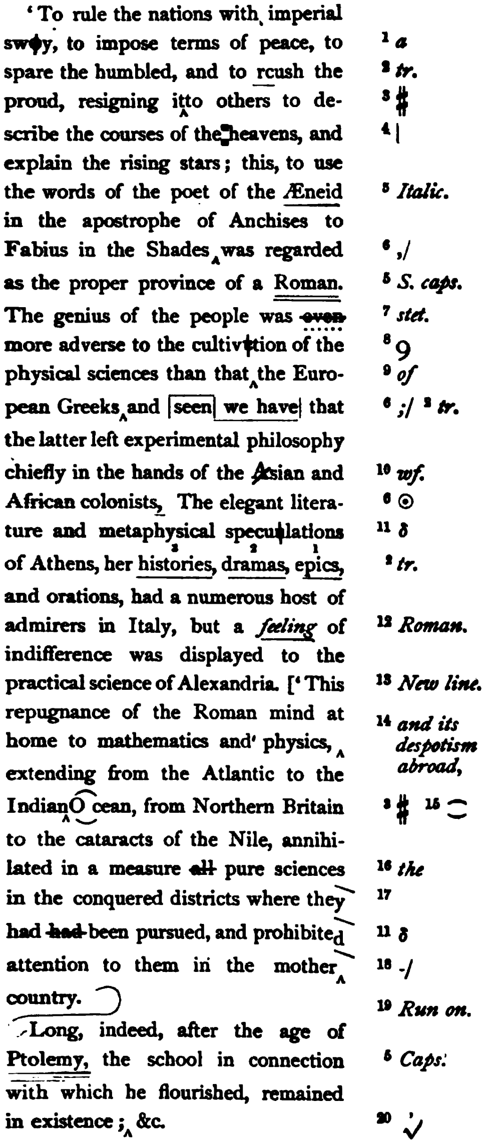
Promotion in the navy is governed partly by seniority and partly by selection. On a midshipman passing all his examinations for the rank of lieutenant, he receives his commission as sub-lieutenant, and is then advanced to lieutenant, except in a few special cases, by seniority. Those specially selected for promotion have either obtained a first-class in all subjects of examination, or else have distinguished themselves on active or other special service. Advancement from the lieutenants' to the commanders' list may be said to be by pure selection. As there are supposed to be 1000 lieutenants on the active list and only 250 commanders, it is inevitable that this should be the case. Except, however, for very distinguished service, lieutenants are not promoted before having served ten years in that rank, and the promotions are generally to be found among officers who have ten to fifteen years' seniority as lieutenants with a proportionate amount of good service. Promotion from the commanders' list to the captains' is also by selection; but there is this difference, that as the number of commanders is only some 70 in excess of the captains, any commander who puts in the requisite amount of sea-service can count, with a fair amount of certainty, on attaining his step. Captains and admirals are promoted on their respective lists by pure seniority; the three admirals of the fleet, however, are selected for good service from the list of admirals, and no admiral is qualified for selection who has not hoisted his flag in command of a squadron either as a rear- or vice-admiral.

Promotions in all the civil branches are, except for distinguished service, made by seniority alone.

Prong-horn. See ANTELOPES.

Proof. See EVIDENCE; also ENGRAVING.

Proofs, Correction of. The corrections to be made on a 'proof' of printed matter are marked on the margin; and for this purpose an established set of signs or shorthand is used. The following specimen of a proof exhibits the application of most of these signs:



'To rule the nations with imperial	
sw~~o~~y, to impose terms of peace, to	1 *a*
spare the humbled, and to rcush the	2 *tr.*
proud, resigning it‸to others to de-	3 #
scribe the courses of the▮heavens, and	4 |
explain the rising stars; this, to use	
the words of the poet of the Æneid	5 *Italic.*
in the apostrophe of Anchises to	
Fabius in the Shades‸was regarded	6 ,/
as the proper province of a Roman.	5 *S. caps.*
The genius of the people was ~~even~~	7 *stet.*
more adverse to the cultiv~~ɐ~~tion of the	8 9
physical sciences than that‸the Euro-	9 *of*
pean Greeks‸and seen we have that	6 ;/ 2 *tr.*
the latter left experimental philosophy	
chiefly in the hands of the ~~A~~sian and	10 *wf.*
African colonists, The elegant litera-	6 ⊙
ture and metaphysical specu~~l~~lations	11 δ
of Athens, her histories, dramas, epics,	2 *tr.*
and orations, had a numerous host of	
admirers in Italy, but a *feeling* of	12 *Roman.*
indifference was displayed to the	
practical science of Alexandria. [' This	13 *New line.*
repugnance of the Roman mind at	14 *and its despotism abroad,*
home to mathematics and' physics,‸	
extending from the Atlantic to the	
Indian‸O cean, from Northern Britain	3 # 15 ⁀
to the cataracts of the Nile, annihi-	
lated in a measure ~~all~~ pure sciences	16 *the*
in the conquered districts where they	17
had ~~had~~ been pursued, and prohibited	11 δ
attention to them in the mother‸	18 -/
country.	19 *Run on.*
Long, indeed, after the age of	
Ptolemy, the school in connection	5 *Caps.*
with which he flourished, remained	
in existence ;‸ &c.	20 ’ ✓

(1) A wrong letter. After every mark of correction a line / should be drawn, to prevent its being confounded with any other in the same line. (2) A word or letter to be transposed. Where letters only are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. (3) A *space* wanted. This mark is also used when the spacing is insufficient. (4) A space or quadrat *sticking up*. (5) Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. (6) Correction or insertion of stops. (7) A word struck out, and afterwards approved of (Lat. *stet*, 'let it stand'). (8) A turned letter. (9) An omission. (10) A letter of a wrong fount. (11) A word or letter to be deleted. (12) Alteration of type. (13) A new paragraph. (14) Insertion of a clause. (15) A *space* to be removed or diminished. (16) A wrong word. (17) When letters or lines do not stand even. (18) Mark for a hyphen. (19) No new paragraph. (20) The manner in which the apostrophe, inverted commas, the star and other references, and superior or 'cock-up' letters and figures are marked.

The immediate object of a 'reader' or corrector of the press is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation, abbreviations, &c., and in many cases to the verification of quotations, dates, and proper names. Where extensive alterations, omissions, or additions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs, or the suppression of those in type, should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are employed, such as newspapers and cyclopædias. The corrector has also to direct his attention to the numbering of the pages; to the arrangement of chapters, paragraphs, and notes; to running titles, &c. It is part of his business to observe the mechanical defects of the work—defective types, turned letters, inequalities of spacing between words, sentences, and lines, crooked lines, and to secure symmetry in verses, tables, mathematical operations, and such like. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, &c., even more. Lastly follows the revision, in which little more is done than seeing that the compositor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second proof for himself.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and, above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter. See Book, Printing.

Propaganda (Lat. *De Propaganda Fide*), the name of a Congregation (q.v.), and also of a College, in Rome, the object of which is to direct and forward the propagation of the Catholic religion, especially among the heathen, although Christian dissenters from the Roman Church are also included in the sphere of its operations. The institution was originated by Pope Gregory XIII. (1572–84); but it was fully organised by Gregory XV., who in 1622 established a special Congregation for the purpose. This his successor, Urban VIII., extended and endowed, annexing a college for the education of missionaries to the several countries. One great feature of that college has been to provide for such work natives of the several countries, who are conveyed to Rome at an early age for the purpose of being specially educated in all the necessary learning of a missionary. This Congregation conducts the affairs not only of the missionary countries properly so called, but also of those in which the hierarchical organisation is not full and formal. The College of the Propaganda is a noble institution, with some 200 pupils of all countries, tongues, and complexions, who are not only maintained and educated gratuitously from a very early age, but are equipped and sent forward to their several destinations at the charge of the institution. It possesses a valuable library (30,000 vols.) and museum, and a polyglot printing-press. Its great festival is the Epiphany of our Lord—His 'manifestation to the Gentiles;' and this feast is celebrated by an exhibition of exceeding interest and curiosity, at which are delivered recitations in every language represented in the College or its missions, amounting often to fifty or sixty. Of this festival Cardinal Mezzofanti (q.v.) used to be the guiding spirit.

Propertius, Sextus (for the second family-name, Aurelius, often given him there is no authority), the most impassioned of the Roman elegiac poets, was a younger contemporary of Tibullus, born about 48 B.C. in Umbria, probably at Asisium (the modern Assisi). Nearly all we know of him is gleaned from his writings, according to which he came of an undistinguished, comparatively poor family, lost his father in boyhood, and had a portion of his patrimony confiscated, after Philippi, by the Triumvirs, to reward their veterans, but retained means enough to proceed to Rome for education, and, having chosen his residence, like Virgil and Mæcenas, on the Esquiline, to make poetry the business of his life. The school then fashionable was the Alexandrian, represented by Callimachus and Philetas, and these he made his models, drawing from them his learned tone and his wealth of mythological colouring. In the political and martial movements of the time he took no part, though his patriotism was pure and strong—witness his exultation over the victory off Actium, his scorn of Cleopatra and her presumptuous ambition to dominate the mistress of the world, above all, his appeal to the Romans to renounce self-indulgence and to return to their neglected legends for the civic virtues and the heroism of 'the brave days of old.' Such was his precept; while his practice was the emotional poetic life, in the congenial society of Ovid, Virgil (whose *Æneid* he has nobly eulogised), the epic poet Ponticus, and Julius Bassus. Like them he won the favour of Mæcenas, to whom he dedicated a book of his poems, and even ingratiated himself with Augustus, whose achievements he duly celebrated. But the central figure of his inspiration was his mistress Cynthia, a lady somewhat older than he, whose real name was Hostia. For many years he cherished a glowing passion for this highly gifted and beautiful, but far from virtuous woman, till about 24 B.C. he disentangled himself from her spells. She died before him; but even after death she lived in his memory as she still lives in the poems that have immortalised her. Propertius left Rome, it would appear, only once, on a visit to Athens, when he may have experienced the shipwreck he has so vividly described. The year of his death has, with probability, been placed about 14 B.C. Of his poems only the first book, devoted entirely to Cynthia, was published during his lifetime; certainly the last of the four was given to the light, in terms of his will, by his friends. Its contents are youthful pieces, in which he celebrates the legends of early Rome in the style of Callimachus, and have a special interest in having most likely inspired Ovid to the composition of his *Fasti* —perhaps even of his *Heroides*. As a poet Propertius ranks high in Roman literature—the tone of the later criticism (with Goethe at its head) being one of increasing admiration for his native force, his eye for dramatic situation, his power over the reader's sympathies, giving the effect of reality to what in the hands of Tibullus or even Ovid is merely conventional. He has more in common with Catullus than with either of these, while he lacks the artistic graces peculiar to the three, being often rough to harshness and obscure from defect of finish.

For the English student there is an admirable text by Palmer (Dublin, 1880), and good critical notes by Paley and Postgate in their respective editions. There is no adequate translation of him in any language, Cranstoun's, in English (1875), being about the most faithful.

Property. See Heritable and Movable, Land Laws, Personalty, Possession, Real.

Prophecy. For the doctrine of prophecy and its relation to prediction, see Bible, Vol. II. p. 119. See also the works on the several prophets cited at the articles Isaiah, Jeremiah, &c.; the works on prophecy by Hofmann, Delitzsch, Tholuck, Ewald, Kuenen, Reuss; Fairbairn, *Prophecy* (1856; 2d ed. 1864); Stanley Leathes, *Old Testament Prophecy* (1880); W. R. Smith, *The Prophets of Israel* (1882); Riehm, *Messianic Prophecy* (Eng. trans. 1891).

Propolis. See Bee, Vol. II. p. 21.

Proportion, in Arithmetic and Geometry, is a particular species of relation subsisting between groups of numbers or quantities. Notwithstanding that the idea of proportion is found to exist in perfection in the mind of every one, yet a good definition of it is a matter of extreme difficulty. The two definitions which, on the whole, are found to be least objectionable are that of Euclid and the ordinary arithmetical definition. The latter states proportion to be the 'equality of ratios,' and throws us back on a definition of the term *ratio*, which may most simply be considered as the relation of two numbers to each other, shown by a division of the one by the other. Thus, the ratio of 12 to 3, expressed by $\frac{12}{3}$, or 4, denotes that 12 contains 3 four times; and the ratio of 8 to 2 being also 4, we have from our definition a statement that the four numbers, 12, 3, 8, and 2, are in proportion, or, as it is commonly expressed, 12 bears to 3 the same ratio that 8 does to 2, or 12 : 3 : : 8 : 2. In the same way it is shown that 3 : 8 : : $13\frac{1}{2}$: 36; for $\frac{3}{8}$ expresses the ratio of the first to the second, and $\frac{13\frac{1}{2}}{36} = \frac{27}{72} = \frac{3}{8}$. It will be gathered from the two arithmetical proportions here given, and from any others that can be formed, that '*the product of the first and last terms* (the *extremes*) *is equal to the product of the second and third terms* (the *means*);' and upon this property of proportional numbers directly depends the arithmetical rule called 'proportion,' &c. The object of this rule is to find a fourth proportional to three given numbers—i.e. a number to which the third bears the same ratio that the first does to the second; and the number is at once found by multiplying together the second and third terms, and dividing the product by the first. Proportion is illustrated arithmetically by such problems as, 'If four yards cost six shillings, what will ten cost?' Here, 15 being the fourth proportional to 4, 6, and 10, fifteen shillings is the answer. The distinction of proportion into *direct* and *inverse* is not only quite unnecessary, but highly mischievous, as it tends to create the idea that it is possible for more than *one* kind of proportion to subsist. *Continued proportion* indicates a property of every three consecutive or equidistant terms in a 'Geometrical Progression' (q.v.)—for instance, in the series 2, 4, 8, 16, 32 . . . , 2 : 4 : : 4 : 8, 4 : 8 : : 8 : 16, &c., or 2 : 8 : : 8 : 32, &c. In the above remarks all consideration of incommensurable quantities has been omitted. The definition given by Euclid is as follows: Four magnitudes are proportional when, any equimultiples whatever being taken of the first and third, and any whatever of the second and fourth, according as the multiple of the first is greater, equal to, or less than that of the second, the multiple of the third is also greater, equal to, or less than that of the fourth; i.e. A, B, C, D are proportionals when, if mA is greater than nB, mC is greater than nD; if mA is equal to nB, mC is equal to nD; if mA is less than nB, mC is less than nD; m and n being any multiples whatsoever. The apparent cumbrousness and circumlocution in this definition arise from Euclid's endeavour to include incommensurable quantities; throwing them out of account, it is sufficient to say that four magnitudes are proportional if, like multiples being taken of the first and third, and like of the second and fourth, when the multiple of the first is equal to the multiple of the second, the multiple of the third is equal to the multiple of the fourth. For example, take the numbers 12, 3, 8, and 2; multiply 12 and 3 respectively by such numbers as will give equal products, say by 4 and 16, the product being then 48 in both cases; the products of the remaining numbers, 8 and 2, by these multipliers are equal to one another, being both 32; and therefore these four numbers are proportional.

Prorogation, the continuance of parliament from one session to another. Prorogation not only suspends all business, but quashes all proceedings pending at the time, except impeachments by the Commons and writs of error and appeals before the House of Lords. A bill must be renewed after a prorogation as if it had never been introduced. See PARLIAMENT.

Prosecution. See CRIMINAL LAW.

Prosecutor, he who takes the initiative in bringing a person to trial on a criminal charge. In England a prosecutor may begin by taking steps to have the accused brought before a magistrate; the magistrate may send the accused for trial, or, in certain cases, he may bind the accuser over to prosecute. On a charge of perjury, conspiracy, libel, &c. the prosecutor must proceed before a magistrate, unless a judge or law officer of the crown has given him leave to prefer an indictment. In other cases, a prosecutor may, at his own discretion, begin by preferring an indictment which will come in due course before the Grand Jury (see JURY) at assizes or quarter sessions. The liberty of prosecution thus permitted is a valuable safeguard; the government cannot shield offenders by refusing to prosecute; it must, however, be remembered that the Attorney-general can always stop the trial of a prisoner by entering a *nolle prosequi*. In cases which concern the state it is the duty of the Attorney-general to prefer an indictment or information; in other cases the law was formerly content to leave the parties injured by a crime to commence proceedings at their own expense and risk. Of late years the government has shown a disposition to take upon itself the duty of prosecuting in cases where the public interest is concerned. In 1879 a public prosecutor was appointed; in 1883 the duties of this office were transferred to the solicitor to the treasury; and prosecutions are now usually undertaken by the Treasury or by local authorities. Criminal courts have also been empowered to allow costs to prosecutors; and these costs are now paid by the Treasury. In Scotland the procurator-fiscal makes inquiry in regard to crimes committed within his district; cases are prepared and conducted by the Lord Advocate or by one of his deputies; and prosecutions by private persons are practically unknown. In Ireland prosecutions are usually undertaken by crown solicitors and by counsel acting under the control of the Attorney-general. There are public prosecutors in the United States. See CRIMINAL LAW.

Proselytes (Gr. *pros-elytos*, Heb. *gerim*) was an English form of the Greek translation of the name given by the Jews to those heathens who became converts to Judaism. There were two kinds of proselytes distinguished: 'Proselytes of the Gate,'—i.e. heathen strangers, who, in order to be allowed to reside in Palestine, had undertaken to submit to the 'Seven Commandments of the Sons of Noah,' that prohibit blasphemy, idolatry, murder, incest, theft, disobedience to the authorities, and the eating of flesh with the blood in it: commandments which probably had grown out of certain restrictions originally put upon the 'strangers' by the Mosaic Law (Exodus, xii. 19; xx. 10, &c.). These 'Proselytes of the Gate,' or 'Sojourners,' could not claim all the privileges of an Israelite, could not redeem their first-born, and, at a later period, were not allowed to live in Jerusalem. The second class of proselytes was formed by the *gere hatsedek* ('Pious Proselytes'), or *gere haberith* ('Proselytes of the Covenant'). These accepted all the dogmas and customs of Judaism to their fullest extent, and were called 'Complete Israelites.'

Proserpine (in Latin Proserpina, a form of the Greek Persephone), daughter of Zeus and Demeter (Ceres). The story of her abduction by Pluto, god of the under-world, of her mother's unceasing search for her, and of her living part of the year above and part underground, is detailed under DEMETER. There can be little doubt that the myth is an expression of the revival of nature in spring after the death of winter. Proserpine was usually worshipped under the name of *Korē* ('maiden') along with her mother Demeter. The chief seats of her worship were Sicily and Magna Græcia; but she had also temples at Corinth, Megara, Thebes, and Sparta. The pomegranate is her symbol, and the pigeon and cock are sacred to her. In works of art she bears a cornucopia, or is represented with ears of corn and a cock.

See the works by Preller (1837), Förster (1874), and Overbeck in *Griechische Kunstmythologie*, 4th book (1878).

Prosody (Gr. *prosōdia*), that part of grammar which treats of the rules of rhythm in metrical composition. See METRE, RHYME, BLANK VERSE.

Prosper of Aquitaine, the zealous champion of Augustine and Augustinian doctrine against the Semi-Pelagians, was born in Aquitaine about the end of the 4th century, was a prominent theologian in southern Gaul in 428–434, and in the latter year settled in Rome. The date of his death is not known. Besides letters, *Responsiones*, and pamphlets on the doctrines of grace and free-will, he wrote a chronicle, coming down to 455 A.D., a long hexameter poem against the Pelagians, and a *Liber Sententiarum* compiled from Augustine's works. There is an edition of Prosper's works by Le Brun and Mangeant (Paris, 1711). He is sometimes called St Prosper, the 25th June being his day in the Catholic calendar.

Prossnitz, a town of Moravia, 13 miles by rail SW. of Olmütz, has celebrated corn-markets and manufactories of clothing, linen and cotton stuffs, and distilleries and breweries. Pop. (1890) 19,512.

Prostate Gland, a firm body of muscular and glandular structure which surrounds the male urethra immediately below the neck of the bladder. In size and shape it is not unlike a chestnut. It occasionally is the seat of tumours, and of acute inflammation, sometimes leading to abscess; but far the most frequent disorder to which it is subject is a chronic enlargement occurring after middle life, which is the most common cause of retention of urine at that period. See URINE.

Prostitution dates unhappily from the earliest stages of human culture, and was a recognised institution in the times of the Jewish patriarchs (Gen. xxxviii. 15). The religious prostitution of women in honour of the goddess of fertility was usual in ancient Babylonia, and was an integral portion of the worship of Ashtoreth in Phœnicia; and similar licentious orgies disgraced the worship of the Egyptian Isis at Rome. Venal prostitution was legalised at Athens, and the Romans had regular brothels. Christian kings issued at various times strenuous laws aiming at the suppression of the vice; some of the earliest examples of this legislation being found amongst the capitularies of Charlemagne. The Crusades gave a great impetus to unconcealed immorality; and in the middle ages it may be said that prostitution was recognised as a necessary and inevitable part of the social organism. In the Thirty Years' War swarms of women followed the armies of both sides. Modern states vary much in their attitude to this vice, either disregarding it, regulating it by specific ordinances, or trying to check it. In Japan (q.v., Vol. VI. p. 286) prostitution may even be regarded as an honourable self-devotion.

In the language of English law, a prostitute is a woman who carries on a course of habitual and promiscuous immorality. Acts of immorality are not always criminal; but in England a brothel or disorderly house is a nuisance, and a person who keeps such a house may be indicted and punished by fine and imprisonment; if two ratepayers make a complaint to the police the local authorities undertake the prosecution, and the expenses are paid out of the rates. The landlord of a house is also liable to penalties if it is used with his knowledge as a brothel. Special penalties are imposed on brothel-keepers harbouring thieves, and on publicans who permit prostitutes to assemble on their premises. The Criminal Law Amendment Act, 1885, deals with the offence of procuring any woman or girl to have unlawful connection with any person, or to become an inmate of a brothel at home or abroad, and with the offence of using threats, or false representations, or drugs for the same unlawful purpose. A search-warrant may be granted under the act in case there is reason to suspect that a woman or girl is detained as an inmate of a brothel. No punishment is inflicted on the men who frequent a brothel; not because the guilt of sexual vice is less in a man than in a woman, but because immoral women form a definite class of the community and immoral men do not. In the law of contract prostitution is regarded as a worthless or as an illegal consideration, according to circumstances. Thus, a bond providing for *future* illicit cohabitation is void, as being founded on an illegal consideration; a promise to pay money for *past* cohabitation is founded on no consideration at all, and is binding if made under seal. A person who lets lodgings or supplies dresses, &c. to a woman for the purpose of enabling her to live as a prostitute cannot recover the rent of the premises or the price of the goods sold. In some continental countries the law extends a certain toleration to brothels, and deals with prostitutes for the purpose of preventing the spread of venereal disease. By the Contagious Diseases Acts, 1864–68, a system of inspection was established in certain military and naval stations in England and Ireland; magistrates were empowered to order the examination and detention in hospital of women suffering from contagious diseases. As to the medical and moral results of the acts, there is an extraordinary conflict of evidence. A resolution condemning the whole system of examination was adopted by the House of Commons in 1883, on the motion of Mr Stansfeld; the acts have been repealed; and in India, where the same system was in force, it has been abolished by the governor-general in council.

See also the article CONTAGIOUS DISEASES ACTS; Wardlaw, *Lectures on Female Prostitution* (1843); Acton, *Prostitution Considered* (1857; 2d ed. 1870); Sanger, *History and Causes of Prostitution* (New York, 1858); Henry Mayhew, the extra volume of *London Labour and the London Poor* (1861); Lecky, *History of European Morals* (1869); Dr Eliz. Blackwell, *Moral Education* (1878), and *The Human Element in Sex* (1883); Sheldon Amos, *Laws for the Prohibition, Regulation, and Licensing of Vice* (1877); Powell, *State Regulation of Vice* (New York, 1878); Lacroix, *Histoire de la Prostitution* (6 vols. 1851–54); Lecour, *La Prostitution à Paris et à Londres* (3d ed. 1877); and German works by Hügel (1865), Kühn (3d ed. 1888), Huppe (1870), Schrank (1886), and Stursfeld (1887).

Protagoras, the earliest of the Greek sophists, was a native of Abdera, born about 490 B.C. Going to Athens about the middle of the century, he taught there and in other Greek cities, at home and in Sicily, a system of practical wisdom, specially fitted to train men for the duties of citizen in a Greek state, chiefly grammar, rhetoric, &c. The basis of his speculation is the proposition that 'man is the measure of all things,' a logical consequence of the teaching of Heraclitus. The *Theætetus* and *Protagoras* of Plato are devoted to a refutation of his doctrines. All Protagoras's works are lost. He himself perished at sea, probably between 421 and 415 B.C., whilst on his way to Sicily to escape a charge of atheism brought against him at Athens.

Proteaceæ, a natural order of evergreen exogenous plants, containing about 650 known species of shrubs and small trees, chiefly natives of South Africa and of Australia, and forming a remarkable feature of the vegetation of these regions. Some of them, as species of Protea and Banksia (q.v.), are frequently cultivated in gardens and greenhouses, being prized for their singular and elegant appearance, and their curious and often beautiful flowers. The timber of some of the larger species is used for various purposes; others supply much of the firewood of the Cape of Good Hope and Australia.

Protection, a theory of the proper attitude of government towards the industrial development of a nation. The protectionist believes that his government should aid in the development of the citizen and of the natural resources of the country. He also believes that this aid can often be given by the judicious stimulation of particular industries. Protection is not therefore, as is frequently asserted, a theory of foreign trade. It is true that the expression 'protective law' is sometimes confined to tariff or duty on imports which tends to increase the home production of a commodity while decreasing the amount imported. But, in the correct and broader view of the subject, all laws which tend to develop particular industries are protective.

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There are three ways in which a government can increase the amount of production in any industry. The first is by direct aid to those engaged in it. This may be accomplished through what is called in the United States an internal improvement—a term which may be applied to all works tending to increase the productive power of the country. It includes canals and railroads subsidised by government which open new fields to cultivation, dikes which keep back the water of a river, and reservoirs for the purpose of irrigation. Aid may also be extended to those engaged in an industry by a bounty or subsidy. It is true that the improvement by the government of the navigation of rivers or of harbours is often advocated by those who strenuously oppose bounties, and in fact all other forms of government aid to industry. And at first it would appear as if the payment of money in bounties simply stimulated the industry in which the payment was made, while any of the internal improvements above mentioned is an aid to all production. This is a fallacy. A canal between the Great Lakes in the United States, while it may be a considerable stimulus to the production of wheat and corn, because it brings nearer to the principal markets sections suited to these cereals, has only the most remote effect on the production of cotton. On the other hand, the effect of a subsidy or bounty is never confined to the industry in which it is paid. It always has more or less influence on all auxiliary occupations. A bounty on raising hogs, as far as it stimulated their production, would increase the acreage devoted to corn. Thus we usually find that the consistent opponent of bounties, who, at the same time, advocates internal improvements, disapproves of the former on account of the moral effect of the direct payment of money by the government to the individual. Those who oppose such payments on strictly economic grounds are likewise usually found among the opponents of all internal improvements. Both internal improvements and bounties tend to increase production in some industries more than in others. In so far they are both protective.

The history of the public lands of the United States offers a striking example of protection through a direct reward held out by the government for prosecuting definite lines of industry. Public lands could be obtained by citizens on the easiest terms (see HOMESTEADS). A great stimulus was thus given to the production of those agricultural commodities for which the soil or situation of the public lands was suited. Most of the government land was capable of growing wheat, while comparatively little was adapted to cotton. In this way there was a distinct inducement held out to the citizen to grow wheat. This fact has had a profound effect on American agricultural industry.

The second method of protection, or the stimulation of an industry, is to impose burdens on other industries. This may be done by taxation or any restrictive regulation, The result of placing a burden on a particular industry is to lessen the amount of production in that industry, the energy thus suspended being turned into new channels; and the remaining industries of the country are stimulated in varying degrees. Thus taxes on alcoholic drinks, lessening the amount consumed, decrease their production, while increasing the production of many other articles. Such laws usually give a small quota of protection to many occupations, but at the same time there are cases in which the protective effect is confined to a single industry. When there are two commodities which can be applied to practically the same purposes, the taxation or absolute prohibition of one will not only greatly retard its consumption, but greatly increase the consumption of the other. This is particularly true where the difference between the two commodities, as in the case of beet and cane sugar, or of butter and oleomargarine, is more in the method of production than in the finished commodity. The laws fettering the sale and production of oleomargarine in the United States are as much a protection to the production of the cheaper and inferior grades of butter as the bounty on beet-sugar in Germany is to the production of the beet. Again, there are other commodities which, though they differ in kind, satisfy the same general purpose. In such cases the consumption of one can be retarded or prohibited in order to protect or stimulate the other. The taxation of wool, for instance, will lead to the greater consumption of cotton; this has been one of the marked results of the tariff on wool and woollens imported into the United States. In the same way, the taxation of one article of food will very frequently have the effect of increasing the consumption of another. This kind of protection has not found much expression in legislative intention, though, as in the case of the United States tariff on wool, it has frequently been one of the marked results of legislative action. In the middle ages export duties, or the absolute prohibition of the exportation of certain articles, was a popular method of stimulating the home production of particular commodities. Thus in England, during the reign of Edward III., the exportation of wool was prohibited, not to protect the wool-growers of the kingdom, but to bring about the establishment of woollen manufactories.

The third way in which it is possible to stimulate an industry is to burden the foreign producer of the commodity which it is desired to produce at home. The home producer is given a certain monopoly either by prohibiting the importation of the foreign commodity, or by exacting a tax for the permission to import. Nearly all countries in this manner protect some of their industries. So usual has it become to place an import duty on a commodity when a nation desires to foster its production within the bounds of the nation that the word 'tariff' is often used as if it were the only form of protection. For this reason we have entered rather more minutely than otherwise would have been necessary into the other methods of accomplishing the same object. They all increase the amount produced in some industries more than in others; they equally break the principles of *laissez faire*.

It is essential to keep in mind the theoretic similarity between a tariff law and a law providing for internal improvements. The economic principles which underlie a protective tariff are also the foundation of many other activities of the modern state, which all thinkers recognise as within the province of government, and the judicious exercise of which is universally conceded as absolutely essential to the welfare of the nation. The modern free-trader attempts to sever his theory of the necessary benefits to be derived from the freedom of international trade from that conception of the functions of the state which is usually called the doctrine of *laissez faire*. Yet to theoretically maintain his position on international trade it is necessary for him to establish a universal negative. He must show that any stimulation of an industry by government is always and necessarily bad. If government cannot aid particular industries by a tariff there is no reason why it should be permitted to do so in any other way. The argument for universal free trade is therefore not only fatal to protective tariffs, but to many internal improvements, as well as to many laws dealing with the public lands of a nation. Again, by realising the theoretic similarity of a tariff law and a law providing for an internal improvement, we shall avoid the mistake made by many that the indiscriminate stimulation of any industry that is not in a flourishing condition is the object of the protectionist. An internal improvement which cost more than the benefit it conferred would be an improvement only in name. It is only when such works increase the productive power of the nation that they are truly beneficial. In the same way, though a tariff or other protective law may stimulate many industries, it is only advisable if it increases the productive power of the people. The proof of protection as a theory lies in the demonstration of the possibility under given circumstances of increasing the productive power of a nation as a whole by the stimulation of a particular industry. The demonstration of the practicability of protection lies in the proof of the possibility of knowing, with reasonable certainty, when the circumstances are such as to render protection to an industry advisable.

In any investigation into the grounds on which protection is based we should distinguish between economic and political considerations. At different periods in the history of a nation there will be a great change in the relative importance of these factors. Even among purely economic considerations the alteration of conditions causes a change in the emphasis which will be placed on different arguments. Nothing shows this more clearly than an historical review of the various considerations which have induced the people of the United States to adopt and maintain their high tariff policy. During the first fifty years of their history the American people seem to have been greatly influenced by the thought that it is more patriotic to buy home-made articles than to import from abroad. They felt that in case of war the nation should be independent. The commercial relations of the period were by no means as close as they are to-day. This fact justly gave to this argument a prominence which would be unwarranted at the present time. In the early history of the United States a great deal of stress was also very properly laid on the argument for protection to infant industries. The argument is based on the fact that to establish an industry is always a slow and expensive process. Even if it is shown that when the industry is once established its products would be raised or made at home cheaper than they can be imported, it may still be impossible to start the industry without aid from the government, or without such aid its establishment may long be delayed. If it is an agricultural industry, for instance, capital may have to be expended in preparing land for cultivation, or the people may have to learn through many failures how to raise the particular crop or care for the breed of stock. There never has been an agricultural product introduced into any country without four-fifths of the people who first undertook to produce it abandoning its cultivation as unprofitable, only to take it up again when those more persistent or with more capital have demonstrated its practicability. No clearer proof can be found of the difficulty of introducing an industry, which as it is now established is immensely profitable, than in the history of hog-raising in the western part of the United States. For years one who could raise hogs was looked upon as having a peculiar gift, simply because the majority who attempted to do so failed to make hog-raising pay. The protectionist considers that where a nation is reasonably certain that, when the industry is once fairly established, the people can obtain the product of that industry more cheaply than they now import it from abroad, but at the same time the expense of starting or developing the industry is considerable, then it is advisable for the government to aid in its establishment. The particular character of the aid given must depend upon circumstances. It may be that what is necessary to develop an industry is to open a certain section of country. Under these circumstances protection will be often wisely extended through internal improvements such as canals and railroads. On the other hand, if the people do not understand the method of production, a tariff on its importation from abroad would probably be the best method of protection. It would temporarily raise the price, and thus, holding out the hope of high profits, induce the people to make the necessary experiments in production.

Another purely economic argument for a protective tariff, which was also especially urged during the first decades of American history, is the advantage of a market for the surplus products of the soil within the boundaries of the nation rather than in a foreign country. The foreign nation is usually supplied with the same agricultural product from other nations, and very likely raises the commodity itself. The price of the exported commodity and the demand for it therefore depend on the climatic conditions of the previous year in distant countries, and is subject to great fluctuations. The violence of the fluctuations is increased by the fact that the foreign nation usually confines its demand to one or two products. The prosperity of a purely agricultural state becomes dependent, therefore, not only on the climatic conditions of distant countries, but on the condition of one or, at most, two crops. The difficulty, of course, is to determine when the extent of the fluctuation in prices renders a trade unprofitable which is otherwise advantageous. A general rule cannot be given. Each case must be examined by itself.

Closely allied to the last argument is one originally advanced by Mr Carey. He urged that a nation should maintain the proper balance of its industries. This does not mean that a people should produce things for which the soil or climate of their country is totally unfit, but rather that a nation should grow and manufacture within its boundaries all things which are suitable to the country, irrespective of the fact that they may be imported more cheaply than they can be produced at home. The proper balance of industry depends upon physical and social conditions. The cheapness of production is not the only test of the advantages to be derived from the extension of an industry. Mr Carey depended upon historical evidence to support these propositions.

All these arguments arose at a time when the country was comparatively new. They are especially applicable to immature conditions. To a young country the harmonious development of its natural resources and internal trade are much more important considerations than the ability to supply foreign markets. The foreign demand may be limited, or the changes in economic conditions witnessed in a new country rapidly growing may render it in a short time unable to compete with other nations in the production of those commodities in which it first excelled. The United States having passed beyond immature conditions, it is but natural that the arguments on which protection was advocated during the earlier stages of the nation's history should be replaced by considerations applicable to older nations.

The problems which surround the development and settling of land and the starting of manufactories mark the first period of a people's life in a new country. But as soon as large sections are thoroughly settled the problems which surround the distribution of wealth become prominent. The United States has proved no exception to this rule. In the period since the civil war the idea of protection to American labour has had great weight with the mass of voters. In many instances the labourers engaged in the protected industries are receiving higher wages than those engaged in similar occupations in Europe.

It is argued that wages would be reduced if the protective system was abandoned. At the same time it may be contended that, if the adoption of free trade by the United States would throw a large number of labourers in the protected industries out of employment, these would seek other industries, and by their competition force down all wages. This is essentially an argument from the standpoint of distribution. Arguments from production, however, are by no means wanting. In fact they are daily becoming more prominent, though owing to changed economic conditions they differ widely from those which were advanced when the country was in the first stages of its development. In the earlier decades of their history the American people protected those industries which, when once established, would soon compete with any other nation. Temporary protection was all that was contemplated. Its object was to turn the industries of the country easily and quickly into those channels in which they were ultimately destined to flow.

But experience has shown the Americans that if it is desirable to continue many of their present industries protection must be continued long after the name of an 'infant industry' has ceased to be applicable. The American protectionist, therefore, must refute the fundamental position of the modern free-trader—viz. that the cheapness of each particular commodity is always for the benefit of the whole people. For it follows from this proposition that protection can never be justified which does not, within reasonable time, reduce the cost of the commodity protected, rendering the protection itself no longer necessary. The latest arguments of the protectionist have consequently been directed towards the disproof of this proposition. It is contended that there are definite classes of circumstances in which the stimulation of particular industries, even at the expense of an increase in price of the protected commodity, will result in increasing the productive power of the nation—that is, the increased ability of the people of the nation to satisfy their desires. The laws of political economy naturally fall under two heads, subjective and objective, according as they are deduced from an investigation into the nature of man himself and his desires, or into the nature of the physical world. In looking at the physical world one notices that different countries are suited to the production of different commodities. To force peaches to grow in Canada and wheat in Cuba would be a waste of energy. At the same time it is not less true that in every part of the world the total results will be larger where there is a varied production than if the inhabitants confined themselves to raising a single crop. Another fact in the physical world which profoundly affects agriculture is what is called by economists the law of diminishing returns. It is based on the limited nature of the natural resources of a country, especially for the growth of particular commodities. If there is more than a certain quantity of wheat demanded, for instance, all the good wheat-lands being exhausted, poorer wheat-lands, requiring the expenditure of more energy per bushel, will be used to cultivate that cereal. The amount of energy which will be necessary to obtain a loaf of bread does not depend on the average energy required to produce a bushel of wheat, but on the energy which is needed to produce that portion of the wheat crop which is grown on those acres least suited for its cultivation. For as all the wheat is sold at practically the same price, that price must be high enough to compensate those who have expended the greatest amount of energy in producing it. It follows from these considerations that it is of prime importance to the country that every part of the land should be put as far as possible to its best use—that is, growing that for which it is adapted. If any land is required to grow a commodity for which it is ill suited the amount of energy which the people have to expend in order to obtain that commodity is greatly increased. If a man is left to himself he will not always use the land in the best way. By the best use is not meant that use which enables the producer to obtain directly from the land what will be for him the greatest amount of food. It is rather that use which, taking into consideration the wants and products of the rest of the world, tends to make the inhabitants of the nation obtain directly or through exchange the greatest amount of production. The protectionist contends that the peculiar economic condition of the United States, for instance, would make the adoption of free trade result in a bad use of the natural agricultural resources of the country.

Thus of all the products of the United States wheat and cotton are alone those which Europe especially demands. In cotton the United States has practically a monopoly, and its exportation is not affected by the tariff. The cultivation of wheat, however, would be greatly increased by any step in the direction of free trade. Suppose the Americans removed the duty on iron, England would send to the United States more iron than she does at present, and would buy more wheat to pay for the iron. As a result of free iron, wheat would be grown even more than at present on lands unsuited for its cultivation. It would require more energy to obtain a loaf of bread, as what has to be given in exchange for a product must compensate for the energy expended on what is produced under the most disadvantageous circumstances. The amount, therefore, which the inhabitants of the country, in which term we include the farmers themselves, would have to give for wheat would be increased. At the same time it is acknowledged that with the removal of the tariff on iron the amount of energy required to obtain a definite quantity of iron would be decreased. The protectionist argues that the people, by seeking to increase their foreign trade at the expense of home industries, would lose as consumers more than they would gain. It will be seen that the solution of the question depends upon two factors. In the first place it depends upon the proportion which wheat bears to iron in the expenses of the average man. If, on the repeal of the tariff, iron falls 25 per cent., and wheat rises 5 per cent., but the average man spends fifteen times as much in wheat as in iron, free trade in iron has caused actual loss in production. The people find more difficulty in satisfying their desires. Secondly, the solution depends upon the physical conditions of the country in respect to its capacity for wheat-raising—how far an increased demand for wheat will cause lands less suited for wheat to be planted with that cereal. From the above it will be seen that advantages of protection depend upon the particular circumstances of each case.

There is another argument which likewise attacks the major premise of the free-trader, and on which the Americans are beginning to lay some stress. This owes its origin to the fact that the desires of the Americans are at present adapted to European conditions rather than to those of their own continent. The protectionist believes that government can aid in the unconscious adaptation of the individual citizen to his environment. This can be done by the second method of protection instanced in the first part of this article; that is to say, the imposition of burdens on the commodities which satisfy the same desires as the commodity one desires to protect. To illustrate this from the use of cotton and wool in clothing. The climate of England is much damper than that of the United States. Wet cotton fibre is a better conductor of heat than wet woollen fibre. It is absolutely essential that the Englishman should have in his clothing a large proportion of wool. At the same time, cotton being more easily obtained than wool, it is a waste of energy to use the latter where the former can be employed without danger to health. The dry climate of the greater part of the United States renders it possible for the people to employ with safety a larger proportion of cotton in their clothing than is advisable in England. But the Americans, instead of taking advantage of their environment, tend to copy the fashions of London. Thus the tariff on wool and woollens, besides being defended on the ground of the protection it affords the sheep raisers, is also advocated on the ground that it unconsciously causes the people to use a larger proportion of cotton.

This review of the last two arguments by which the protectionists in the United States have supported their policy shows something beside the fact that a change in economic conditions will produce a corresponding change in the influence of different arguments. It also shows that it is easy to imagine conditions, which at the same time are not unlikely to occur, in which the adoption of a protective policy, either through a tariff legislation, internal improvements, or bounties, will increase the productive power of the nation. The universal negative which asserts that under no circumstances can the interference with free competition increase productive power is disproved. Thus much has already been admitted by free-traders. But they contend that it is impossible for any one to tell exactly when a combination of circumstances exists which would render the protection of a particular industry advisable, and therefore it is better not to interfere with international competition. The argument admits that we can easily imagine whole classes of cases in which interference with free international competition in particular commodities would be highly beneficial, but objection is made to any action being taken, because we cannot tell exactly when it would be right to interfere. As a matter of fact, this argument is not aimed at protection, but against all changes in existing laws. If for a long series of years the policy of a nation has been to protect the iron industry, then according to this objection it has no right to adopt free trade in iron, because, while some may consider it desirable, that fact depends on circumstances which we can never exactly estimate or with absolute certainty determine. There is no intrinsic difference between the legislation for the purpose of increasing the productive power of the nation and developing its resources through a tariff and through an internal improvement. The action of men and of nations is based on probabilities. The best we can do at any time is that which we believe is most probably right. It is undeniable that it is more difficult to impose a proper tariff than to decide where a canal should be built. It may also be admitted that in some cases it is much more difficult to determine when protection is desirable than in others. Each case must be examined by itself. Any one who advocates a change in existing laws should have ground for believing that the change would be beneficial; but, believing that a change would be advantageous, he need not wait until he has arrived at absolute certainty before attempting to effect that change.

We have not attempted to answer many arguments of the free-trader. For the most part these arguments either go to show what the protectionist admits or disprove follies for which he never contends. One illustration of this last tendency will suffice. It is stated by the free-trader that protectionists desire a tariff or other protective law, because they think it will increase the amount of gold and silver coinage in the country. That there are many who do not realise that the value of the exports and imports always tend to balance each other must be allowed; but that many who are influenced by reason are protectionists because they think protection adds to the stock of the nation's gold and silver we cannot believe. The attempt to impose this argument on those who advocate a tariff is similar to that which would class the modern believer of a governmental policy which seeks to develop the natural resources of the country with the advocate of the mercantile system of the middle ages and its obsolete theory of the 'Balance of Trade.' This last was the belief that the only trade which is beneficial is that which at the end of a series of transactions showed a balance in money due by the foreign to the home country. There is probably nothing in the science of economics more definitely settled than that the apparent balance of trade is no indication of its profitableness to the nation.

The thought which truly underlies all protectionist arguments is that the government of the nation, being the chief among its social organisations, should not simply be the enforcer of civil order, but that it can and should aid in the advancement of the people and in the increase of their productive power. It is impossible, even if it were desirable, to increase simultaneously all the industries of the nation. Government aid to industry, if it comes at all, must come through protection to particular industries or classes of industries. The internal improvement as well as the tariff gives a greater stimulus to one occupation than to another. The advisability of such stimulation or protection does not depend upon the fact that it increases production along certain lines, but that it enables the people to satisfy their desires more easily. The protectionist does not claim that protection is always good, or that we can tell the precise moment when an internal improvement or a tariff becomes advisable, but he does claim that under certain circumstances great good can come to a nation from judicious aid to industry; and that, though we can never tell exactly when these circumstances exist, we can sometimes be as certain as of anything else in the domain of political science.

It is proper that mention should here be made of a theory which is popularly supposed to stand midway between free trade and protection—that of the fair-trader. Speaking broadly, it may be said that a believer in the fair-trade theory advocates freely opening the ports of his nation only to those countries which on their part admit, without restriction or tax, the products of his country. There are two senses in which this general attitude may be regarded. The first is essentially non-economic. It is an outcome of a sentiment for equality and equity, or an undefined feeling that a nation is conferring a benefit on another country when she admits the products of that country free of duty, and therefore she should not do so unless a corresponding advantage is given to her by the foreign nation. Nations, however, do not open or close their ports to foreign trade for the good of foreigners, but for their own advantage. A foreign government may exact a duty on our products when imported into their country, but this is no reason why we should or should not tax their products. On the other hand, if we regard the attitude of the fair-trader as denoting a belief that his government in treating with other governments should attempt to establish those commercial relations which are most advantageous to his country, his position is essentially that of a protectionist. It may often be advisable that a nation, for the sake of gaining an advantage in one direction, should forego an advantage in another. When this principle is applied to foreign relations it finds its practical expression in what are known as 'reciprocity treaties.' It is this policy which the protectionists in the United States are at present logically assuming in negotiating their commercial treaties with foreigu nations.

See Henry Carey's works; *History of American Protective System*, by A. W. Young (1866); *Protection, a Boon to Consumers* (1867), and *The Protective Question Abroad* (1870), by J. L. Harges; *Plea for Limited Protection*, by Lord Bateman (1877; Amer. ed. 1878); *An Argument for a Protective Tariff*, by J. B. Wise (1880); *Government Revenue*, by Ellis H. Roberts (1884); *Protection to Home Industry*, by Robert Ellis Thompson (1886); *The American Protectionist's Manual*, by G. B. Stebbins (1888); *The Economic Basis of Protection*, by

Simon N. Patten (1890); *Our Sheep and the Tariff*, by Wm. Draper Lewis (1891).

[With the above article, which is by the author of the last-named work, a representative American protectionist, may be compared the article FREE TRADE, in Vol. IV., by Professor Shield Nicholson, written from the opposite point of view.]

Protective Legislation, a term applicable to legislation in promotion of Protection as opposed to Free Trade, is more specially used of legislation in favour of classes of the community thought specially to stand in need of it, the Factory Acts (q.v.) being a notable example. To the same category belong the Employer's Liability Act (see LIABILITY), the Merchant Shipping Acts, much of the legislation in regard to mines, Crofters (q.v.), and Irish tenants (see LAND LAWS). The supporters of the Laissez-faire (q.v.) theory of government, even when admitting justification for some of those measures, protest against others of them or parts of them as interfering with industry and commerce, and tending to limit freedom and establish a socialistic state-despotism. The proposal to limit the working day to eight hours is resisted on the same ground; and some extend their protest to free education, free libraries, and government measures for the housing of the poor. See *A Plea for Liberty*, edited by Thomas Mackay, with preface by Herbert Spencer (1891).

Protector, a title which has sometimes been conferred in England on the regent or governor of the kingdom during the sovereign's minority. It was given to Humphrey, Duke of Gloucester, in 1422, in the minority of Henry VI. Richard, Duke of Gloucester, was Protector in 1483, prior to his ascending the throne as Richard III. The Duke of Somerset, one of King Henry VIII.'s eighteen executors, was in 1547 constituted Protector during the minority of Edward VI., with the assistance of a council, consisting of the remaining seventeen executors; a dignity, however, which he enjoyed for but twenty months. Oliver Cromwell, in December 1653, took the title of Lord Protector of the Commonwealth of England, Scotland, and Ireland. In 1658 his son Richard succeeded to his title and authority, but was never formally installed in the Protectorate, which he resigned in the following year.

Proteids are an important class of substances, mostly of animal origin, but occurring also in the vegetable kingdom, of which egg albumen may be taken as a good example. The various members of the class are closely related to each other, and amongst them they make up the greater portion of the animal organism. The classification of the proteids is given in the article Animal Chemistry (q.v.). The most careful analyses of the various proteids show that they all closely approximate to the same ultimate composition, and contain about 53·5 per cent. of carbon, 7 of hydrogen, 15·5 of nitrogen, 22·5 of oxygen, and from ·9 to 1·6 of sulphur. The majority of the proteids exist in two modifications, the one soluble and the other insoluble in water. The latter modification can be obtained from the former by the addition of alcohol or ether, or of many mineral acids or metallic salts to their aqueous solutions. Coagulation also takes place in most cases by the application of heat, as in the case of egg albumen in boiling water. The proteids are all dissolved by strong solution of acetic acid, and by phosphoric acid. They are also dissolved by alkalies with formation of alkali sulphide. When heated with solution of mercuric nitrate containing a little nitrous acid, they assume a violet-red colour; and when the solution of a proteid substance in acetic acid is mixed with strong sulphuric acid, a violet-coloured solution is obtained, which in the spectrum shows characteristic absorption bands.

By the action of the gastric juice, of pepsin and dilute hydrochloric acid, and of several other ferments, the proteids are eventually converted into peptones. The latter are soluble in water, and are not coagulated by heating. See ALBUMEN, CASEIN, FIBRIN, and GLOBULINS.

Proteles. See AARD-WOLF.

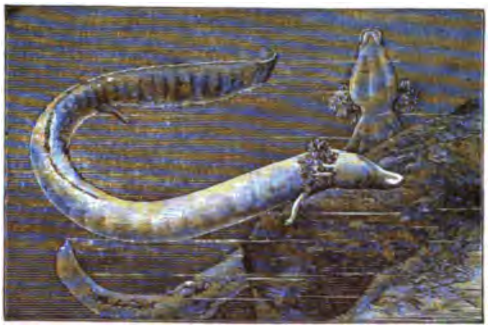
Proterosaurus (Gr. *proteros*, 'first,' *sauros*, 'reptile'), a genus of fossil reptiles occurring in the Permian system, which is the lowest horizon at which reptilian remains have as yet been detected. It is of a primitive type, and belongs to a highly generalised group of reptiles. The skull is imperfectly known, but the teeth appear to have been anchylosed to the bone, and not implanted in distinct sockets, as was at one time supposed.

Protestantenverein, an association of Protestant ministers, professors, and others belonging to the 'liberal' or advanced school of theology in Germany, formed in 1863 to promote what its members insisted was the spirit of true Protestantism in opposition to what they regarded as reactionary and obscurantist. By the orthodox and conservatives the association was denounced as rationalist or infidel; and though since 1867 it has held annual meetings in various towns throughout Germany, and has several organs in the press of the Fatherland (including the *Protestantische Kirchenzeitung* and a *Jahrbuch*), it and its members have been treated with marked disfavour by the ecclesiastical authorities, membership in the association being, it is alleged, practically a bar to appointments or preferments. See Schenkel, *Der Deutsche Protestantenverein* (new ed. 1871).

Protestantism, a term derived from the part taken by the adherents of Luther in *protesting* against the decree passed by the Catholic states at the second diet of Spires or Speier in 1529. This decree had forbidden any further innovations in religion, and enjoined those states that had adopted the Reformation so far to retrace their steps as to reintroduce the Mass and order their ministers to avoid disputed questions, and to use and explain the Scriptures only as they had hitherto been used and explained in the church. The name is repudiated by a considerable section of the Anglican Church. See CHURCH HISTORY, LUTHER, REFORMATION.

Proteus, in the Homeric or oldest Greek mythology, appears as a prophetic 'old man of the sea' (*halios gerōn*), who tends the seal-flocks of Poseidōn (Neptune), and has the gift of endless transformation. His favourite residence, according to Homer, is the island of Pharos, off the mouth of the Nile; but according to Virgil, the island of Carpathos (now *Skarpanto*), between Crete and Rhodes. Here he rises at mid-day from the floods, and sleeps in the shadow of the rocky shores, surrounded by the monsters of the deep. This was the time when those who wished to make him prophesy must catch him. But it was no easy task. Proteus, unlike most vaticinal personages, was very unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavours hopeless he resumed his proper form, and then spoke out unerringly about the future.

Proteus, a genus of tailed amphibians with persistent gills, represented by two or three species in the caves of Carniola and Dalmatia. They are lank animals, towards a foot in length; and with their peculiar habitat may be associated the pale colour of the flesh, and the embryonic state of the eyes, which are hidden beneath the surface. It has been shown, however, that sensitiveness to diffuse light persists. A nearly related genus, Necturus, lives in North American rivers and lakes. The name *Proteus animalcule* was formerly used as a synonym for Amœba (q.v.).



Proteus anguinus.

Protevangelium, a very old apocryphal gospel attributed to James, the brother of the Lord (see APOCRYPHA); also used of a primitive gospel (Ger. *Ur-evangelium*), from which it has been held several of our gospels were derived. See GOSPELS.

Protococcus (Gr., 'first-grain'), a genus of very simple unicellular green plants, one species of which (*P. viridis*) is everywhere abundant as a green film on tree-trunks and damp walls, or in stagnant rain-water. The colour is sometimes reddish, and the organism may be found passively encysted during drought, and at other times actively motile with a couple of cilia. See ALGÆ.

Protocol (Gr. *prōtos*, 'first;' and *kolla*, 'glue'), (1) the rough draft of an instrument or transaction, and more particularly the original copy of a government despatch, treaty, or other document; (2) a record or register.

Protogene (Gr., 'first-born'), a granitic rock, composed of the same ingredients as true granite, but the mica is more or less altered so as to resemble talc, for which it was formerly mistaken. It received its name because it was supposed to have been the *first-formed* granite. It abounds in the Alps, and is found also in Cornwall. The clay produced by its decomposition is greatly valued for the manufacture of china. Protogene is now recognised to be simply an altered granite.

Proto'genes, a painter of ancient Greece, was born at Caunus in Caria, and practised his art at Rhodes, where he worked steadily on through the din of the siege of 305–304 B.C. A contemporary and friend of Apelles (q.v.), he was a slow and careful painter, sparing no pains to secure a natural and finished piece of workmanship. His best-known pictures were Ialysus (a Rhodian celebrity), a Satyr, 'Paralos and Ammonias' (sacred ships of the Athenians, executed for the Propylæa at Athens), 'The Thesmothetæ' (for the Athenian senate-house), 'Alexander and Pan,' 'Cydippe and Tleptolemus,' and some portraits.

Protonopsis. See MENOPOME.

Proto-notary, a member of the College of Proto-notaries Apostolic in the papal curia, whose duties are to register pontifical acts, make and keep the records of beatifications, &c.

Protophytes (Gr. *Protophyta*, 'first plants'), a term often applied to the simplest plants, such as Protococcus in the algoid, and Bacteria in the fungoid series. See ALGÆ, BACTERIA.

Protoplasm (*proton*, 'first,' *plasma*, 'formed substance') is a technical name for living matter. The term was first applied (1846) by the botanist Hugo von Mohl to the 'slimy, granular, semi-fluid' contents of vegetable cells, but before that Rösel von Rosenhof (1755) had studied the amœba, which is a unit-mass of relatively pure living matter, Robert Brown and other botanists had watched the rotation of the living substance inside the cells of some plants, and Dujardin (1835) had described the 'sarcode' of Foraminifera as 'a glutinous, transparent, living jelly.' After Dujardin and Von Mohl had thus directed attention to 'sarcode' and 'protoplasm,' observations on both gradually accumulated, the idea began to be mooted that the two substances were essentially the same, and in 1861 Max Schultze defined the cell as a nucleated mass of living matter or protoplasm. We cannot indeed say that the protoplasm is the same in the cells of plants and animals, for the precise nature of living matter defies our analysis; but we do know that 'the physical basis of life' has in all cases some common characteristics of structure and behaviour, diverse as are the ways in which its inherent activity may be manifested.

Protoplasm may be conveniently studied in the unicellular Protozoa—e.g. Amœbæ and Foraminifera; in the colourless cells of blood; in the ova of animals—e.g. of frog and pond-snail; in young vegetable shoots; or in the cells of a simple plant, like Chara or Spirogyra. When we submit the living matter in its natural state to microscopic examination we usually see a clear semi-fluid substance, sometimes obscured by granules, sometimes with numerous bubbles or vacuoles, sometimes with hints of a fine network traversing the whole. This vacuolated and reticular structure is much more easily demonstrated after the cells have been 'fixed' and stained, and, if necessary, 'sectioned' according to the practice of microscopic technique. In this state the network-like appearance of the cell-substance has been demonstrated in a great number of cases, and we may fairly regard it as characteristic (see CELL).

As the students of structure have been led with increasing carefulness of microscopic analysis to distinguish between the netted framework and a more fluid stuff in its meshes, so many physiologists distinguish the framework as the acting part, which lives and is relatively stable, from the content which is acted on, and is in a state of physical and chemical change. It is clearly necessary to discriminate between protoplasm in the strict sense and the substances with which the genuinely living matter is associated—food-stuffs about to be or being utilised, and waste-products which result from the vital activity. The food-granules and the waste-products we can analyse—they may be respectively glycogen and uric acid; the living matter we cannot analyse, for it dies at the moment our analysis begins.

All physiologists are agreed that waste-products are formed when work is done or while life lasts, and that living organisms have a characteristic power of repair. They are ever changing, and yet they remain more or less the same. Streams of matter and energy pass into the organism; they are somehow incorporated into the living capital, work is done and waste is given off, and the organism continues from day to day, or from year to year, relatively intact. For while 'the transfer of energy into any inanimate material system is attended by effects retardative to the transfer and conducive to dissipation,' the secret of protoplasm, as expressed by Joly in the language of physics, is that 'the transfer of energy into any animate material system is attended by effects conducive to the transfer and retardative of dissipation.'

So far we have stated facts; speculation begins when we try to express the precise relations of the protoplasm to the waste and repair of the organism. Two somewhat different views must be considered. We may regard protoplasm as a complex substance or mixture of substances, which shares directly in the constant chemical and physical changes or metabolism of the organism. It is the climax of an ascending series of constructive or synthetic steps, by which food-material becomes more and more complex and unstable; it is subject as the organism lives to constant disruptive or analytic changes, which result in the liberation of energy and in the formation of simpler and simpler waste-products. Thus protoplasm is regarded as the changeful central substance in metabolism; it is continually being unmade, breaking up, and wasting as it lives; it is continually being made by the constructive processes of repair. We call the repairing or constructive process *anabolism*, and its chemically discernible steps *anastates;* we call the discharging or disruptive process *katabolism*, and its chemically discernible steps *katastates*.

But, on the other hand, we may regard protoplasm as a kind of ferment which influences the material round about it without itself being so directly affected as the previous conception implies. It is the relatively stable cause of metabolism, acting on less stable material of a less complex nature, acting upon it so that constructive anabolic processes or disruptive katabolic processes predominate for the time.

Furthermore, while all are agreed that in the life of organisms there is a characteristic alternation or antithesis between waste and repair, between discharge and restitution of energy, between katabolism and anabolism, there is difference of opinion as to the character of these antagonistic processes. The English physiologist Gaskell, prompted by his researches on the functions of nerves, some of which command activity while others induce rest, was led to regard what he called anabolism and katabolism as processes which bear to protoplasm a relation similar to that which sleep and wide-awake life bear to the organism. The 'winding-up' process of anabolism or restitution goes on (autonomically) of itself; the 'running-down' process of katabolism or discharge is determined by stimulus. Anabolism is comparable to the self-loading, katabolism to the stimulated firing of a gun. But the German physiologist Hering, prompted by his researches on colour-sensations, was led to regard what he called assimilation and dis-assimilation as two antagonistic kinds of activity, both dependent on stimuli which differ in their direction and results.

Apart from the precise biological problems which are raised when we seek to define the limits of our analytic knowledge of living matter, there is the great difficulty of forming any conception of the relation between life and its physical basis. We may cite Huxley's famous address on *The Physical Basis of Life* and Hutchison Stirling's essay *As Regards Protoplasm* as pre-eminent types of the numerous endeavours which have been made to secure accurate thinking about this supreme problem. Suffice it to say that in two ways we gain some knowledge of protoplasm or living matter. On the one hand, we know it as it is presented to our senses in living organisms, and the result of our analysis of this presentation leads us to recognise in protoplasm a marvellously subtle kind of matter and motion, or ultimately of motion. On the other hand, we have an intimate knowledge of protoplasm in our own brains, where its activity is manifested in thought. That we need not attempt to give an explanation of ultimate realities like protoplasm and thought, that thought is only a function of protoplasm, that protoplasm is only a form of thought, that thought and protoplasm are different aspects of one reality, are the respective conclusions of the agnostic, the materialist, the idealist, and the monist philosophers who have theorised about living matter.

See BIOLOGY, CELL, PHYSIOLOGY. The technical literature on protoplasm is not readily accessible, but references to researches since 1886 will be found in the annual *Zoological Record;* while some of the older investigations are cited by Prof. Geddes in the article 'Protoplasm,' *Ency. Brit.* The student will find the best introduction to modern speculations, such as those of Gaskell and Hering, in Prof. Michael Foster's article 'Physiology,' *Ency. Brit.*, in Prof. Burdon Sanderson's presidential address to the Biological Section of the British Association (Report Brit. Assoc. 1889), and *Nature*, xl. (September 1889).

Protop'terus. See MUD-FISHES.

Prototheria. See ECHIDNA, MAMMALS.

Protozoa (Gr. *prōton*, 'first,' and *zōon*, 'animal'), simple unicellular animals, contrasted with the multicellular Metazoa. Except in a few cases, each Protozoon is a single cell, a unit-mass of living matter physiologically complete in itself. Being such a unit involves being without organs and without sexual reproduction. Yet a Protozoon may have parts, and two individuals may unite in mutual fertilisation. A Protozoon is to any higher animal, from sponge onwards, as an egg-cell is to the body into which it develops. But the exceptional cases to which we referred are most important—they are loose colonies or aggregates of Protozoa. Formed by the incomplete separation of dividing units, they bridge the gulf between single-celled and many-celled animals. Simplest of Protozoa are such forms as Protomyxa, whose life is a succession of changeful phases, amœboid, encysted, flagellate. The others may be classified according to the predominance of one or other of these phases. The Rhizopoda, predominantly amœboid, include Amœba and others like it, Foraminifera, Heliozoa, and Radiolaria. The Gregarines are predominantly sluggish and encysted. The Infusorians are usually active, ciliated, or flagellate. These classes of Protozoa are discussed separately.

Prototracheata. See PERIPATUS.

Protractor, a mathematical instrument, used in drawing or plotting, for the laying down of angles. It is variously shaped, and may be circular, semicircular, or rectangular.

Proud-flesh is the popular term for coarse and too luxuriant granulations springing up on Wounds (q.v.) or Ulcers (q.v.). See also INFLAMMATION.

Proudhon, PIERRE JOSEPH, a noted French socialist, was born July 15, 1809, at Besançon, in which town his father was a poor cooper. Through the good offices of charitable friends, he received the rudiments of his education at the college of his native place, and from the first gave great promise of talent. While still very young, however, he quitted the institution in order to aid his family, who had fallen into great distress, and sought employment in a printing establishment. Here he was noted for the most punctual discharge of duty; and, in the hours not occupied in work, he contrived, by a rare exercise of resolution, to complete and extend his education. In 1830 he declined an offer of the editorship of a ministerial journal, preferring an honourable independence as a workman to the career of a writer pledged to the support of authority. In 1837 he became partner in the development of a new typographical process; was engaged on an edition of the Bible, to which he contributed notes on the principles of the Hebrew language; and in 1838 published an *Essai de Grammaire Générale*, in approval of which a triennial pension of 1500 francs was awarded to him by the Académie de Besançon. On this accession of funds he paid a visit to Paris; and subsequently contributed to the *Encyclopédie Catholique* of M. Parent Desbarres the articles 'Apostasie,' 'Apocalypse,' and others. In 1840 he issued the work entitled *Qu'est-ce que la Propriété?* ('What is Property?') which afterwards became so famous. The nature of the doctrine announced in it is sufficiently indicated in its bold paradox, soon to be widely popularised—*La Propriété c'est le Vol* ('Property is Theft'). Notwithstanding his attack on property, which gave great offence to his patrons, Proudhon held his pension for the regular time. In 1842 he was tried for his revolutionary opinions, but was acquitted. In 1846 he published his greatest work, the *Système des Contradictions Économiques.* During the revolution of 1848 Proudhon attained to great notoriety. He was elected member of Assembly for the Seine department, but he could not there gain a hearing for his extreme and paradoxical opinions. He found more adequate scope for his energy in the press, publishing several newspapers, in which the most advanced theories were advocated in the most violent language. He attempted also to establish a bank which should pave the way for a socialist transformation, by granting gratuitous credit, but failed utterly. The violence of his utterances at last resulted in a sentence of three years' imprisonment, and in March 1849 he fled to Geneva, but returned to Paris in the following June, and surrendered at the prison of Sainte Pelagie.

While shut up there he married a young working-woman. During his imprisonment he gave to the world the works entitled *Confessions d'un Révolutionnaire* (1849), *Actes de la Révolution* (1849), *Gratuité du Credit* (1850), and *La Révolution Sociale démontrée par le Coup d'État* (1852); the last of which is remarkable, in the light of subsequent events, for the clearness with which it states the alternative of *l'anarchie ou le Césarisme*, as pressed on Louis Napoleon, then president. In June 1852 he was set at liberty, but in 1858 was again condemned to three years' imprisonment, and retired to Belgium, where he continued to publish from time to time on his favourite subjects of speculation. Amnestied in 1860, he died in obscurity near Paris, January 19, 1865.

The theories of Proudhon cannot be presented in a clear or systematic form; we can only give some account of the most important of them. He held that property was theft, inasmuch as it appropriates the value produced by the labour of others in the form of rent, interest, or profit without rendering an equivalent. He maintained that one service can be duly repaid only by rendering another, whereas the owner of land and capital abuses his position by exacting all manner of service without giving an equivalent. His famous paradox respecting *anarchy*, which he regarded as the culmination of social progress, was simply an exaggerated and premature assertion of the great principle that the fully-developed man should be a law to himself—that is, the moral progress of man should make government and external law unnecessary. In the perfect society order would be secured and maintained in the absence of government through the reasonable self-control of the free individual. Laws, police, the whole machinery of government as now established are the marks of an imperfectly developed society. Personally Proudhon appears as an original and not unattractive character in the monograph of Sainte-Beuve, which unfortunately was not finished. His complete works fill 33 vols. (Paris, 1868-76); his correspondence, 14 vols. (1874).

See Sainte-Beuve, *Proudhon, sa Vie et Correspondance* (Paris, 1872); and the article SOCIALISM, and works there cited.

Prout, FATHER. See MAHONY.

Prout, SAMUEL, painter in water-colours, was born at Plymouth, 17th September 1783. He studied from nature, and sketched with Haydon through Devon and Cornwall, his drawings in the latter county being made for Britton's *Beauties of England and Wales.* In 1805 he removed to London, in 1815 was elected to the Water-colour Society, and in 1818 went to Rouen by Havre. The picturesque street-architecture and fine Gothic remains there made so strong an impression on his mind that afterwards his principal works were those in which architecture had a prominent place; and from time to time, in his after-career, he made excursions, ransacking every corner of France, Germany, the Netherlands, and Italy for picturesque architectural remains. Prout's name should be dear to all artists and amateurs, for there are few who have not been incited or instructed by his numerous elementary drawing-books, in the slightest of which talent and feeling for art are conspicuous. His water-colour drawings are characterised by decision in handling, great breadth, and clear and pleasing colouring. He died February 9, 1852.

See Ruskin's Memoir of Prout in *Art Journal* (1852); and his *Notes on the Loan Collection of Drawings by Prout and Wm. Hunt* (1879-80).

Provençal Language and Literature. The Provençal language is one of the six principal branches of Latin speech, usually classified by philologists under the title Romance languages. The name Provençal, which appears to be derived from the *Provincia Romana* of Cæsar, was not used in the earlier middle ages except in the restricted sense of the language or dialect of Provence proper. The troubadours themselves used the term *lengua romana* (or *lo romans*). The term *langue d'oc* was also known in the middle ages, but was afterwards transferred to designate a province of France. The Provençal and other Neo-Latin idioms existed as dialects of the Latin previous to the Germanic invasions, having replaced the ancient languages of Gaul. Although the Provençal and the northern French had originally sprung from the same stock, they had gradually grown distinct from one another, until at the time of the troubadours they differed almost as widely as French and Italian. The Provençal language at the time of the troubadours extended far beyond the boundaries of Provence proper. It extended over the area from the Alps to the Pyrenees and the Mediterranean to the Loire. Beyond France it was known in the east of Spain—in Catalonia and Aragon, and in the Balearic Isles—also in Savoy, Piedmont, and part of Switzerland.

The pure Provençal idiom, in which the poets of the 12th century sang, was used by the higher classes over the whole of the district referred to, but the bulk of the people knew only their own dialects—viz. the Provençal (proper), Piedmontese, Gascon, and Catalan, all of which differed but slightly from one another. At the end of the 13th century, consequent upon the establishment of the French domination in the south and the introduction of the northern French language, the literary Provençal began rapidly to disappear, while the vulgar dialects still remained; and it was in them that the compositions of the later middle ages were written. The Provençal language was more highly inflected than any of the other Neo-Latin languages, and was the earliest of these to be fixed grammatically. It was highly adapted for lyric poetry, owing to its melodiousness and its rhyming facilities. The grammarian Vidal referring to it says: 'La parladura francesca val mais et es plus avineus a far romanz et pasturellas, mas cella de Lemosin val mais per far vers et cansons et sirventes' (The

French speech is better and more suited for making epics and pastourelles, whilst that of Lemosin [i.e. the Provençal] is better for making love-songs and satires). In the modern Provençal dialects there is to be noted chiefly a greater simplicity of inflections and grammatical forms and a large admixture of French words.

The first employment of the Provençal language in writing dates back to about the 9th century. The few specimens that survive are mostly writings in Latin, but mixed more or less with Provençal words and phrases. It is to the priests and monks that are most probably due the earliest attempts at composition in the Provençal language. In order to arouse the religious sympathies of the people they composed or translated from the Latin into the vulgar idiom pious tales, allegories, legends of saints, &c. There were also introduced into the liturgy, along with the prayers and hymns in pure Latin, others in the popular dialect. In 813 at the councils of Arles, Mainz, and Tours preaching in the popular language was recommended to the clergy. Towards the close of the 11th century a revival took place in Provençal poetry consequent upon the religious wars of the Crusades and the introduction of the institution of chivalry. The influence of the Moors of Spain undoubtedly, too, had its effect in the development of Provençal poetry and culture. The poetry of mediæval Provence has much in common with that of the Moors.

Although it was in the north of France that epic poetry in the middle ages especially flourished, still in the south it was by no means so neglected as many have supposed. Among the earliest compositions in the Provençal language were undoubtedly epic romances, treating either of historical subjects, such as the struggles against the Franks or the wars with the Moors of Spain, or else of the semi-mythical deeds of Charlemagne and King Arthur which formed the basis of the Carlovingian and Arthurian (or Round-Table) legends. Of these old popular epics which were sung and so handed down from generation to generation we possess but few traces. From the middle of the 12th century epic poetry may be divided into popular and artistic. Of the first class but few specimens remain, but of the artistic epic they are more numerous, probably owing to the fact that, being recited and not sung, it was more necessary to commit them to writing.

The Provençals did not cultivate the drama like the French; in fact the only productions that might come under this head are pieces on pious subjects in dramatised form, such as the *Mystery of the Passion*, the *Marriage of the Virgin*, &c. Provençal literature was essentially poetic, and its prose works are of little importance. They were in the early period mostly translations from the Latin, sermons and chronicles—also the biographies of the principal troubadours. Later, in the 14th and 15th centuries, prose works became more numerous, and included scientific, juridical, philological, and other works. The lyric poetry is by far the best-known branch of Provençal literature. It was in lyric verse that the Provençal poets gave expression to the sentiments of chivalry and love—of that adoration and devotion to women which had become with them a sort of worship.

The word *troubadour* (in Provençal *trobaire, trobador*) is derived from the verb *trobar* (Fr. *trouver*, 'to find, invent, compose;' from Lat. *turbare*, 'to move,' meaning latterly 'to seek,' and also 'to find'). This verb was used only with reference to the composition of lyric poetry. Hence, strictly speaking, a troubadour means a poet of the lyric form. Epic poets were styled *noellaires* (Fr. *nouvellistes*, 'romancers'). The troubadours were of two classes—viz. professional and amateur. Amongst the latter were many nobles and even kings, as, for instance, Richard Cœur-de-Lion, Alfonso II. of Aragon, the Counts of Poitou, Provence, and Toulouse; of the professional troubadours also many were of high birth. Generally speaking, the latter were recruited from all ranks of society (merchants, soldiers, monks, lawyers, &c.), and they were of various grades. The majority of the troubadours led a wandering life, frequently travelling beyond the limits of their own country—more especially into Spain, visiting Catalonia and Aragon, and even Castile. Beyond the Alps they visited Piedmont, Lombardy, and Tuscany, where many of them settled. Others—mostly those who were tired of wandering—attached themselves to the households of the great feudal lords, wherein they played an important part. There were no fixed schools of poetry for learning the troubadour's art. They acquired it either by attaching themselves as pupils to some celebrated troubadour, or by visiting the great châteaux which the more distinguished poets were accustomed to frequent. The convent, too, was a great school of song; the monks had both the means and leisure to cultivate the taste for poetic composition, and there were many monks amongst the troubadours. At a later period professors of poetry established themselves in the chief towns of Provence; Peire Cardinal settled as such at Tarascon in the 13th century. The first of the troubadours of whom we know was Guillem IX., Count of Poitiers, a powerful noble of the south of France. He flourished towards the end of the 11th century. To the first half of the 12th century belong Cercamon (or *Cherchemonde*); Marcabrun, who was originally attached to the service of Cercamon in his wanderings; Peire d'Alvernh, a troubadour of great merit; and Bernart de Ventadorn, who was famed for the grace and sweetness of his poetry. The second half of the 12th and first half of the 13th centuries was the most brilliant period of Provençal poetry. Of the many poets who flourished during this period the following are the most distinguished: Gaucelm Faidit; Gui d'Uisel; Peirols; Arnaut de Maruelh, the author of many exquisite love-songs; the talented Folquet, Bishop of Marseilles; Peire Vidal of Toulouse, a versatile and most eccentric poet; Arnaut Daniel, the chief of the artificial school; Giraut de Bornelh, considered by the Provençals themselves to be the finest of all their poets (though Dante and Petrarch both regard Arnaut Daniel as superior to him); Raimbaut de Vaquieras; Guillem de Cabestanh, a most melodious singer; the Monk of Montaudon, a powerful and unsparing satirist; Raimon de Miravals; Uc de Saint Circ; Guillem Adhemar; Bertrand de Born, the author of many warlike *sirventes;* Guillem Figueira; and Peire Cardinal, the great writer of moral and religious satire. The latter half of the 13th century shows the poetry of the troubadours in its decline, and few of the poets of this period deserve to be classed with those of the previous one. Towards the close of the century lived Guiraut Riquier, a poet of great renown, who has been termed the 'last of the troubadours.' He specially cultivated the popular forms of lyric poetry, particularly the *pastoreta.* Among the long list of troubadours (about 400 in all) there are only about a dozen women-singers of whom we know. Their works, so far as one can judge from the scanty fragments that remain, are much inferior in merit to those of the troubadours. The most distinguished among them was the Countess Beatrix de Dia, who has been termed the Sappho of Provence.

The compositions of the troubadours were intended to be sung to the accompaniment of some musical instrument. In most cases the poets themselves composed the melodies for their pieces. The text was called *motz*, the melody *son*. There is no doubt that many of the troubadours sang and accompanied their own compositions. But those who were unable to do so were obliged to have recourse to professional musicians to sing and play for them. These professional musicians they found among the *joglars* (Fr. *jongleurs*) or wandering minstrels. The origin of the *joglars* dates back to the time of the Romans; they were the descendants of the *joculatores*, who took part in the ancient circus-games. The *joglars* of the middle ages were a sort of travelling showmen, who gave performances at village feasts, and were often accompanied by trained dogs and monkeys. There were some of them, however, whose profession was rather more artistic than mere buffoonery or jugglery; they became the singers and accompanists of the troubadours. Some were in the service of the troubadours, and travelled about with them; others went about independently, singing the pieces they had either bought or had presented to them by the troubadours. The latter, as a class, held themselves much above the *joglars*, though it sometimes happened that *joglars* rose to the ranks of the troubadours.

It was only from the 12th century that a poetic system began to be fixed, and the different branches of lyric verse received distinctive titles. Previous to that period every lyric poem was termed *vers*, from the Latin *versus*, 'a hymn,' because the early lyric compositions were modelled on the ecclesiastical verses, whatever their subject might be. Epic compositions were termed *prosa*. The two principal branches of lyric poetry were the *canso* or love-song and the *sirventes* or satire. The *canso* was the outward expression of love and its various phases. In order to write the love-song (to *trobar*) it was essential, according to the ideas of Provençals, that the poet should be in love himself, that he should be inspired by the passion before he could give expression to it. Their idea of love, it may be remarked, was not wholly that of romantic adoration; hence the many licentious pieces among the lyrics of the troubadours. The *canso* generally closed with a few lines in which the poet apostrophised himself or his song, and commissioned it to explain his sentiments to his lady-love. This was termed the *tornada*. The term *sirventes* or *sirventesc* was used to comprise not only satirical poems, but generally every class of lyric composition that did not treat of love. These were divided into various classes—personal, social, political, moral, and religious—the last named including the songs of the Crusades. In their social satires the troubadours attacked with energy the vices and oppression of the nobles. Attacks, too, on the clergy were frequent, more especially at the time of the Albigenses war, when the poets sided (with one or two exceptions) with the heretics against the Church of Rome. In doing so they do not appear to have been influenced so much by questions of doctrine as by hostility to the northern French intruders, and we do not find any of them putting forward heretical opinions in their works, with the single exception of one piece by Peire Cardinal.

The crusades against the Saracens formed a constant theme enabling the troubadours to celebrate in song their love of daring and glory. Most of the crusade-songs we possess relate to the third crusade, which took place during the most flourishing period of Provençal poetry. In these songs they exhorted their countrymen to rise and take up arms against the infidels. War in general—not merely religious—was a favourite subject with the troubadours. The most famous writer of warlike *sirventes* was Bertrand de Born (q.v.), a typical mediæval baron.

The *tenso* was a sort of dispute or contention in verse in the form of a dialogue between two troubadours, generally upon some question relating to love or chivalry. Tensos actually did take place among the troubadours, although in many of their poems the antagonists would appear to be merely fictitious persons. This form of verse was of eastern origin, and was common among the Arabs and Persians.

Besides the *canso*, *sirventes*, and *tenso*, there existed also simpler, more popular forms of lyric verse. Originally the *balada* was a poem intended to be sung in dancing. It consisted generally of three strophes, and was remarkable for its graceful dance-like rhythm. The *pastorela* (*pastoreta*), or shepherd's song, was always a favourite form of verse with the Provençal poets. The *alba* (or dawn-song) and the *serena* (or even-song) were also cultivated by the Provençals. The latter is to be distinguished from the serenade, and was a poem depicting the longing of the poet for the approach of the night and the meeting with his beloved. *Novas*—tales in verse (compare the north French *Fabliaux*, q.v.)—were few and unimportant among the Provençals compared with those of the French.

The Provençal system of versification was most highly elaborated, the poets observing the most intricate metrical rules in their compositions. An instance of such elaborate verse is the *sestina*, which was invented by Arnaut Daniel and imitated by Dante, Petrarch, and other poets. The *sestina* was a species of verse consisting of six stanzas, each of six lines, in which the rhyming words of the first stanza were carried on through all the others in an inverted order. The opposite of the *sestina* was the *descort*, which was subject to no definite rules as regards either metre, rhyme, or length of stanzas. Some poets even purposely sought after discordance. A distinguished troubadour, Raimbaut of Vaqueiras (1180–1207), in one of his pieces uses five different languages (viz. Provençal, Tuscan, French, Gascon, and Catalan) in five succeeding verses, the sixth being a mixture of all five. The *sonnet* is frequently supposed to have been of Provençal origin. But the only two examples we know of in that language were by an Italian who composed in Provençal, Dante da Majano. The probability is that it was peculiar to the Italians, though doubtless it was the outcome of the influence of Provençal versification. *Sonet* in Provençal is simply identical with *son*, meaning melody.

The two distinguishing characteristics of Provençal versification are the rhyme and the syllabic accent. Some have supposed that in their predilection for rhyme they were influenced by the Moors, but it is more than likely it was natural to the Provençals. The great number of final syllables of the same sound existing in the declensions and conjugations of their language offered great ease of rhyming, and doubtless this had much to do with the formation of their poetry. Owing to their excessive regard for form, there is noticeable in the lyrics of the troubadours a certain sameness or want of variety of sentiment, and a tendency to be artificial rather than natural. Yet the high merit of their poetry must be acknowledged when we consider how rough were the times in which they lived, and how few literary models they had to guide them. The culture of the Greeks and Romans had long been extinct, and of classical literature they knew nothing, whilst at the time of the highest point of their development the poetry of northern France, of

England, of Germany, and of Italy was yet in its infancy.

Rapid as had been the rise of Provençal poetry, as rapid was its decline. What more than anything else was the cause of this decline was the war against the Albigenses (q.v.) in the 13th century, which proved disastrous to the nobles of the south of France. Their lands were laid waste, their castles destroyed. Besides this, with the establishment of the French domination in the south the French language began to be generally used among the upper classes; thus there was no longer any encouragement for the troubadours. Their poetry ceased to be cultivated as formerly. The clergy, too, in their fanatic endeavours to extinguish heresy, destroyed large numbers of Provençal works, and in a bull Pope Innocent IV. styles the Provençal a heretical language, and forbade the use of it to the clergy. With the 13th century the real literary life of the Provençals had disappeared. The two following centuries can only be regarded as an after-period in which the traditions of the troubadours still lingered on. In the first half of the 14th century an effort was made to revive the old poetry.. Seven citizens of Toulouse, under the title *La sobregaya companhia dels set trobadors de Tolosa*, established in that city a society of song. Under the auspices of this society were organised *Jeux Floraux*, or poetic contests, at which prizes were given. The activity of the society was not confined to Toulouse; branch societies were formed throughout the south of France, and even in Catalonia and Aragon; but, though it existed for several centuries, this society could never effect what it aimed at—viz. the restoration of the brilliant period of Provençal song. In the 14th and 15th centuries prose works became more numerous. Such were learned treatises—theological, medical, legal, and philological—local chronicles, and pious tales or legends.

During the following three centuries there are almost no Provençal works worthy of notice. In the 19th century, however, a new poetic activity began to manifest itself, commencing with the poet Jacques Jansemin, or Jasmin (q.v.), and after him Romanille, the founder of the Society of the Felibres (which has in view the preservation of the Provençal language and customs), Mistral (q.v.), a poet of great genius, Aubanel, and others. Poetic festivals, like the *Jeux Floraux*, have also been introduced to aid the movement.

On the subject of the Provençal Language see Diez, *Grammatik der Romanischen Sprachen* (1836–38; 5th ed. 1882); Raynouard, *Lexique Roman* (1838–44), and his *Grammaire comparée des Langues de l'Europe Latine* (1821); Mahn, *Grammatik u. Wörterbuch der Altprovenzalischen Sprache* (1885 *et seq.*); D. B. Kitchin, *An Introduction to the Study of Provençal* (1887). On the literature see Diez, *Die Poesie der Troubadours* (2d ed. 1883), and *Altromanische Sprachdenkmäler* (1846); Raynouard, *Choix de Poesies originales des Troubadours* (1816-21); Fauriel, *Histoire de la Littérature Provençale* (1846); Bartsch, *Grundriss zur Geschichte der Provenzalischen Literatur* (1872), and *Chrestomathie Provençale* (4th ed. 1880); Hueffer, *The Troubadours, a History of Provençal Life and Literature* (Lond. 1878); Mahn, *Die Biographien der Troubadours* (2d ed. 1878); Gatien-Arnoult, *Monuments de la Littérature Romaine depuis le 14^{me} Siècle;* Milá y Fontanals, *Los Trovadores en España* (Barcelona, 1861); Paul Meyer, *Les derniers Troubadours de la Provence;* and Böhmer, *Die Provenzalische Poesie der Gegenwart* (1877).

Provence, formerly a maritime province of France, was bounded on the S. by the Mediterranean, and comprised the modern departments of Bouches du Rhône, Var, Basses-Alpes, and parts of Alpes Maritimes and Vaucluse. It included a portion of the Roman province of Gaul generally called simply *Provincia* ('the Province'), whence it derived its name. The Provençal (q.v.) tongue, however, was spoken over a much larger area (see also the section on the language and literature of FRANCE). Provence was overrun in the 5th century by the Visigoths and Burgundians, for a time was under the Saracens, and in 879 was mostly incorporated with Cisjuran Burgundy (q.v.) and with it was attached to Germany. The main part of the region remained, however, under the Counts of Arles, also known as Counts of Provence, and was practically independent. Early in the 12th century the countship passed by inheritance to Raymond Berengar, Count of Barcelona, and under the protection of his successors Provençal poetry attained its zenith. In 1245 the last count died, and the inheritance passed, through his daughter, to her husband Charles of Anjou, who united Provence with Naples. Under the Angevin princes the constitution of Provence, with its three estates holding the power of the purse, was well balanced and free; and it is possible that through Simon de Montfort (q.v.) the English parliamentary constitution may be indebted to it. The last of the counts, Charles, grandson of René the Good (q.v.), bequeathed his county to the dauphin of France; and it was united to that county in 1486 by Charles VIII.

Several of Daudet's works give vivid pictures of Provençal scenery, life, and character; and there are histories of Provence by Papon (1777–86) and Mercy (1830), and descriptive works by Garcin (1833) and Lentherin (1879). Descriptive sketches of some of the antiquities and architecture are given in Baring-Gould's *In Troubadour Land* (1891). See also ANJOU, FRANCE, AVIGNON.

Proverbs. All attempts to define a proverb, from the time of Aristotle downwards, have been unsuccessful. One of the difficulties is to find an essential difference that will not admit or exclude too much, and another is the diversity of opinion among parœmiographers as to where the line should be drawn. Some would include almost any form of popular phrase, while others, like Giusti, refuse to recognise anything that is not a sentence containing a precept or admonition of some sort. In default of an exact definition we must be content with descriptions, such as Earl Russell's—'The wisdom of many, and the wit of one,' or that of Cervantes—'Short sentences drawn from long experience,' or the more complete if less pithy one of Cipriano de Valera—'Short sayings, sententious and true, and long since accepted as such by common consent.' This last has the merit of recognising what is in truth the distinctive characteristic of the proverb, that it is a popular current saying adopted as a convenience by the community. All the qualities said to be essential to it, shortness, sense, salt, and the rest, are subsidiary to this. To be current it must be easily remembered, and therefore, within certain limits, short; without sense it would have no value, and without salt it would not take the popular fancy. But there is another quality no less essential than these which seems to be always ignored, and that is general applicability. Unless a saying is capable of being applied to a variety of cases it can never become a proverb. Lord Palmerston's famous dictum, 'Dirt is only matter in the wrong place,' has sense, salt, and shortness, but it will never be a proverb. It is of no use except in sanitary discussion and when dirt is in question. Lord Derby's answer, after trying a South African port specially recommended for gouty subjects, 'I prefer the gout,' has a much better chance, for it serves every purpose of 'The remedy is worse than the disease,' and is far richer in salt. A proverb is in fact a colloquial coin, not for exclusive dealing at any one particular stall in the market, but negotiable at the butcher's as well as at the baker's; and it is in this its numismatic character that the essence of the proverb lies. A wise man's saying may be ever so wise, pithy, and pointed, but it is only *his* saying, and nobody is bound to take it as a settlement of any question. The proverb, on the other hand, has been adopted time out of mind and stamped by common consent as the recognised expression of public opinion. It has thus become by prescription a legal tender in controversy, while the other is only the cheque of a presumably solvent capitalist. In this respect proverbs and ballads are on precisely the same footing. They derive their authority from popular suffrage, and take their stand not as the issue of this or that man's brain, but as the adopted utterances of the people at large. But there is this difference between them, that the ballad had a maker, whoever he may have been, but no man ever yet made a proverb. He may have made the original saying, but the forces that made it a proverb were entirely beyond his control. No man by taking thought can add one proverb to his language any more than one cubit to his stature.

It would be a mistake, however, to fancy that every proverb must have had its germ in some wise or shrewd remark. Some are fables in little, or the concentrated essence of fables; and, as might be expected, a large number of the proverbs of the East, the birthplace of the fable, are of this sort. Every oriental collection abounds in proverbs like 'The ant got wings to her destruction,' 'They came to shoe the Pasha's horses, and the beetle held out his foot,' 'They asked the mule, "Who is thy father?" "The horse," said he, "is my maternal uncle."' By purists, perhaps, these and others of the same species, including the familiar 'Pot and Kettle,' may be denied a place among the proverbs proper; but they fulfil all the functions of the proverb, and they serve moreover to show how near akin are these two venerable vehicles of old-world wisdom, the fable and the proverb. Nor is the proverb of necessity the *wit* of one. Sometimes it is the simplicity or naïveté of one, and the wit lies in the application of it by the many. The Viennese have a good specimen of this kind. The late Emperor Ferdinand, driven for shelter one day into a peasant's house, took a fancy to some dumplings that had been just cooked for the family supper. The court-physician, being responsible for the imperial digestion, remonstrated, but his majesty's gracious answer was 'Kaiser bin i', knödel muss i' haben'—'Emperor I am, dumplings I'll have'—which became in course of time a recognised comment in cases of pertinacity. Here we have what is very rare, a proverb traced to a definite source; a few instances there are like 'A bridge of silver for a flying foe,' which was, it is said, a saying of the 'Great Captain,' Gonsalvo de Cordova; but as a rule the proverb is a scrap of unfathered wit or wisdom that came into the world nobody knows how. And here, too, we have a proof that though many regard the proverb as a mere fossil, there is still vitality in it. No doubt modern society has recourse to proverbs in conversation much more sparingly than was usual in the days of our forefathers, and the reasons are plain enough to see. To accept a proverb as an answer implies deference to authority and is in effect an acknowledgment of the wisdom of our ancestors. There is necessarily an antagonism between the proverb and individualism or self-assertion or self-conceit, or whatever other name we may choose to give it. The office of the proverb is to hit the nail on the head, to put the matter in a nut-shell, to bring back discussion to the point at issue, to check prolix argumentation. In all languages it condemns loquacity and commends silence. It is in fact a primitive form of 'closure.' If an Arab or Persian orator waxes fervid on the theme of equality and bombards his hearers with pompous platitudes about Nature's law, some graybeard will ask, 'Hath God made the five fingers of thy hand all equal?' and *solventur risu tabulæ*. In the nature of things, therefore, it is impossible that the proverb should be popular among the worshippers of excellent speech. The Celtic races, it may be observed, never greatly favoured proverbs. But for all that proverbs are very far from being the dry bones they are sometimes supposed to be. If any one took the trouble to register carefully all the proverbs or references to proverbs that came under his notice in the course of a day, making a note of allusions in his newspaper, whether in leaders, parliamentary, law or police reports, letters from correspondents, critiques, or puffing advertisements; jotting down those he overhears in the railway carriage or tramcar, those dropped in business conversation, in chat at the club, in table-talk at and after dinner; and in fact from breakfast to bedtime keeping his ears open for proverbs, he would find probably that they enter into our daily speech to a much greater extent than he had suspected. We are apt to use proverbs automatically. So completely have they engrafted themselves that we talk of gift horses, and half-loaves, and a bird in the hand, and sauce for the goose mechanically and without any thought of speaking proverbially. There is no family perhaps that has not proverbs or rudimentary proverbs of its own, founded on some adventure or drollery or blunder of one of its members, and used proverbially by all, often to the perplexity of the uninitiated visitor; and what is true of the family is true of the community on a more extensive scale. It has its own current sayings, allusions, comparisons, similitudes, incomprehensible to the outsider, but full of meaning to all who are to the manner born. Of these there will be now and then one more generally applicable and negotiable than the rest, with more of the true proverb metal and ring in it, which in time will pass the bounds of the community and become the property of the nation. A man sees another bolting out of his house, and asks what he has been about there. 'You'll see when the eggs come to be fried,' says the other, making off; which is explained when it is time to fry the eggs and it is found out that the frying-pan has been stolen. It will be first a family joke; then a parish joke; then a stock saying in the market-place—'very good; time will tell; you'll see when the eggs come to be fried;' then a saying in many market-places; and so at last a proverb. This is the actual story of one enshrined in Don Quixote—*Al freir de los huevos.*

As they pass from the family and the community to the nation, so they pass from one nation to another. The purely national proverbs form only a portion of the proverbs in any language. It almost seems as though there had been from time immemorial a kind of proverb exchange through which any serviceable proverb in one language passed into any other that stood in need of it; and this makes it a matter of difficulty, or rather impossibility, to settle the nationality of many of the best and most familiar. We are not, however, to jump at once to the conclusion that proverbs which are identical or nearly so must be in every instance merely versions or variants of one common original. To take an extreme case, our old friend the swallow that makes no summer is current now in sixty or seventy versions, and was current more than 2000 years ago, a date which allows ample time for it to have penetrated into the remotest corners of Europe. But it does not by any means follow that none of these came into existence independently. The remark is one which must have been made at first hand in many a tongue on many a spring day. 'Summer!' cries the young man, 'Lo, a swallow!' 'Nay,' says the old one, with that repression of youthful optimism which is the privilege of age, '*One* swallow,' &c. But undoubtedly in most cases of widely distributed proverbs the probability is on the side of a common ancestor. It is not easy, for instance, to see how that one about the gift-horse's mouth, which was, as we know, 'a vulgar proverb' in the time of St Jerome, could ever have been independently produced. That two minds should hit upon precisely the same illustration for the same thought may be within the bounds of possibility, but that in each case a proverb should be the fruit of it pushes the coincidence to the utmost limits of chance.

It is obvious that the greater number of these proverbs which seem to be common property must be of eastern birth. If we find a proverb in English, German, Italian, and Spanish, and also in Arabic, Persian, and Hindustani, which is the more likely—that it has passed from Europe to Asia, or from Asia to Europe? A wide distribution argues antiquity, for necessarily the proverb travels slowly; and, go back as far as we may, we find the proverb, the fable, and the parable working together in the East. When David appealed to Saul it was with 'a proverb of the ancients,' and it was with proverbs that the prophets drove home their words, proverbs that are, many of them, in use there to this day, like 'As is the mother, so is her daughter,' and 'The fathers have eaten sour grapes, and the teeth of the children are set on edge.' The sayings of 'them of old time' cited in the Sermon on the Mount—'Judge not that ye be not judged,' 'The straw in another's eye thou seest, but not the beam in thine own,' and others, are still current in Syria. 'One sows and another reaps' and 'Who makes a trap for others falls into it himself' are Turkish, and 'Where the corpse is there the vultures will be' is a Bengali proverb. The proverbs that are strictly national have an interest of another kind. Coming directly from the people, the chosen vehicles of their sentiments and opinions, they naturally reflect the habits of thought, the turn of mind, the way of looking at things, that prevail among those who use them. Any one at all versed in comparative parœmiology will be able for the most part to make a shrewd guess at the original language from a translated specimen. They reflect other things too—often the history of the nation they come from. The Spaniard, as he was before Ferdinand and Ximenez bridled Aragon and Castile, makes himself heard in 'The king goes as far as he may, not as far as he would;' there are Teutonic proverbs older than Luther, in which his very spirit seems to speak; there are Italian proverbs that, in their cynicism, distrust of mankind, and open advocacy of lying, are more eloquent on the state of society in mediæval Italy than any of her historians. And the differences they suggest are often curious. The devil figures prominently in the proverbs of Europe; but in those of the Latin races he is always treated with respect, or at any rate credited with astuteness, the only exception, perhaps, being the Italian one that accuses him of weaving a coarse web. In Teutonic proverbs, on the other hand, he is held up to ridicule on the score of his amazing simplicity. He tries to get wool off his pigs; he takes a donkey for a cow, and remarks how soft its horn is; he sits down on a swarm of bees, because where there is singing going on one may make one's self easy; and so on through a host of proverbs that give a very poor idea of his intellect.

Of the national groups the Spanish is unquestionably the most remarkable. The number of Spanish proverbs is prodigious. In any other language 5000 or 6000 would be a large collection, but a Spanish MS. by Yriarte, the Royal librarian, which was in the Heber library, contained between 25,000 and 30,000, a number which, however incredible to others, is not at all surprising to those who know the proverbial aptitudes of the people and the language. In Spain almost everything has its proverb; every village of the plain, every herb of the field, has its virtues or vices put in a compendious shape for general circulation. And they are as racy as they are numerous, full of shrewd sense and knowledge of human nature, and rich in that grave, dry Spanish humour which never compromises itself by a descent into facetiousness. The Spaniard is, no doubt, naturally sententious, but the facilities offered by his rich, sonorous Castilian should not be overlooked; and among them must be reckoned its wealth in rhymes, consonant and assonant, of which there is such striking proof in the number and excellence of the Spanish rhyming proverbs. Language, it may be observed, plays an important part in proverbs. Take, for example, the Scotch 'Better a toom house than an ill tenant.' Compared with the English 'empty,' how much more effective is the Scandinavian 'toom,' to say nothing of the alliteration or inverted rhyme. The Basque proverbs, from which several of the Spanish are obviously derived, are of much the same character; and in both, but especially in the Basque, the resemblance to the proverbs of the East is very distinct. The Basque proverbs have not been as carefully collected as they deserve, and of course form only a small group; but, relatively to the Euskara-speaking population of a little over half a million, their numbers indicate a propensity to the use of the proverb as strong as the Spaniard's. The Italian proverbs, only less numerous than the Spanish, are more remarkable for wit, often bitter, than for humour; in the French, on the other hand, there is little or none of that brilliant wit and epigrammatic neatness of expression which distinguish French literature. But this is only what might be expected. French wit is the product of French culture, and proverbs are natural productions. Our own, including the Lowland Scotch, must be regarded as simply a subdivision of the great Teutonic group comprising the German, the Plattdeutsch, the Dutch, the Danish, the Swedish, and the Norwegian. Each of these has, of course, its own peculiar proverbs, but in each case the main body, it will be seen on comparison, belongs to a common stock. Next to Spain, the region richest in proverbs in Europe is probably that watered by the lower Elbe, and including Oldenburg, Hanover, Holstein, and Mecklenburg—the Anglo-Saxon country, in fact. Compared with other groups, the Celtic proverbs must be rated as poor. The Gaelic proverbs, as Nicolson's admirable collection shows and he himself admits, have been largely recruited from Norse and Lowland Scotch sources; and the purely Celtic are to a great extent made up of sayings in praise of Fingal, or expressive of the opinion which one clan has of another, or of itself. The Welsh proverbs gathered by Howell are very flat; and of the Irish Dr Nicolson observes that the wonder is they are so few, and those few so remarkably deficient in the wit for which our Hibernian cousins are specially distinguished—a remark certainly borne out by the specimens usually given, in which moral truisms of the copy-book order, like 'Virtue is everlasting wealth,' 'Wisdom excels all riches,' 'Falling is easier than rising,' have a decided predominance. Among the oriental proverbs the Arabic hold the first place in respect of quantity, and perhaps quality likewise, but the Persian and

Hindustani are also excellent, and in the Turkish, together with abundant worldly shrewdness, there is sometimes a vein of poetry that is very striking. It is questionable whether the 'tender beauty,' to use Trench's phrase, of our own proverb of the shorn lamb is not rivalled by its Turkish parallel, 'God makes a nest for the blind bird.'

The bibliography of proverbs is, of course, a subject which cannot be compressed within the limits of an article. Even the admirable work of M. Duplessis, *Bibliographie Parémiologique* (Paris, 1847), full as it is, has been outgrown by the proverb literature that has sprung up since its appearance; and Nopitzsch's *Literatur der Sprichwörter* (Nuremberg, 1833) is still more out of date. The oldest collections of proverbs—true proverbs, that is to say, not aphorisms or maxims of sages—are probably the French *Proverbes ruraux et vulgaux* and *Proverbes au Villain*, a significant title as indicating the recognised source of proverbial wisdom. Both of these are of the 13th century, and there are one or two others of the same sort almost as old. The Marquis of Santillana, the Spanish poet, statesman, and soldier, is the oldest collector of proverbs of whom we know anything. His collection of 625 'Proverbs that the old women repeat over the fire' was made at the request of John II. of Castile about the middle of the 15th century, but was not printed till 1508. The earliest German collections were those of Johann Agricola in 1528, and Sebastian Franck in 1541, for Bebel's 'Proverbia Germanica' (1508), being in Latin, cannot be counted. Of Italian proverbs the first genuine collection was the *Proverbi* of Antonio Cornazzano (Venice, 1518). Comparatively little attention has been paid to our own. John Heywood, the dramatist, in 1546 composed in verse *A dialogue conteyning in effect the number of all the proverbes in the English tunge*, which has a certain interest and value as the first attempt towards a collection in the language. George Herbert's *Jacula Prudentum* is, as its original title of *Outlandish Proverbs* implies, merely a collection of foreign proverbs in an English dress. Howell in 1659 collected a few which he appended to his *Lexicon Tetraglotton*, to take away the reproach against England 'that she is but barren in this point, and those proverbs she hath are but flat and empty.' The first deserving the name of a collection was Ray's in 1670, which, though faulty in system and arrangement, brought together a considerable number of genuine, racy, popular proverbs, and has passed through seven or eight editions. The best, that in Bohn's *Handbook of Proverbs* (1855), is supplemented by a copious 'Alphabet of Proverbs,' to which the companion volume, the *Polyglott of Foreign Proverbs* (1857), forms a useful adjunct. A later collection is Mr W. C. Hazlitt's (2d ed. 1882). Scotch proverbs have fared better. A collection by David Fergusson appeared in 1641, and a much larger one by Kelly in 1721, followed by Allan Ramsay's in 1737. Henderson's was published in 1832, and Hislop's in 1862. A collection of Gaelic proverbs was made by Donald Macintosh in 1785, and a more complete one by Alexander Nicolson in 1882. Trench's *Lessons in Proverbs* (1853) somewhat relieves the poverty of English proverb literature. In strong contrast to English neglect is the zeal of German collectors. Goedeke enumerates seventy-five names, and Duplessis more than thrice that number of works. A few of the more notable, after Agricola and Franck, are Lehmann, *Politischer Baumgarten* (1630); Siebenkees (1790); Wander, *Scheidemünze* (1832) and *Sprichwörter Lexicon* (1867); Korte (1837); Eiselein (1840); Simrock (1846); Sutermeister, *Schweizerische Sprichwörter* (1869); Binder, *Sprichwörterschatz* (1873); Schröder, *Plattdüdsche Sprückwörderschatz* (1875); Rheinsberg-Düringsfeld, *Sprichwörter der Germanischen und Romanischen Sprachen* (1872-75). The last is probably the most masterly work on proverbs ever written. It is not so much a collection as a concordance of proverbs, in which more than 1700 are traced through all the Teutonic and Latin languages and most of their dialects. The chief French collections are *Proverbes Communs* (15th century); Lebon, *Adages et Proverbes de Solon de Voge* (16th century); Meurier, *Trésor des Sentences* (1617); Oudin, *Curiositez Françoises* (1640); Pancoucke, *Dictionnaire des Proverbes* (1749); Tuet, *Matinées Sénonaises* (1789); Le Roux de Lincy, *Livre des Proverbes Français* (1859; the best; over-elaborate in arrangement, but valuable for its introduction and appendices); Oihenart, *Proverbes Basques* (1657; reprinted 1847); Sauvé, *Proverbes de la Basse Bretagne* (1878): Lespy, *Proverbes du Pays de Bearn* (1876); Toselli, *Recuei de Prouverbi* (Nice, 1878).—Italian: Cynthio, *Proverbi* (1526); Pescetti, *Proverbi Italiani* (1598); Giusti, *Proverbi Toscani* (1853; new ed. by G. Capponi, 1884); Bonifacio, *Proverbi Lombardi* (1858); Tommaseo, *Proverbi Corsi* (1841); Pasqualigo, *Proverbi Veneti* (3d ed. 1882).—Spanish: *Refranes Famosissimos Glossados* (1509); Blasco de Garay, *Cartas en Refranes* (1545); Pedro Valles, *Libro de Refranes* (1549); Hernan Nuñez de Guzman, *Refranes o Proverbios* (1555); Mallara, *Philosofía Vulgar* (1568); Palmireno, *El Estudioso Cortesano* (1587); Oudin, *Refranes Castellanos* (1605); Sorapan, *Medecina en Proverbios* (1616); Cejudo, *Refranes* (1675), *Refranes de la Lengua Castellana* (1815, from the Dictionary of the Academy); Collins, *Dictionary of Spanish Proverbs* (1822); U. R. Burke, *Spanish Salt* (1877; the proverbs in Don Quixote); Haller, *Altspanische Sprichwörter* (1883).—Portuguese: *Adagios, Proverbios, &c.* (1780-1841).—Dutch: Harrebomée, *Spreekwoorden* (1858-63).—Danish: Molbech, *Danske Ordsprog* (1850); Kok (1870); Grundtvig (1875).—Swedish: Reuterdahl, *Gamla Ordspråk* (1840); *Svenska Ordspråkboken* (1865).—Norwegian: Aasen, *Norske Ordsprog* (1856).—Icelandic: Dr H. Scheving (1847).—Flemish: Willems (1824).—Modern Greek: Negris, *Dictionary of Modern Greek Proverbs* (1834).—Russian: A selection in appendix to Duplessis (1847).—Arabic: Scaliger and Erpenius, *Proverbium Arabum Centuriæ Duæ* (1623); Burkhardt, *Arabic Proverbs* (1830; 2d ed. 1875); Freytag, *Proverbia* (1838-43); Landberg, *Proverbes et Dictons de la Province de Syrie* (1883).—Persian and Hindustani: Roebuck, (1824).—Bengali and Sanskrit: Morton (1832).—Behar: Christian (1891).—Turkish: Decourdemanche, *Mille et un Proverbes Turcs* (1878); *Osmanische Sprichwörter* (1865; K.K. Orient. Akad., Wien).—Chinese: *Hau Kiou Chooan, or the Pleasing History* (1761), contains a small collection.—Japanese: Steenackers and Ueda Tokunosuké, *Cent Proverbes Japonais* (1884).

Proverbs, THE BOOK OF, a canonical book of the Old Testament, holds the second place among the Hagiographa, coming immediately after Psalms. The Hebrew word *mashal*, translated in the title by *paroimia* in the LXX. and *proverbium* in the Vulgate, primarily means 'similitude,' and is applicable to any kind of allegory, simile, or comparison, especially when made for purposes of instruction; and every kind of didactic poetry is also included under the name. Typical instances of the use of the word occur in Ezek. xvii. 2 (LXX. *parabolē*, A.V. 'parable'), 1 Sam. x. 12 (LXX. *parabolē*, A.V. 'proverb'), Ps. xlix. 4 ('parable'), Isa. xiv. 4 (LXX. *threnos*, A.V. 'proverb'); it thus applies equally to that brief spontaneous product of popular wit or wisdom which in ordinary English parlance is most usually understood by the word 'proverb,' and also to that special kind of literary production which the Romans called *sententia*, the Greeks *gnomē*, and which is known to the modern French as the *maxim*. The Book of Proverbs as we now have it is made up of a number of originally separate collections; besides the general preface (i. 1-7), usually attributed to the author of chap. i.-ix., it consists of the following eight parts: (1) i. 8-ix. 18 has more appearance of plan, method, and free composition than any of the others, and is specially distinguished by the elaborateness with which its moral lessons are enforced. Its personification of wisdom as the first creation of God is 'one of the most remarkable and beautiful things in Hebrew literature,' and clearly marks it as belonging to a comparatively late phase of Hebrew thought not far removed from the beginnings of Alexandrian speculation. (2) x. 1-xxii. 16, headed 'the proverbs of Solomon,' consists of 376 miscellaneous distichs, mostly of the antithetic type, of which a good example is furnished by the opening verse of the collection. (3) xxii. 17-xxiv. 22 consists of thirty-two moral precepts, six of which are distichs, seventeen in four lines, and the others of various forms, including a discourse or *mashal* of some length against drunkenness (xxiii. 29–35). An exhortation to heedfulness under instruction is prefixed (xxii. 17-21). (4) xxiv. 23–34 is superscribed 'These also are sayings of the wise,' and contains six sayings or precepts of a somewhat trite order, including, however, the familiar description of the sluggard and his vineyard. (5) xxv. 1–xxix. 27 has the heading 'These also are the proverbs of Solomon, which the men of Hezekiah, king of Judah, copied out.' Of the total number (127) 114 are distichs, six in four lines, and the rest irregular. This collection is generally considered by critics to contain more elements of high antiquity than the rest of the book, and is specially distinguished by the vigour, freshness, and originality of its observations and expressions. (6) xxx. consists of twelve sets of verses of various import, including some riddles of the Hebrew type. The somewhat obscure heading ought probably to run 'The words of Agur the son of Jakeh of Massa' (cf. Gen. xxv. 14; 1 Chron. i. 30, iv. 38), and the opening verses to be read (as in R.V. margin) 'The man said, I have wearied myself, O God, I have wearied myself, O God, and am consumed, for I am more brutish than any man, and have not the understanding of a man'—the despairing expression of a spirit that has exhausted its energies in the effort to reach a true knowledge of God. (7) xxxi. 1-9, 'The words of Lemuel, king of Massa (see above), wherewith his mother instructed him,' a warning against wine and women, and an exhortation to righteousness in judgment. (8) xxxi. 10–31, an alphabetical piece without superscription, consisting of twenty-two distichs in praise of the 'virtuous woman'—i.e. the wise, energetic, capable housewife. There are no data that enable us accurately to determine the relative ages of these eight portions. It seems not unreasonable to suppose that the book may have been brought into its present form by the writer of the first part (i.–ix.). It is not improbable that the book contains individual utterances of very great antiquity—as old as, and perhaps even older than, Solomon himself; but it is impossible to pick out these with certainty. There is no good reason for identifying the main collection (x. 1–xxii. 16), consisting as we have seen of 376 mashals, with the 3000 proverbs of Solomon mentioned in 1 Kings, iv. 32, though this has been done by Jerome; that x. 1–xxii. 16 was not before the compilers of xxv. 1–xxix. 27 is evident from the number of doublets contained in the latter series (cf., for example, xxv. 24 and xxi. 9; xxvi. 13 and xxii. 13; xxvi. 15 and xix. 24, and numerous other instances). It is probable that the present book was a slow and gradual growth; and that the process may have been carried on to a very late date is shown by the considerable variations between the Massoretic and Septuagint texts.

For a good account of the Book of Proverbs, with references to the literature of the subject, see Reuss, *Gesch. d. heil. Schriften Alten Testaments* (1890). The most convenient commentaries are those of Hitzig (1858), Bertheau (1847; new ed. by Nowack, 1883), and Delitzsch (1873; Eng. trans.). See also *The Speaker's Commentary*, and a homiletical work by Horton (1891).

Providence, a seaport and the semi-capital of the state of Rhode Island, the second city of New England and the twentieth in order of population in the United States, is situated at the head of navigation, on an arm of Narragansett Bay known as Providence River, 35 miles from the ocean and 44 miles by rail SSW. of Boston. It covers a wide area on both sides of the river, which, above its two bridges, expands into a cove, a mile in circuit, on the borders of which is a handsome park, shaded with noble elms. It is a city of large commerce, manufactures, and wealth, abounding with beautiful villas and gardens. Founded before the conventional type of American cities had been discovered, its streets are pleasantly irregular, and the site singularly uneven, rising in one place to 204 feet above high-water; and in one ward, much of which is still in farms, there are numerous hills and valleys. Among the many notable public buildings and institutions of Providence are a city hall, of granite, which cost upwards of $1,000,000, and has facing it the state's soldiers' monument; the state-house; the custom-house and post-office; the Athenæum, and the buildings of the Rhode Island Historical Society; the arcade and the Butler Exchange; a great number of churches, schools, and libraries, hospitals and asylums, including a noble charity known as the Dexter Asylum for the Poor; the Friends' Boarding-school (popularly, 'the Quaker College'); and Brown University, a Baptist institution, founded in 1764, and amply endowed: it has about 300 students, and ranks among the leading colleges of the United States. The city has lost most of its foreign trade, but instead it has become one of the great manufacturing centres of the country; two small rivers afford abundant water-power. The chief establishments are engaged in producing silver-ware, tools, stoves, engines, locomotives, cottons and woollens, corset-laces, shoe-laces, lamp-wicks, &c.; and besides there are scores of manufactories of jewellery, many bleaching-works, &c. Providence was settled in 1636 by Roger Williams. Pop. (1870) 68,904; (1880) 104,857; (1890) 132,146.

Province (Lat. *provincia*), a territory acquired by the Romans beyond the limits of Italy, and governed by a Roman Prætor (q.v.) or proprætor, or by a proconsul (see CONSUL). The senate decided which provinces were to be prætorian and which consular. As a rule the provinces were unmercifully plundered by the governors and the tax-collectors (*publicani*). Under Augustus there were twelve *imperial* provinces, requiring military occupation, and under the emperor's immediate control, and ten senatorial provinces, entrusted to senatorial management (see ROME). The provinces of France (q.v.) were superseded at the Revolution by the departments. The great governmental divisions of India, Canada, and other countries are often entitled provinces. The sphere of duty of an Archbishop (q.v.) is his province, usually consisting of several dioceses. The monastic orders are or were distributed in provinces of varying area; the *provincial*, in its monastic reference, is the superior of all the houses and all the members of a monastic order within any particular province. See GENERAL, MONACHISM.

Provins, a town of France (dept. Seine-et-Marne), by rail 59 miles SE. of Paris, has remains of ancient walls, flanked by ruined watch-towers. The most interesting feature is an ancient tower, built in the 12th century, vulgarly called Cæsar's Tower. The vicinity was long famous for its roses, and they are still cultivated to a considerable extent. There are numerous flour-mills and dye-works. Pop. 7888.

Provisional Order is an order granted, under the powers conferred by an act of parliament, by a department of the government, by the Secretary of State, or by some other authority, whereby certain things are authorised to be done which could be accomplished otherwise only by an act of parliament. The order does not receive effect, however, until it has been confirmed by the legislature. Till that time it is purely provisional; and even after it has been so confirmed and is in reality an independent act, it retains the title of a provisional order. Provisional orders are most useful in facilitating the modification or extension of the provisions of general acts, so as to adapt them to the special necessities of particular districts. They may be obtained with much greater expedition and less cost than a private bill; the confirmatory act when unopposed may be obtained in a week or two, and has all the facilities of a government measure.

Provisions of Oxford. See MONTFORT.

Provisors, STATUTE OF. The object of this statute, passed in the reign of Edward III. (1350), was to correct and put an end to the abuses which had arisen in the exercise of the papal prerogatives as to the disposal of benefices in England. See ENGLAND (CHURCH OF), Vol. IV. p. 357.

Provo City, capital of Utah county, Utah, is on the Provo River, between Utah Lake and the Wahsatch Mountains, and 46 miles by rail SSE. of Salt Lake City. It contains flour-mills, tanneries, &c. Pop. (1890) 5159.

Provost (Lat. *præpositus*, 'set over'), in Church Law, the chief dignitary of a cathedral or collegiate church, from which use the title has also been transferred to the heads of other bodies, religious, literary, or administrative. The name is also given to the superiors of certain religious houses of lesser rank, and the relation of which to the more important houses is analogous to that of the priory to the abbey. The head of a cathedral chapter was anciently the archdeacon. At present, in the Roman Catholic Church, cathedral chapters are presided over by provosts in Austria, Prussia, Bavaria, and England, but in other parts of Germany and in France by deans. In the Church of England the Dean (q.v.) is the chief officer of a cathedral; but the title of provost survives, alongside that of dean, in the Scottish Episcopal Church. In the Protestant Church in Germany, in the north especially, where several minor churches or chapels are attached to one chief church, the minister of the latter is called provost (*probst*). In England the heads of Oriel, Queen's, and Worcester colleges in the university of Oxford, and the head of King's College, Cambridge, are designated provost. The head of Eton College is also so called.

In Scotland the chief municipal magistrate of a city or burgh is called provost, the term corresponding to the English word mayor. The provost presides in the civic courts along with the bailies, who are his deputies (see BOROUGH). The provosts of Edinburgh, Glasgow, Aberdeen, Perth, and, since 1892, Dundee, are styled Lord Provost. The Lord Provost of Edinburgh is entitled to the prefix 'Right Honourable,' which may be attached not merely to the name of his office, but to his Christian name and surname. See ADDRESS (FORMS OF), PRECEDENCE. Within the city and liberties of Edinburgh the Lord Provost takes precedence next after members of the royal family.

Provost-marshal, in the Navy, is a person appointed to have charge of a prisoner before a court-martial, and until the sentence of the court is carried into execution. In the British Army the provost-marshal is an officer, appointed only abroad, to superintend the preservation of order, and to be, as it were, the head of the police of any particular camp or district. He has cognisance of all camp-followers, as well as of members of the army. Under the Army Act of 1881 he cannot as formerly inflict any punishment of his own authority, but may apprehend any offender and bring him before a court-martial. It may then be his duty to see the sentence of the court carried out.

Proxy (contracted for Procuracy), the agency of one person who acts as substitute for another. Every member of the House of Lords was formerly permitted, on obtaining a nominal license from the crown, to appoint another lord of parliament his proxy to vote for him in his absence. Only a spiritual lord could be proxy for a spiritual lord, and a temporal for a temporal lord, and no peer could hold more than two proxies at the same time. Proxies were never used in judicial business, or in committees of the House, nor could a proxy sign a protest. The practice of admitting proxies was discontinued in 1867. Shareholders in joint-stock companies may vote by proxy. Formerly princely persons were sometimes, for reasons of state or convenience, represented by deputy at their own marriages; but marriage by proxy is not recognised by the law of England. See MARRIAGE, Vol. VII. p. 58.

Prudentius, MARCUS AURELIUS CLEMENS, the most important of the Roman Christian poets, was born in the north of Spain in 348 A.D. Nothing is known regarding him except what he has himself told in a poetical autobiography prefixed to his works. From this we learn that he received a liberal education, practised as a pleader, discharged the functions of civil and criminal judge, and was ultimately appointed to a high office at the imperial court. His religious convictions came late in life, and he devoted the evening of his days to the composition of religious poetry. The year of his death is not known. Of his poems the chief are (1) *Cathemerinon Liber*, a series of twelve hortatory hymns, the first half for the different hours of the day, the latter half for different church seasons (Eng. trans. 1845); (2) *Peristephanon*, a collection of fourteen lyrical poems in honour of martyrs; (3) *Apotheosis*, a defence of the doctrine of the Trinity against heretics; (4) *Hamartigeneia*, on the Origin of Evil, a polemic, in verse, against the Marcionites; (5) *Psychomachia*, on the Triumph of the Christian Graces in the Soul of a Believer; (6) *Contra Symmachum*, the first book a polemic against the heathen gods, the second against a petition of Symmachus for the restoration of the altar and statue of Victory cast down by Gratian; (7) *Diptychon*, a series of forty-nine hexameters, arranged in four verses, on scriptural incidents and personages. Bentley calls Prudentius 'the Horace and Virgil of the Christians,' which may be true enough if the critic only meant to say that he is the first of the early Christian verse-makers. See the article HYMN, Vol. VI. p. 46.

Editions are by F. Areval (Rome, 1788), reprinted in Migne's *Patrologia*, lix.–lx.; Obbar (Tübingen, 1845); and Dressel (Leip. 1860). See Brockhaus, *A. Prudentius* (1872); Ebert, *Geschichte der Christlich-Latein. Lit.* (vol. i. 1874); Faguet, *De A. Prudentii Clementis Carm. lyricis* (1883); and F. St John Thackeray, *Translations from Prudentius* (1890), with an excellent introduction on his life and times, language, metre, and style.

Prud'hommes, COUNCILS OF. See FRANCE, Vol. IV. p. 776.

Prunella. Skeat defines this material as 'a strong woollen stuff, originally of a dark colour,' Fr. *prunelle*, 'a sloe,' whence *prunella* in a Latinised form. We know this word chiefly from Pope's fine lines (*Essay on Man*, iv. 204):

> Worth makes the man, and want of it the fellow,
> The rest is all but leather or prunella.

To which passage, in the *Globe* edition, Mr Ward notes 'because clergymen's gowns were often made of this kind of stuff.'—The name Prunella is also given to a genus of plants of the natural order Labiatæ. Several species are natives of Europe; one only is found in Britain, *P. vulgaris*, popularly known as Self-heal, a plant very frequent in moist and barren pastures, as it is also throughout most parts of Europe, central Asia, North America, and New Holland. It was at one time in considerable repute as a febrifuge. It is mildly aromatic and slightly astringent.

Prunes are dried fruit of the plum-tree (*Prunus domestica*), of the variety called *Juliana*, largely prepared in France, and exported thence. Great numbers come also from Bosnia and Servia.

Pruning, the removal of branches from fruit or forest trees, in order to the greater production of fruit, the improvement of the timber, or purposes of ornament. In pruning for ornamental purposes taste must chiefly be consulted, but reference must be made to what has been too little regarded in pruning of every kind—the nature or habit of the tree itself. Some trees will bear clipping into fantastic forms, which would be utterly destructive of others. Such forms, once esteemed as the finest ornaments of a pleasure-ground, or the neighbourhood of a mansion, are rejected by the simpler taste of the present age, and the 'topiarian art' has few admirers. Much may be done, however, by the removal of branches to give a finer form to ornamental trees; but in this, as in the pruning of trees grown for the sake of their timber, a great mistake is very generally committed in permitting branches to grow to a considerable size before they are cut off. It may be accepted as a general rule that the branches removed should be small in proportion to the bulk of the trunk. The removal of twigs and small branches is attended by no bad effects, and may be beneficial; but the removal of large branches is dangerous. The leaving of stumps or snags is an aggravation of the evil. They rot away and spoil the timber of the stem; indeed, a hole is not unfrequently formed, which may eventually lead to the rotting of the whole of the interior of the trunk of the largest oak. But in the case of forest trees pruning may with advantage be in great part avoided, by taking care to plant at proper distances, and thinning out the plantations sufficiently in early periods of their growth. In this way better timber is obtained and a greater produce from the land. Pines and firs scarcely ever require pruning, and are probably in almost all cases the worse of that which they get, except in the removal of those lower branches which have actually begun to decay. In other trees it is sometimes of importance to watch for branches that would divide the trunk, and to prevent the division, causing the main stem to ascend higher before it forms a crown; but to be of any use this must be done whilst the branches are still very young. Plantations should therefore be examined with a view to pruning, at intervals of not more than two years, after they are six or eight years old.

In orchards and fruit-gardens pruning is necessary, the object being not to produce timber, or the utmost luxuriance of trees, but fruit in the greatest perfection and abundance. The habits of each kind must be studied. Even in the pruning of gooseberry and currant bushes regard must be had to natural diversities, the gooseberry and black-currant producing fruit chiefly on young wood, whilst the red and white currant produce fruit chiefly on spurs from older branches. And so it is amongst trees; apricots, for example, producing fruit chiefly on young wood, cherries mostly on spurs, whilst plums produce both in the one way and in the other. The object of the gardener in pruning is to bring the tree into the condition best suited for producing fine fruit and in the greatest abundance; and to this the training of wall trees must also be accommodated. Sometimes, in order to produce particularly fine fruits for the improvement of the variety by seed, or for the sake of a prize at a horticultural exhibition, the gardener diminishes the number of branches likely to bear fruit beyond what would otherwise be desirable.

The general seasons of pruning are winter and spring; but some trees, particularly cherries and all other drupaceous fruit trees, are advantageously pruned in summer, as they then throw out less gum.

Pruning instruments are of various kinds—knives, axes, saws, bills of very various forms, &c.; and the *averruncator*, which may be described as a pair of scissors, one blade hooked or crooked, attached to a long handle, and working by a cord and pulley. It is scarcely used except for standard trees in gardens and orchards.

Prurigo is the name applied to a group of diseases of the skin, characterised by the presence of papules, scarcely distinguishable in colour from the normal skin, and so 'felt rather than seen,' accompanied by intense itching. One form of the disease, *prurigo senilis*, is met with in old people in consequence of the irritation caused by lice, and disappears when these are got rid of. In its most characteristic form, however, it almost always begins in childhood, and may persist through life: even when it is got rid of for a time it is very apt to recur. It chiefly affects the trunk and extensor surfaces of the limbs, and is worst in winter. The disease is aggravated by the scratching from which the sufferer cannot refrain, and the skin becomes thickened and often eczematous as well. Warm baths and soothing ointments externally, good feeding, cod-liver oil, and arsenic or quinine are generally found to give great relief, and often cure the disease entirely.

Prussia (Ger. *Preussen*), by far the largest and most important state in the German empire, is a kingdom embracing nearly the whole of northern Germany. It is bounded N. by the German Ocean, Jutland, and the Baltic; E. by Russia (and Russian Poland); S. by Austria, Saxony, the Thuringian states, Bavaria, Hesse-Darmstadt, and Alsace-Lorraine; W. by Luxembourg, Belgium, and the Netherlands. Prussia owns besides Hohenzollern (q.v.) and about thirteen other smaller exclaves or detached territories lying within the bounds of other German states. The total area is 134,462 sq. m., with about 30,000,000 inhabitants—i.e. nearly two-thirds of the entire German empire, with about three-fifths of the population, equal to about one and one-tenth the size of the United Kingdom, or one-half of the state of Texas. The frontier line has a circumference of 4720 miles, of which 1025 miles are coast-line (770 miles on the Baltic, 255 miles on the German Ocean). The following are the provinces into which Prussia is divided:

	Area in sq. m.	Pop. in 1880.	Pop. in 1890.
East Prussia	14,446	1,933,936	1,958,132
West Prussia	9,964	1,405,898	1,433,480
Berlin (city)	25	1,122,330	1,579,244
Brandenburg	15,560	2,266,825	2,542,401
Pomerania	11,762	1,540,034	1,521,211
Posen	11,311	1,703,397	1,752,094
Silesia	15,743	4,007,925	4,223,807
Saxony	9,863	2,312,007	2,579,852
Sleswick-Holstein	7,360	1,127,149	1,217,393
Heligoland	¾	....	2,086
Hanover	15,031	2,120,168	2,280,491
Westphalia	7,892	2,043,442	2,428,736
Hesse-Nassau	6,128	1,554,376	1,664,000
Rhenish Prussia	10,543	4,074,000	4,710,313
Hohenzollern	447	67,624	66,148
Total	136,075¾	27,279,111	29,959,388

Omitting Berlin and Heligoland, the density of population ranges between 131 (Pomerania) and 452 (Rhenish Prussia) per sq. m. About one-fifth of the present area of Prussia has been acquired since 1853, the largest gains being made after the victorious war of 1866. The Prussia of Frederick the Great embraced only 47,800 sq. m. when he ascended the throne, and 75,000 when he died. In 1819 the population was 10,981,934; in 1864, 19,254,649; in 1871, 24,689,252.

PHYSICAL FEATURES. *Mountains.*—The greater part of Prussia, more than two-thirds of its total area, belongs to the north European plain, while less than a third, chiefly in the south-west, can be described as hilly or mountainous. The division line between the two districts is roughly indicated by an irregular series of heights beginning with the Teutoburgerwald, to the east of the upper Ems, and the Weser Hills, on both sides of the upper Weser, and thence running towards the south-east in the Harz Mountains (q.v.), with the Brocken (3740 feet), and in the northern outliers of the Thüringerwald (Finsterberg, 3100 feet; Inselsberg, 3000 feet). Farther to the south-east this line of heights is continued by the Riesengebirge (q.v.), separating Prussian Silesia from Bohemia, and forming the northern ranges of the Sudetic system. None of these ranges rise above about 5000 feet; the Schneekoppe (5250 feet) in the Riesengebirge is the loftiest summit on Prussian territory. The western and south-western parts of the country, comprising Rhenish Prussia, Westphalia, and Hesse-Nassau, thus cut off from the sandy and heathy wastes of the north, are quite distinct in their physical character from the rest of Prussia. They are divided by the Rhine into two portions. On the west side of the river, between Aix-la-Chapelle and the Moselle, is the elevated plain known as the Hohe Veen and the Eifel, which has a mean elevation of 1600 feet, with a few higher hills (Hohe Acht, 2490 feet). South of the Moselle, and parallel with that river, stretches the Hunsruck, with an average height of 1200 to 1500 feet, and farther south is the Hardt, the name here given to the northern extremity of the Vosges. On the east side of the Rhine the Sauerland, between the Ruhr and the Sieg, with the Rothaar or Rotlagergebirge, is succeeded farther south by the Westerwald (Fuchskauten, 2155 feet), between the Sieg and the Lahn, and by the Taunus (Feldberg, 2885 feet), between the Lahn and the Main. To the south of the Taunus, famous for its mineral springs, lies the fertile valley of the Main, while to the east the Vogelsberg, chiefly, however, in Hesse, forms a link with the Hohe Rhön (Wasserkuppe, 3115 feet), which may be regarded as an outlier of the Thüringerwald. The soil is generally poor in these districts, though they possess special sources of wealth in their iron and coal mines. The level country between the Rhone and the Maas, bordering the Eifel, is, however, extremely fertile; and Hesse-Cassel is particularly fruitful, cereals of all kinds growing abundantly. The great northern plain, which occupies the rest of the kingdom, is varied by two terrace-like elevations already described under GERMANY (Vol. V. p. 172). The surface is diversified with numerous lakes, especially in the east, on what are known as the Pomeranian and East Prussian Lake-plateaus, but none of them is more than 20 sq. m. in area, though altogether they are estimated to cover more than 300 sq. m. The soil, consisting chiefly of loose sand interspersed with a large number of erratic blocks of granite, is sterile, covered in many places with heaths and belts of stunted pines. On the northern slope, terminating on the shores of the Baltic, there are several fertile districts, more especially along those rivers which have been carefully embanked, as the Niemen and the Vistula. The southern elevation of the Prussian plain, running between the Polish mountains of Sandomir in the south-east and the Elbe between Magdeburg and Burg in the north-west, attains a height of about 1000 feet near Breslau on the Oder, where it is known as the Trebnitz Heights. Its general character is more fertile than the northern elevation; while the country between the two is, for the most part, extremely sterile. It includes the sandy waste in which Berlin, the capital, is situated. South of this tract, and in Silesia and Prussian Saxony, the country is fertile, including some of the most productive grain-growing districts of Prussia. Hanover has much the same character. Great marshes or peat-moors cover the north and north-west districts; but the valleys that lie among the Harz Mountains in the south are often fertile, and well adapted for agriculture. The coasts are low, and require to be protected from the overflowing of the sea by embankments and dykes. Sleswick-Holstein, to the north of the Elbe, is in part sandy and heathy, like the plain of Hanover, but it has also numerous marshes.

Rivers.—The northern plain is watered by five large rivers—the Niemen, Vistula, Oder, Elbe, and Weser—all of which rise beyond the borders of the kingdom, and the Pregel, Eider, and Ems, which are exclusively Prussian. In the west the chief river is the Rhine, which enters Prussia at Mainz, and thence flows north through a narrow valley noted as one of the most picturesque parts of Germany. The Rhine, which is navigable throughout its entire course in Prussian territory, receives numerous tributaries—as the Lahn, Wied, Sieg, Wupper, Ruhr, Lippe, Berkel, and Vechte, on the right, and on the left the Ahr and the Moselle or Mosel, the latter of which is navigable for more than 150 miles within the Prussian dominions. The Weser, Elbe, Oder, and Vistula, as also the Spree and Havel, affluents of the Elbe, are of high importance for the inland navigation of Prussia, and are each discussed in special articles. Altogether Prussia is said to possess 119 navigable rivers, besides nearly fifty others that may be used by rafts, and ninety canals. Of the last named, which form a network connecting the chief rivers of north Germany, the most important are the Bromberger, the Finow, the Friedrich-Wilhelms, the Eider, and the Kaiser-Wilhelm canals.

Climate.—The climate of Prussia presents great differences in the eastern and western provinces, the former being exposed to heavy snowstorms in winter and great drought in summer, while the latter have milder winters and a greater rainfall. At Berlin the annual mean temperature is 48° F.; on the Rhine it is 49° (summer, 63°; winter, 34°); in the east provinces and among the mountains it is below 43° (summer, 61°; winter, 25°).

Productions.—Agriculture and the rearing of cattle constitute the principal sources of employment and wealth of the rural population of the entire monarchy, and the state has hitherto directed its unremitting attention to the furtherance of the one and the improvement of the other; abrogating onerous land-taxes, advancing money to landowners, encouraging agricultural institutions, introducing approved breeds of animals and improved farm instruments, &c. Rather less than one-half, or 12,000,000, of the population of the kingdom are engaged in agriculture as their sole or chief occupation. Of the total area 50 per cent. is occupied by arable land, 9⅓ per cent. by meadows, and 11 per cent. by pasturage. Large estates, as a rule, are only to be found in the eastern and least populated provinces of the monarchy. Rye, wheat, oats, barley, peas, millet, rape-seed, maize, linseed, beet-root, potatoes, tobacco, flax, hemp, hops, chicory are extensively cultivated. The finest grain districts are the Börde, near Magdeburg, the low lands on the Wartha and Netze, and on the Plöne and Madüe lakes, the north-eastern parts of Pomerania, the island of Rügen, the valleys of the Oder in Silesia, of the Saale, Moselle, Saar, and parts of Hesse-Nassau. Magdeburg is the centre of the beet-root sugar industry. Western Prussia is noted for its excellent fruits and vegetables, and its provinces stand pre-eminent for their wines. Nassau is specially famous for its Rhine wines. The forest-lands, which are chiefly in East Prussia, Posen, Upper Silesia, Westphalia, Southern Hanover, and Hesse-Nassau, are of great value and considerable extent, occupying an area of 10,000,000 English acres. The mineral products of Prussia include coal, iron, lead, zinc, copper, cobalt, antimony, manganese, arsenic, sulphur, alum, nickel, black lead, baryta, gypsum, slate, lime, freestone, salt, amber, agate, jasper, onyx, &c. Prussia yields about one-half of the annual zinc production of the world; and of the total output of coal in Germany, about three-eighths of that of the United Kingdom, Prussia produces 93 per cent. The chief coalfields are in Silesia, Westphalia, and Rhenish Prussia, which are at the same time the chief industrial provinces of the kingdom. The region of the Harz in Hanover is also famous for its mining industries. All metals, salt, precious stones, and amber found along the Prussian coast from Danzig to Memel belong to the crown. Prussia has upwards of 100 mineral springs, of which the most noted and efficient are the sulphur baths of Aix-la-Chapelle and Ems, the iron springs of Schwalbach, Wilhelmsbad, Driburg, and the hot and saline baths of Reinerz, Landeck, Flinsberg, Freienwalde, Lauchstedt, Wiesbaden, Schlangenbad, and Selters. East Prussia is noted for its royal studs, and the excellent breed of horses which it now raises, and of which large numbers are annually exported. Westphalia enjoys a special reputation for the excellence of its hams and pork, Pomerania for its smoked geese, and Brandenburg and Hanover for honey and wax. Fish of all sorts are abundant in the rivers and numerous lakes; seals are taken in the Baltic. The wooded districts abound in game of every kind, pheasants, partridges, and wild geese being often found in enormous quantities. Besides stags, fallow-deer, wild boars, foxes, otters, weasels, polecats, martens, badgers, hares and rabbits, the lynx, bear, eagle, and beaver are occasionally met with.

Manufactures.—The principal manufactures are linens, for which certain districts of Silesia, Prussian Saxony, and Brandenburg enjoy a European celebrity; while of late years the cotton manufactories, worked by steam, have maintained a successful rivalry with the older linens, worked by hand-looms. Besides these there are numerous manufactories of silk, wool, mixed cotton and linen fabrics; including fine shawls and carpets in Brandenburg, stockings and ribbons in the Rhenish provinces, where, as well as in Westphalia and Hesse-Nassau, the flax, hemp, and silk and cotton thread is mainly prepared for the manufacturers. These districts, moreover, stand foremost in regard to the preparation and manufacture of iron, steel (the steel and gun works of Krupp, at Essen, being world-famous), and other metallic wares, paper, leather, soap, oil, cigars, and tobacco, and for the number of their distilleries and breweries; while Saxony and Silesia have the largest number of chicory, starch, beet-root, gunpowder, and glass works. Berlin and Elberfeld rank as the two most important centres of manufacture on the Continent. In 1893–94 there were 316 beet-root sugar factories in Prussia, which produced 1,001,804 tons of raw sugar. In 1894 the total value of the minerals produced in the kingdom was 576,679,725 marks (of which nearly two-thirds came from the Rhine-land and Westphalia); while the mineral produce of the German empire was only 675,000,000 marks.

Commerce.—The commerce of Prussia is materially facilitated by her central European position, and the network of river and canal navigation, which makes her the connecting medium between several of the great European states, and which, with (1895) 17,486 miles of railway, 40,500 miles of public roads (all, or nearly all, formed since the time of Frederick the Great), and a coast-line of 1000 miles, gives her a free outlet to the rest of the world. The Prussian mercantile marine in 1889 numbered 2255 vessels of 354,213 tons. The chief ports are Memel, Pillau, Königsberg, Danzig, Colberg, Swinemünde, Stettin, Wolgast, Stralsund, Kiel, Flensborg, Altona, Harburg, Geestemünde, Leer, and Emden. The principal commercial towns are Berlin, Königsberg, Breslau, Barmen, Elberfeld, Danzig, Posen, Stettin, Cologne, Magdeburg, Aix-la-Chapelle, and Frankfort-on-the-Main. Annual fairs are still held at Breslau, Magdeburg, and Frankfort-on-the-Oder.

The money, measures, and weights of Prussia are those in use throughout the German empire. In accordance with the law of 1872 the ***mark*** is the unit of reckoning, and has gradually displaced Thalers (q.v.) and silbergroschen. The Prussian or Berlin Bank, founded in 1765, with numerous branches in the provinces, is the most important of those banks which possess the right of issuing notes.

Religion, &c.—The dominant religion is Protestantism, and since 1817 the Lutheran and Reformed Churches have been united under the head of one common evangelical church. Everything connected with the external administration of church matters is under the control of the minister of public instruction and ecclesiastical affairs, but every religious community manages its own internal concerns; the Protestant churches acting in conjunction with consistories or boards appointed by the government, one of which exists in each province, under the direction of the upper president, or provincial governor, and a clerical superintendent-general, who in Posen and Pomerania bears the title of bishop; while the Roman Catholic Church is directed by the two archbishops of Posen and Gnesen, and Cologne, under whom stand the four bishoprics of Culm, Münster, Paderborn, and Treves. The four episcopal sees of Breslau, Ermeland, Osnabrück, and Hildesheim are directly under the jurisdiction of the pope, while the district of Glatz, in Silesia, belongs to the archbishopric of Prague; Katscher, in Upper Silesia, to that of Olmütz; and Fulda and Limburg to that of Freiburg. The results of the census of 1885, as regards the numbers of the religious bodies, are as follows: the Protestants of Prussia numbered 18,244,405 (64·4 per cent. of the pop.); Roman Catholics, 9,621,763 (33·9 per cent.); Jews, 366,575 (1·29 per cent.). Roman Catholics are most numerous in Hohenzollern (95 per cent.), Rhenish Prussia (71 per cent.), Posen, Silesia, Westphalia, and West Prussia. The higher Roman Catholic clergy are paid by the state, the parochial clergy chiefly by endowments. For the *Kultur-kampf*, see the article GERMANY, Vol. V. p. 185.

Education.—Education is compulsory in Prussia between the ages of six and fourteen, and its management and direction are under the control of the state. In no country are better or ampler means supplied for the diffusion of knowledge among all classes of the community. Prussia has ten universities—viz. Königsberg, Berlin, Greifswald, Breslau, Halle, Göttingen, Münster, Bonn, Kiel, and Marburg, which in 1889–90 numbered above 1240 professors and teachers and 15,770 students. The educational system has already been described under GERMANY, Vol. V. p. 176. In 1891 there were in Prussia 34,742 elementary schools, with 76,107 teachers and 4,916,476 pupils. The management of the elementary national schools is in the hands of the local communities; but the state appoints the teachers, and in part pays their salaries, the remainder being supplied by the public. In addition to the libraries of the several universities there is the Royal Library at Berlin, with 800,000 volumes and about 15,000 MSS. Among the numerous scientific, artistic, and literary schools and societies of Prussia the following are some of the more distinguished: the Academy of Arts, founded in 1700; the Royal Museum of Arts; the Academy of Sciences; the Natural History, Geographical, and Polytechnic Societies of Berlin; the Antiquarian Society of Stettin; the Breslau Natural History and Historical Societies; &c.

Justice.—Till lately the *Code Napoléon* was in force in the Rhenish provinces, and in Hither-Pomerania the common German law; but in other parts of the kingdom the Prussian code, compiled under Frederick the Great's direction, was followed. A new penal code was promulgated in 1850, by which all pre-existing seigniorial, municipal, or ecclesiastical rights of decreeing punishments were unconditionally abrogated. A partial codification was brought about in 1862, and in 1869 a code of commercial law valid for the North German Confederation. Since the establishment of the empire imperial law has precedence of that peculiar to the various states in a large number of subjects. Universal criminal and commercial codes are now in force for the whole empire, and a universal civil code has been prepared. A common judicature bill for the empire was passed in 1879. Prussia has sixteen *Oberlandes-gerichte* or provincial courts, one or more in each province. Connected with that sitting at Berlin is the Privy-council of Justice, which has jurisdiction over the royal family and the princely houses of Hohenzollern. The supreme tribunal of the empire has been established, not at Berlin, but at Leipzig, in Saxony.

Army, Navy, &c.—In 1890 the strength of the Prussian army on a peace footing, according to official returns, numbered 380,000, of whom 53,000 were cavalry and 48,000 artillery. The army consists of the regular troops and the Landwehr (q.v.), and in time of war an extra force can be called up under the title of the landsturm. Every able-bodied male Prussian is liable to be called upon to serve between twenty and thirty-nine years of age (see GERMANY). Clergymen of the Roman Catholic and Evangelical churches and indispensable supporters of families are exempt. Great care is bestowed on the education and military training of officers and men; and, besides numerous admirable academies, there are several good schools of operative and veterinary surgery, &c. connected with the educational department of the army. The navy of the new German empire is the navy of Prussia. See GERMANY.

Constitution, &c.—Prussia was an absolute monarchy till the crisis of 1848, when the decided movement in favour of liberal views compelled the king to convoke a national assembly, and submit to the establishment of a constitutional form of government, which has been repeatedly modified. The national representative body consists of two bodies: (1) an upper chamber (*Herrenhaus*, or 'House of Lords'), which is now composed of the princes of the royal family who are of age, the chiefs of the mediatised princely houses recognised by the Congress of Vienna, numbering sixteen in Prussia, the heads of the territorial nobility (about fifty), life-peers chosen by the king from the class of rich landowners, manufacturers, and 'national celebrities,' a titled representative chosen by all landowners in each of the Prussian provinces, representatives of the universities, the burgomasters of all towns having more than 50,000 inhabitants, and an indefinite number of members appointed by the king for life or for a limited period; (2) a lower chamber (*Abgeordnetenhaus*, or 'Chamber of Deputies'), composed of 432 members, 352 for the old kingdom and 80 for the provinces annexed in 1867. Every Prussian who has attained his twenty-fifth year, and who has a municipal vote, has also a parliamentary vote, but not a direct one. Out of every 250 *Urwähler*, or electors in the first instance, is chosen a *Wahlmann*, or direct elector. This is the man who, strictly speaking, votes for a member of parliament. Representatives are elected for five years, and each receives twenty marks per diem, the refusal of which is illegal. In addition to this general house of assembly there are representative bodies for the provinces, communes, and circles, which debate and legislate in regard to local matters within their several departments. The executive council of state is composed of eleven ministers appointed by the king, and holding office without reference to the comparative strength of political parties. The president of the council has a salary of £2700, each of the other ministers receives £1800. By the modified constitution of 1850 all exclusive privileges arising from titles or station are abrogated, and perfect equality in the eye of the law fully recognised; liberty of the subject guaranteed in regard to religious persuasion, the right to hold meetings unarmed within closed doors, and become members of societies; immunity from domiciliary visits, and inviolability of letters, &c. The monarchy is hereditary in the male line. The sovereign and royal family must profess the evangelical confession of faith. The king, who is not responsible for the measures of his government, and whose decrees require the counter-signatures of his ministers, exercises the executive power, nominates and dismisses the ministry, summons and dissolves the chambers, orders the promulgation of the laws, is commander-in-chief of the forces, has the right of proclaiming peace and war, granting reprieves, &c. He bears the titles of King of Prussia, Markgraf of Brandenburg, Sovereign-duke of Silesia, Prince of Orange, Grand-duke of Pomerania and the Lower Rhine, besides a host of lesser titles. The title 'German Emperor,' by which he is now best known, is not, of course, a Prussian dignity. The eldest son of the king bears the title of Crown-prince. The ordinary royal residences are the palaces at Berlin, Potsdam, and Charlottenburg. The royal domains were ceded to the state by Frederick-William III. in 1820, on condition of a rental of 2½ million thalers being paid first from them for the king and his family, which, however, has been increased in 1859, 1868, and 1889 by means of a *Krondotation* ('crown-allowance') to £770,550.

In the year 1895–96 the budget-estimate of the receipts was 1,899,473,497 marks ($452,074,692), just balanced by the expenditure. The total national debt bearing interest was 6,353,866,318 marks ($1,512,220,183), or about 183s. per head of the population. The direct taxes are an income-tax, land-tax, house-tax, class-tax, and trading-tax, and amount to about 5s. 6d. per head. The income-tax yields about 1s. 5d. per head of the population.

Population, Races.—About seven-eighths of the population of Prussia are Germans. Of the Slavonic tribes the most numerous are Poles, numbering 2½ millions. In Brandenburg and Silesia there are about 85,000 Wends; in East Prussia, upwards of 150,000 Lithuanians; Western Prussia has rather more than 10,000 Walloons, using the French language; intermixed in its generally German population Silesia has 55,000 Czechs or Bohemians; Sleswick-Holstein, 140,000 Danes—making in all about 3 millions who do not use the German language, or who employ it only as secondary to their native tongues.

Ranks, Classes.—Three distinct hereditary classes are recognised in Prussia—viz. nobles, burghers, and peasants. To the first belong nearly 200,000 persons, including the higher officials of the state, although that number does not comprise the various mediatised houses, of which sixteen are Prussian, and others belonging to different states, but connected with Prussia by still existing, or former territorial possessions. The burgher class includes, in its higher branches, all public office-bearers, professional men, artists, and merchants; while the peasantry—to which belong all persons engaged in agricultural pursuits—are divided into classes, depending on the number of horses employed on the land, &c.

History.—The lands bounded by the Baltic, which now form part of Prussia, were early occupied by Slavonic tribes, nearly allied to the Letts and Lithuanians. It is conjectured that they were visited by Phœnician navigators in the 4th century B.C.; but, beyond the fact of their having come into temporary conflict with the Goths and other Teutonic hordes prior to the great exodus of the latter from their northern homes, little is known of the people till the 10th century, when they first appear in history under the name of Borussi, or Prussians. In 997 Bishop Adalbert of Prague suffered martyrdom at their hands while endeavouring to convert the people to Christianity. Boleslas, Duke of Poland, succeeded, however, about 1018, in compelling them to submit to baptism and subjection. After many futile attempts on the part of the people to throw off the yoke of Christianity and foreign domination, they finally made a successful stand against Boleslas IV. of Poland in 1161, and for a time maintained a rude and savage kind of independence, which the disturbed condition of Poland prevented its rulers from breaking down. The fear of losing their freedom if they adopted Christianity made the Prussians obstinately resist every effort for their conversion; and it was not till the middle of the 13th century, when the knights of the Teutonic order began their 'famous' crusade against them (see TEUTONIC KNIGHTS), that the Christian faith was established among them. The inroads of the pagan Prussians on the territories of their Christian neighbours, and their advance into Pomerania, were the exciting causes of this important movement. The knights of the order, when appealed to by Conrad, Duke of Masovia, to aid in the subjection of the heathen, gladly promised their services on condition of being permitted to retain possession of the lands which they might conquer; and, having entered the Prussian territories in considerable numbers, they entrenched themselves in Vogelsang and Nessau in 1230, and at once entered upon the conquest of Prussia. For half a century the belligerent brotherhood were engaged in war with the people—winning lands and souls by hard fighting—until at length in 1283 they found themselves undisputed masters of the country, which they had both civilised and Christianised after a fashion—that is to say, by almost exterminating the pagan population. During this period of struggle the knights founded the cities of Thorn, Kulm, Marienwerder, Memel, and Königsberg, repeopled the country with German colonists, encouraged agriculture and trade, and laid the foundation of a well-ordered, prosperous state. The unhappy wars between the knights and the Poles and Lithuanians, together with the moral degeneracy of the order, led, in the 14th and 15th centuries, to the gradual decline of their supremacy. In 1454 the municipal and noble classes, with the co-operation of Poland, rose in open rebellion against the knights, who were finally compelled to seek peace at any cost, and obliged in 1466 to accept the terms offered to them by the treaty of Thorn, by which West Prussia and Ermland were ceded by them unconditionally to Poland, and the remainder of their territories declared to be fiefs of that kingdom. In 1511 the knights elected as their grand-master the Markgraf Albert of Anspach and Baireuth, a kinsman of the king of Poland, and a scion of the Frankish line of the Hohenzollern family. Although his election did not immediately result, as the knights had hoped, in securing them allies powerful enough to aid them in emancipating themselves from Polish domination, it was fraught with important consequences to Germany at large, no less than to the order itself. In 1525 the grand-master was acknowledged Duke of Prussia, which was converted into a secular duchy (afterwards known as East Prussia), and renounced the Roman Catholic religion for Lutheranism, his example being followed by many of the knights. The country made rapid advances under the rule of Albert, who improved the mode of administering the law, restored some order to the finances of the state, established schools, founded the university of Königsberg (1544), and caused the Bible to be translated into Polish, and several books of instruction to be printed in German, Polish, and Lithuanian. His son and successor, Albert Frederick, having become insane, a regency was appointed. Several of his kinsmen in turn enjoyed the dignity of regent, and finally his son-in-law, Johann Sigismund, elector of Brandenburg, after having held the administration of affairs in his hands for some years, was, on the death of the duke in 1618, recognised as his successor, both by the people and by the king of Poland, from whom he received the investiture of the duchy of Prussia, which, since that period, has been governed by the Hohenzollern-Brandenburg House.

Here it will be necessary to retrace our steps in order briefly to consider the political and dynastic relations of the other parts of the Prussian state. In 1134 the North Mark, afterwards called the Altmark, a district in the west of the Elbe and north-east of the Harz, was bestowed upon Albert the Bear of Luxembourg, who extended his dominion over the marshy region near Brandenburg and Berlin (the Mittelmark), and assumed the title of Markgraf of Brandenburg. During the next two or three centuries his immediate descendants advanced still farther eastward, beyond the Oder into Farther Pomerania. On the extinction of this line, known as the Ascanian House, in 1319, a century of strife and disorder followed, until finally Frederick VI., count of Hohenzollern, and markgraf of Nuremberg, became possessed, partly by purchase and partly by investiture from the Emperor Sigismund, of the Brandenburg lands, which, in his favour, were constituted into an electorate. This prince, known as the Elector Frederick I., received his investiture in 1417. He united under his rule, in addition to his hereditary Franconian lands of Anspach and Baireuth, a territory of more than 11,000 sq. m. His reign was disturbed by the insubordination of the nobles, and the constant incursions of his Prussian and Polish neighbours, but by his firmness and resolution he restored order at home and enlarged his boundaries. Under Frederick's successors the Brandenburg territory was augmented by the addition of many new acquisitions, although the system of granting appanages to the younger members of the reigning house, common at that time, deprived the electorate of some of its original domains. The *Dispositio Achillea*, however, which came into operation on the death of the Elector Albert Achilles (1470–86), while it separated Anspach and Brandenburg, legally established the principle of primogeniture in both. The most considerable addition to the electorate was the one to which reference has already been made, and which fell to the Elector John Sigismund through his marriage in 1609 with Anne, daughter and heiress of Albert Frederick the Insane, Duke of Prussia. In consequence of this alliance the duchy of Cleves, the countships of Ravensberg, the Mark, and Limburg, and the extensive duchy of Prussia, now known as East Prussia, became incorporated with the Brandenburg territories, which were thus more than doubled in area.

The reign of John Sigismund's successor, George-William (1619–40), was distracted by the miseries of the Thirty Years' War, and the country was alternately the prey of Swedish and imperial armies; and on the accession of George-William's son, Frederick-William (q.v.), the 'Great Elector,' in 1640, the electorate was sunk in the lowest depths of social misery and financial embarrassment. But so wise, prudent, and vigorous was the government of this prince that at his death in 1688 he left a well-filled exchequer, and a fairly-equipped army of 38,000 men; while the electorate, which now possessed a population of one and a half million and an area of 43,000 sq. m., had been raised by his genius to the rank of a great European power. His successors Frederick I. (q.v.; 1688–1713) and Frederick-William I. (1713–40) each in his own way increased the power and credit of Prussia, which had been in 1701 raised to the rank of a kingdom. The latter monarch was distinguished for his rigid economy of the public money and an extraordinary penchant for tall soldiers, and left to his son Frederick II. (q.v.), Frederick the Great, a compact and prosperous state, a well-disciplined army, and a sum of nearly nine million thalers in his treasury. Frederick II. (1740–86) dexterously availed himself of the extraordinary advantages of his position to raise Prussia to the rank of one of the great political powers of Europe. In the intervals between his great wars he devoted all his energies to the improvement of the state, by encouraging agriculture, trade, and commerce, and reorganising the military, financial, and judicial departments of the state. By his liberal views in regard to religion, science, and government he inaugurated a system whose results reacted on the whole of Europe; and in Germany more especially he gave a new stimulus to thought, and roused the dormant patriotism of the people. Frederick was not over-scrupulous in his means of enlarging his dominions, as he proved by sharing in the first partition of Poland in 1772, when he obtained as his portion nearly all West Prussia and several other districts in East Prussia. His nephew and successor, Frederick-William II. (1786–97), aggrandised his kingdom by the second and third partitions of Poland in 1793 and 1795. Frederick-William III. (q.v.; 1797–1840), who had been educated under the direction of his grand-uncle, Frederick the Great, succeeded his father in 1797, at a time of extreme difficulty, when continental rulers had no choice beyond being the opponents, the tools, or the victims of French republican ambition. By endeavouring to maintain a neutral attitude Prussia lost her political importance, and gained no real friends, but many covert enemies. But the calamities which this line of policy brought upon Prussia roused Frederick-William from his apathy, and, with energy, perseverance, and self-denial worthy of all praise, he devoted himself, with his great minister Stein, seconded by Count Hardenberg, to the reorganisation of the state. In the years 1806–10 Prussia underwent a complete domestic reorganisation; and after the battle of Waterloo, which restored to Prussia much of the territory lost at the peace of Tilsit in 1807, the career of progress was continued. Trade received a new impulse through the various commercial treaties made with the maritime nations of the world, the formation of excellent roads, the establishment of steam and sailing packets on the great rivers, and at a later period through the organisation of the Zollverein (q.v.), and through the formation of railways. The most ample and liberal provision was made for the diffusion of education over every part of the kingdom, and to every class. In like manner, the established Protestant Church was enriched by the newly-inaugurated system of government subvention, churches were built, the emoluments of the clergy were raised, and their dwellings improved; but, not content with that, the king forcibly united the Lutheran and Reformed Churches in 1817, a high-handed act most fruitful in discontent and difficulties. This tendency to over-legislation has long been the predominating evil feature of Prussian administration; and the state, without regard to the incongruous elements of which it was composed, was divided and subdivided into governmental departments, which, in their turn, under some head or other, brought every individual act under governmental supervision, to the utter annihilation of political independence. The people soon perceived that this administrative machinery made no provision for political and civil liberty, and demanded of the king the fulfilment of the promise he had given in 1815 of establishing a representative constitution for the whole kingdom. This demand was not acceded to by the king, and its immediate fruits were strenuous efforts on his part to check the spirit of liberalism. Siding with the pietists of Germany, he introduced a sort of Jesuitical despotism, which was continued by his successor, Frederick-William IV. The Landstände or provincial estates, organised in accordance with the system of the middle ages, were the sole and inadequate mode of representation granted to Prussia in this reign, notwithstanding the pledge made to the nation for a full and general representative government. The accession of Frederick-William IV. (1840–61) seemed to open a better prospect to the friends of constitutional freedom. A political amnesty was proclaimed, religious toleration was announced, and a contest betwixt the crown and the pope, in which the first signs of the coming Kulturkampf may be traced, was brought to a close by concessions on the part of the king. Frederick-William, however, was an enthusiastic upholder of the divine right of kings, and it soon became apparent that he was in no way prepared to follow up his vague promises of political liberty by sharing political power with the people. The bureaucratic spirit of over-governing became daily more and more irksome to the nation, and it was evident that a constitutional struggle was inevitable. The king and his advisers, underrating the importance of the movement of 1848 in Germany, thought they had satisfied the requirements of the hour by granting a few unimportant reforms and by making equivocal promises of future concessions. A collision betwixt the troops and the citizens of Berlin, in which blood was shed, awoke the king to the full gravity of the crisis, and he hastened to allay the general discontent by the nomination of a liberal ministry, the recognition of a civic guard, and the summoning of a representative chamber to discuss the proposed constitution. The conversion of the monarch to liberalism was but temporary; and although, after much obstruction, a constitution, superseding the old Prussian estates by a representative parliament, was promulgated in January 1850, it was repeatedly modified in the following years, until few of its democratic features were left. Frederick-William had early distinguished himself and delighted many Germans, both within and without Prussia, by his patriotic utterances in favour of a new united Germany. He was deeply chagrined when in 1848 the national assembly at Frankfort, influenced by Austrian jealousy of the military strength of Prussia, declined to accept him as the national leader, and elected instead the Archduke John of Austria as lieutenant-general of Germany. Yet, when in the following year he was offered the imperial crown, he found himself unable to face the responsibility of accepting it. He hesitated to make so important a move in the contest with Austria for the hegemony of Germany. The later years of this reign were characterised by great advances in the material prosperity and internal improvement of the country. Extensive lines of railway and post-roads were opened, the river navigation greatly facilitated, treaties of commerce formed with foreign countries, and great expansion given to the Prussian and North German Zollverein (q.v.), the army put upon a footing of hitherto unprecedented efficiency of arms and artillery, and the educational system of the country still further developed. William I. (1861–88), who became German emperor in 1871, had been regent of the kingdom since 1858, owing to the insanity of his brother, the late king. William was no more a lover of constitutional, or at least of popular, liberty than any of his predecessors; and in his opposition to the progress of the popular movement, in so far as it aimed at interference with the regal power, he was powerfully aided by his great adviser Bismarck (q.v.), who became prime-minister in 1862 and imperial chancellor in 1871. The successful wars with Austria (1866) and France (1870–71), which so enhanced the prestige of Prussia and which resulted in the united Germany of to-day, are described at GERMANY. Since the king of Prussia became German Emperor the history of Prussia has been practically merged in the history of Germany. After the brief reign of Frederick III. (March 9 to June 15, 1888), his son, William II. (q.v.), ascended the throne. While still adhering to the military policy of his grandfather, and still cherishing a more or less exalted belief in the divine right of kings, the young monarch has shown himself able to realise the importance of the great social questions of modern times, and ready to deal with them in a decided yet sympathetic manner. The advanced, and in some respects socialistic 'labour-policy' of the emperor, unfolded at a labour-conference of representatives of the great powers in Berlin 1890, and the abolition of the anti-socialist laws are said to have been the causes of the resignation by Prince Bismarck of all his ministerial functions in March 1890. This event, which was expected to produce difficulties at home and complications abroad, has hitherto been followed by no consequences of importance. The functions of prime-minister of Prussia and imperial chancellor were entrusted to General von Caprivi. Various minor reforms, including a new scheme of local government, have since then occupied the attention of the Prussian diet. A bill, passed in June 1891, giving compensation for the suspension of salaries of Roman Catholic clergy in Prussia during the Kulturkampf may be regarded as the formal close of that long contest.

See, besides works cited at GERMANY, BERLIN, FREDERICK II., BISMARCK, &c., *Statistisches Handbuch für den preussischen Staat* (vol. i. Berlin, 1888); and H. Tuttle's *History of Prussia* (Boston, 1885 *et seq.*).

Prussian Blue, the name given to sesqui-ferrocyanide of iron, used as a colouring matter. It was discovered in 1704 by Diesbach in Berlin (whence it is also called Berlin Blue), and the manufacture was kept a secret till 1724. See BLUE; also DYEING, Vol. IV. p. 136.

Prussic Acid, a name given to Hydrocyanic Acid (q.v.) because it was first obtained from Prussian blue.

Prutenic Tables, astronomical tables compiled in the 16th century, and so called because based on the system of Copernicus, a Prussian. They were corrected by Brahe.

Pruth, a left-hand affluent of the Danube, rises in the south-east of Austrian Galicia, on the north-east side of the Carpathian mountains, and flows eastward past Kolomea and Czernowitz; from the point at which it leaves Austrian territory to its embouchure in the Danube at Reni, 13 miles below Galatz, it forms the boundary between Russian Bessarabia and Roumania. Length about 520 miles, navigable from near Jassy, 168 miles.

Prynne, WILLIAM, born in 1600 at Swainswick near Bath, from Bath grammar-school passed in 1616 to Oriel College, Oxford, and took his B.A. in 1621. He entered Lincoln's Inn, and in due time was called to the bar, but was early drawn into the vortex of ecclesiastical controversy, and during 1627–30 published *The Unlovelinesse of Love-lockes*, *Healthes Sicknesse* (against drinking of healths), and three other Puritan and anti-Arminian diatribes. In 1633 appeared his *Histrio-Mastix: the Players Scourge*, in whose index, on page 1104, occur the words 'Women players notorious ——.' Six weeks after its publication Henrietta Maria herself took part in a pastoral, so here was a reflection on the queen's own virtue; and on 17th February 1634 Prynne was sentenced by the Star-chamber to a fine of £5000, degradation from the bar, expulsion from Oxford and Lincoln's Inn, the loss of both ears in the pillory, and the shock to his vanity as an author of seeing his book burned in public by the hangman. He was, moreover, condemned to perpetual imprisonment, and immured in the Tower accordingly. Three years later the pertinacious offender found means to publish from his prison two more pamphlets, in which he fiercely assailed the hierarchy, and was unsparing in his personal abuse of Laud. For this he was once more prosecuted; a fresh fine of £5000 was imposed on him; he was a second time pilloried, losing such stumps of ears as the hangman before had spared; and was branded on both cheeks with *S. L.* ('seditious libeller'—rather 'stigmata Laudis' by Prynne's interpretation). He was removed successively to Lancaster, Carnarvon, and Mont Orgueil in Jersey, and remained a close prisoner till in 1640—the Long Parliament then sitting—he was released by a warrant of the House of Commons, and a tumultuous expression of popular sympathy celebrated his restoration to liberty. He acted as Laud's bitter prosecutor, leaving no stone unturned against his old enemy (1644); and in 1647 became recorder of Bath, in 1648 member for Newport in Cornwall. But opposing the Independents and Charles I.'s execution, he was one of those of whom Cromwell 'purged' the House of Commons, and was even imprisoned (1650–52) in Dunster, Taunton, and Pendennis castles. On Cromwell's death he returned to his place in parliament, bestirring himself in the royalist interest; and after the Restoration Charles II. proposed to 'keep busy Mr Prynne quiet by letting him write against the Catholics, and pore over the records of the Tower,' of which records accordingly Prynne was appointed keeper. This did keep him fairly quiet until his death, which took place at Lincoln's Inn on 24th October

1669. 'Voluminous Prynne' Wood calls him; and the continuous stream of writings on the perilous topics of the day, which was always bringing him into trouble, represents but a fraction of his literary activity. He was a great compiler of constitutional history, his most valuable works in this field being the *Calendar of Parliamentary Writs* and his *Records*, both of which contain much that is useful and important.

See vol. iii. of Howell's *State Trials; Documents relating to Prynne*, edited by S. R. Gardiner (Camden Society, 1877); and other works cited at CHARLES I. and LAUD.

Prytane'um, the town-hall of a Greek city, where the fire was kept perpetually burning, where ambassadors were received, where citizens who had deserved especially well of the state were sometimes allowed to live at the public expense; it was in fact the headquarters of the executive of the state. In Athens this body, the *prytaneis*, fifty in number, were chosen from the 500 members of the great council, five for each of the ten tribes. The five representatives of each tribe held office in rotation, one month at a time.

Przemysl, a town of Austrian Galicia, on an affluent of the Vistula, 61 miles W. of Lemberg by rail. It is the seat of a Roman Catholic and a United Greek bishop, carries on a considerable trade, and has manufactures of machinery, spirits, wooden wares, &c. Since 1874 it has been strongly fortified. Pop. (1890) 35,209, fully one-third Jews.

Psalmanazar, GEORGE, 'the Formosan,' was born probably in Languedoc, between 1679 and 1685. Educated by monks and Jesuits at Avignon and elsewhere, he at sixteen turned vagabond, and for two or three years wandered through France, Germany, and the Low Countries, by turns an 'Irish pilgrim,' a 'Japanese convert,' a waiter, a 'heathen Formosan,' and a soldier. At last at Sluys he found a ready accomplice in one Innes, chaplain to a Scottish regiment, who baptised him 'George Lauder' after the governor, brought him over to London, and introduced him to Bishop Compton. For that credulous prelate he translated the Church Catechism into the 'Formosan' language; and to him he dedicated his *Historical and Geographical Description of Formosa* (1704), which found many believers in spite of its patent absurdities, such as that Formosa belonged, not to China, but Japan, and that the hearts of 18,000 boys were sacrificed every new year. The bishop sent him for six months to Oxford, and for a while he was lionised by the highest in the land. In spite, however, of his eating raw meat and enormous quantities of pepper and opium (an opium-eater he continued to the last), people gradually lost faith in him, or the novelty wore off, or by Law's *Serious Call* (1729) he was converted to a sense of the error of his ways. Anyhow, we find him the alleged importer of a white 'Formosan' enamel, a tutor, a regimental clerk (1715-17), a fan-painter, and lastly, for years a diligent hack-writer for the publishers. The *Universal History* was largely of his compiling; and his, too, a popular *Essay on Miracles*. But in all his strange life there is nothing stranger than the esteem expressed for him by Samuel Johnson. He was the man he 'sought after most,' 'the best man he ever knew,' a man whom 'he would as soon think of contradicting as a bishop,' and whose 'piety, penitence, and virtue exceeded almost what we read of as wonderful even in the lives of the saints.' An old man of fourscore years, he died in London on 3d May 1763.

See the autobiographical *Memoirs of* * * * *, *commonly known by the name of George Psalmanazar* (1764), and articles in *Temple Bar* (1865) and the *Cornhill* (1879).

Psalmody. See HYMN, SACRED MUSIC.

Psalms, BOOK OF. This title indicates a collection of songs set to music (for use in the temple and probably sometimes in the synagogue). A more intelligible term, which like 'psalms' is of Greek origin, and is specially favoured by Philo, is 'hymns;' this corresponds exactly to the Hebrew *tᵉhillīm*, 'praises,' or 'songs of praise.' The eucharistic element is in fact the most essential one in the book: with the solitary exception of Ps. lxxxviii. there is an undercurrent of thanksgiving even in the most melancholy compositions (cf. Eph. v. 19, 20). There was, however, an earlier stage of psalmody, as a linguistic study of the Hebrew title assures us, when the service of religious song was of a very rough nature, and not under the control of guilds of singers. The ancient Arabs used a term (*tahlīl*) which corresponds to *tᵉhillah* for the *shouting* of a short consecrated formula, and the common root of both names means 'to call, cry out.' Only by degrees did the Israelitish 'psalmody' rise from a shouting like that of the vintage or the bridal night to the carefully trained singing of later times. Indeed, as late as the fall of Jerusalem the noise of the Babylonian soldiers in the temple is compared to that of the worshippers on one of the olden feast-days (Lam. ii. 7).

The question therefore arises, Can our present psalms, so spiritual in tone and in form comparatively so artistic, really be the very forms of prayer and praise used by the pre-exilic Israelites? Or have they literally driven out earlier and less spiritual compositions? Or lastly, have the older formulæ been greatly expanded and idealised, or even sometimes permitted to become imbedded in later works? For this last conjecture some analogies might perhaps be found in the prophetic literature (see, e.g., Isa. ii. 2-4, and Ewald, *The Prophets*, i. 82, 83), but it can only be admitted to a hearing on proof of the existence in a psalm of really strong inconsistencies of thought and language. Till that proof is given let us accept each psalm as the monument of some particular age, without attempting to extract by analysis fragments of earlier origin than the rest of the poem. To ascertain approximately that age or those ages is the function of criticism. True; but have the critics the means of doing this? 'When once it is admitted, as it must be admitted, that the titles cannot be absolutely relied on,' says an English commentator, 'we are launched upon a sea of uncertainty' (Kirkpatrick). By no means. The question of the origin of the Psalter is of course a complicated one, but we must not say that the student of complicated problems is like a mariner without a compass. There are three conditions upon compliance with which the disagreement of critics will be reduced within very narrow limits. The first is, that no critic should approach the Psalter until he has assimilated a good number of the best critical results which have been reached in other parts of the Old Testament. The second, that he should begin at the end of the Psalter—i.e. with Books iv. and v. (the date of which, as collections, cannot, for various reasons, be later than the accession of Simon the Maccabee), and work his way backwards. The third, that he should break radically with the custom of looking at each psalm by itself, with a view to determining its period. The reason of the first is that there are numerous similarities in language and in tone between the Psalms and other old Hebrew writings; many at least of which afford valid evidence of the date of the poems, the psalmists being in a high degree imitative, and infinitely more prone, for instance, to borrow from the prophets than the prophets to borrow from them. The reason of the second is that, the Psalter being a combination of five 'books' of psalms, it is natural to presume that the two last (which properly form but one book) are later as collections than the three first. These five books are (1) Ps. i.–xli., (2) Ps. xlii.–lxxii., (3) Ps. lxxiii.–lxxxix., (4) Ps. xc.–cvi., (5) Ps. cvii.–cl. And that of the third is that within these five 'books' there are certain minor books or psalters, which have certain common characteristics, and may, at any rate at the outset of the inquiry, be presumed to contain works of the same (not too strictly defined) period. These minor psalters are the Davidic (to which the 'Davidic' psalms in Books iv. and v. do not belong), the Korahite, the Asaphite, and the Songs of Ascent (i.e. of pilgrimage), commonly miscalled 'Songs of Degrees,' in addition to which there are various other groups of psalms, not marked by traditional headings, such as the Hallel and the Hallelujah psalms, the deutero-Isaianic (i.e. those which suggest the writer's acquaintance with the exilic portions of Isaiah), and the Jeremianic (i.e. those which from internal evidence were written either by Jeremiah or by a follower of that great prophet).

Thus, the conscious or unconscious object of recent criticism of the Psalms has been the imparting a stricter and more scientific character to the argument from internal evidence. Not the least difficult part of the work is that which relates to the linguistic phenomena, the evidential value of which has often been too much depreciated. This kind of evidence is no doubt rarely conclusive, but even in the case of the highly imitative psalm-literature will lead the critical student to some perhaps unforeseen results, unless indeed his way is barred by the arbitrary assumption that all the evidences of later date in the supposed pre-exilic psalms have been introduced by editors. And what upon the whole are the results of a criticism which does not float 'upon a sea of uncertainty?' Two very definite ones may be mentioned, with a warning, however, to the student that the criticism of the Psalter is so interwoven with that of other Old Testament books that many good Hebraists might hesitate to endorse even these moderately-stated results. First, that there is a considerable number of psalms belonging to the pre-Maccabean and Maccabean Greek portion of the post-exilic period (see especially Ps. xlix., lxxiv., lxxix., cx., cxviii., cxlix.). The possibility of this theory (which was virtually held by Theodore of Mopsuestia) is expressly admitted in the margin of our own 'Geneva Bible.' The objections to it are of various degrees of plausibility; none of them, however, are conclusive. It has been urged, for instance, that the so-called Psalms of Solomon (the composition of which falls between 63 B.C. and 46 B.C.) breathe an entirely different spirit from the psalms which may most plausibly be referred to the period of the Greek rule and of the Maccabean rising. But it can be easily shown that the latter event was a turning-point in Jewish religion, after which we might fairly expect a considerable difference in the tone even of liturgical poetry. Moreover, the phrase 'an entirely different spirit' is an exaggeration. There are certainly the germs of legalism in Psalms i., xix. 7–14, cxix., and those of later doctrines of immortality and resurrection may (if the late dates of Ps. xvi., xvii., xlix., lxxiii. be granted) be not unreasonably found in parts of the Psalter, while several of the 'Pharisæan' Psalms of Solomon contain passages strikingly parallel to our Ps. xlix. A second result is that none of the extant psalms are the genuine work of David, who was doubtless a gifted musician and poet (the early tradition on this point is clear), but whose hymns were probably too little in accordance with later ideas of art and of religion to escape the great literary as well as political catastrophe of the Exile. Contrast the life of David in the Books of Samuel with the character sketched, evidently from life, in the so-called Davidic psalms. Granting that David lived in the service of an ideal which he sought, but often failed, to realise, could that ideal have agreed with the picture presented to us in the Psalter? How much is there in the tone or the ideas or the implied circumstances of the psalms which agrees with the tone or ideas of the traditional speeches of David and with his traditional history? Enough perhaps to permit us to regard him as a far-off adumbration of the nobler members of the post-exilic church, and therefore also of Him who was the 'root and offspring of David' (Rev. xxii. 16), but scarcely more than this. Indeed the only doubt is, not so much whether any psalms are Davidic, but whether any are even pre-exilic at all. The fact (which, even without scientific proof, it would be unreasonable to doubt) that David composed some psalms was enough to make collectors call certain psalms, or collections of psalms, by his name, somewhat as the various expansions of the older law in different ages were usually referred to Moses. David was in fact the traditional founder of psalmody and to some extent (see below) a precursor of the religion of the Psalter. Perhaps, too, psalms which David really wrote may have been expanded or added to by later writers. The most plausible instance is Ps. lx.; but there is nowhere any necessity to adopt this view. It is safer to hold provisionally that certain psalms are as old as the epoch-making reign of Josiah. Yet the arguments for this view are seldom, if ever, cogent, and mainly depend for their acceptance on our ideas of historical probability, which ideas again depend on the picture we have formed, on critical grounds, of the Babylonian and Persian periods of the history of the Jews. Psalm xviii. is no doubt the psalm which would, more generally than any other, be pronounced pre-exilic. Some of the older critics were even quite sure that it was Davidic, influenced partly by the admission of the poem into what is called the appendix to Samuel (see 2 Sam. xxiii.), which, however, only proves that the poem was conjecturally ascribed to David (the idealised David of later times) by the editor of Samuel, who lived not long before the Exile. To the present writer an early pre-exilic date for this psalm seems incompatible with the internal evidence. He thinks that, though perhaps written in the reign of Josiah as a literary illustration of the life of David, it was only adopted as a temple-hymn after the return from exile, when it was doubtless interpreted as prophetic of a great future Davidic ruler or line of rulers (see Ps. xviii. 50). The final editing of the Psalter he ascribes to the temple-authorities in the time of Simon the Maccabee. The book would quickly be carried to 'Israel in Egypt,' and soon afterwards translated into Greek for the benefit of the great Jewish community at Alexandria. The date of this event cannot be fixed with precision, but it was at any rate before the Christian era.

Among the arguments for the post-exilic date of the Psalms none perhaps is more cogent than that which is based on their essential unity of tone. They have, in short, such a strong family likeness that it would be rash to spread their composition over too extensive a space. And if they all, or nearly all, belong to one period, can we be in doubt which that period is? Is it not obvious that these temple-songs were written for a community which had absorbed, in some real though still imperfect degree, the high teaching of the pre-exilic and exilic prophets? Now, though it would be absurd to say that there were no psalms before the Exile, the writings of Isaiah and Jeremiah prove that the nation, as a whole, was as yet far from having assimilated the pure and spiritual prophetic religion, and that the priests in particular were unprogressive. How then should there have been temple-songs like those in our Psalter before that spiritual regeneration of which the 'Second Isaiah' was presumably the chief instrument? The only way to avoid the conclusion that the Psalms are (with the possible exception of Ps. xviii., and, some will add, of Ps. xx., xxi., xlv., lxi., lxiii.) post-exilic is to suppose that certain psalms, especially those which remind us of Jeremiah, were written in the reign of Josiah and during the Exile, with the prophetic hope that they would one day be required by a reorganised church-nation. This position represents perhaps the enlightened conservatism of the future, but cannot here be discussed.

In any case, the ideal character depicted in the Psalms belongs to an advanced period in Israel's history. It is that of a righteous man who, in the face of oppression, clings to his religion and his God, who trusts to be delivered, and for the most part is delivered, and who now and then forms bold anticipations of a world converted to the true God, or, it may be, crushed into reluctant obedience; and in the noblest features of this ideal it is impossible not to trace the influence of the two great prophetic teachers of the later period—Jeremiah and the 'Second Isaiah.' It is such a righteous man who, at least in Books i.-iii., for the most part appears to be the speaker, and the question arises, whether he is more accurately viewed as a personification of Israel, or as simply the typical or representative Israelite, such as every member of the congregation either was or desired to become. In some cases no one can deny that the former theory is alone correct (see, e.g., Ps. liv., lx., lxxxvii., cxvi., cxxix.), and there are not a few other psalms where its absolute rejection would involve the interpreter in the greatest psychological difficulties (see, e.g., Ps. vi., xxii., xxx., li., cxxx., cxxxi.). It has indeed been hastily stigmatised as forced and fanciful, but the number of passages elsewhere in the Old Testament which without it are unintelligible (see, besides the sections in second Isaiah relative to the 'servant of Jehovah,' Num. vi. 23-26; Micah, vii. 1, 7-10; Hosea, iv. 4, 5, vii. 8, 9; Lam. i. 3), and the numerous analogies in the Greek choruses, prove the baselessness of the charge. The solidarity of the individual and his tribe was in fact one of the ruling ideas of the ancient peoples. It is, however, *a priori* improbable that the new sense of the duties and privileges of the individual, which was stimulated (but hardly caused) by the preaching of Jeremiah and Ezekiel, should not have left its mark on the Psalter of the second temple. And do we not find such a mark on some or even many of the Psalms? Does not the personality of the psalmist sometimes at least assert itself with distinctness (see, e.g., Ps. xlv. 1, lxxiii. 2, 3, 13-17, 21-28, cvi. 4, 5, cxxxix. 18)? Yes; but it will also be noticed that even in such passages (the first and third of those just referred to are perhaps the only exceptions) the psalmist speaks, not only in his own behalf, but at any rate for a class within the Church-nation. And in some of the psalms in which a reference to the nation may most plausibly be maintained, it is almost equally possible to hold that the speaker is a typical or representative Israelite (in the sense described above), or even that the psalmist himself in the same psalm sometimes has the nation, sometimes himself, or any other pious Israelite, in view as the speaker. Reading the Psalms from this point of view makes them not less prophetic of Christ, but much more edifying and intelligible. 'The psalms,' says the eloquent Adolphe Monod, 'are filled with expressions of an unheard-of sorrow. David there speaks incessantly of his troubles, of his maladies, of his innumerable enemies; as we read them we can hardly understand what he meant.' But when we see that it is the troubles of the Church-nation, and not those of any individual, however highly placed, which are described, we can account for the strength of the language, and are also stirred up to purge our own religion of its selfishness. It only needs to be added that our conception of the life of the Church-nation must be a truly historical one. We must not rest contented with the perception that there is a strong family likeness in the Psalms. We must seek out not only resemblances but differences, and ascertain, so far as we can, the historical background of each group of psalms. Hitzig and Ewald may have gone too far in this historical 'divination,' but without exercising this faculty to some extent it is impossible fully to enjoy the Psalms. Historical data will not be wanting if we search for them, and the comparative method will here too be found applicable. The period from the Return to the Maccabees was not so monotonous as it is represented in our handbooks, and by judiciously distributing the Psalms over it on grounds of internal evidence we gain so many fresh first-class authorities for the history of the Jewish Church.

Among modern commentaries accessible in English, see J. A. Alexander (New York, 1850), Tholuck (trans. 1856), Ewald (trans. 2 vols. 1880), Delitzsch (trans. 3 vols. 1887-89), Perowne (latest ed. 1889), Cheyne (1888), De Witt (New York, 1891), Kirkpatrick (vol. i. 1891); and cf. Bishop Alexander, *The Witness of the Psalms to Christ and Christianity*; Cheyne, *The Origin and Religious Contents of the Psalms* (Bampton Lectures for 1876 and 1889 respectively).

Psaltery. See Dulcimer.

Psammetichus, or Psammitichus I. and II. See Egypt, Vol. IV. p. 241.

Psammitic, in Geology, applied to derivative rocks composed of rounded grains, as ordinary sandstone.

Pseudepigraphy, the ascription to books of false names of authors.

Pseudomorphs, in Mineralogy, applied to minerals which assume the crystalline form of other species. Pseudomorphs result from the action upon minerals of water containing carbonic acid, oxygen, and other reagents in solution. The internal structure of a pseudomorph has no relation to the external form of the crystal. Two kinds of pseudomorphs are recognised: (*a*) *alteration* and (*b*) *substitution* pseudomorphs. Alteration pseudomorphs are the result of the chemical metamorphosis of the original mineral either by loss or gain, or exchange of constituents. Substitution pseudomorphs are minerals formed in the moulds or vacant spaces left by the total removal in solution of previously existing minerals.

Pseudonym (Gr. *pseudēs*, 'false,' and *onoma*, 'a name'), a false name adopted by an author which conceals his identity. Originally 'pseudonymous' was used of works deliberately published under a false name, so as to induce people to believe them the works of those whose names they bore, or of works erroneously attributed to a wrong person. Thus, there were pseudonymous gospels of Thomas and of Bartholomew; and the works circulated under the names of the classical writers, but proved not to be genuine, are pseudonymous works. But the term pseudonym is now most commonly used as an assumed name not really meant to mislead—what in England is often called by the French words *nom de plume* or 'pen-name,' and nearly corresponding to the French expression *nom de guerre*. There have been periods in history when the acknowledgment of the authorship of certain pamphlets or books might mean death or banishment to the writer. It is common to find books containing attacks on public men, or those consisting of theological controversy, and the literature of satire, appearing under assumed names. In recent times young authors especially have frequently risked a new work under a pseudonym, and have kept it up afterwards. Once an author is famous it is found advisable to stick to a pen-name. For instance, every one knew the writings of 'George Eliot,' but few would at once have recognised a work by Mary Ann Evans. The present list is not intended to be exhaustive; names in occasional use are not given, but only those which have been impressed by usage on the mind of the public. Neither have such well-known literary disguises as those adopted by the author of *Waverley* been repeated here. It may just be noted that for a longer or shorter number of years 'the author of *Waverley*,' 'the author of *John Halifax, Gentleman*' (Mrs Craik), 'the author of *Guy Livingstone*' (G. A. Lawrence), 'the author of *Grandmother's Money*' (F. W. Robinson), 'the author of *Chronicles of the Schönberg-Cotta Family*' (Mrs Charles), 'the author of *Supernatural Religion*' (unknown), 'the author of *Ecce Homo*,' '*The Autocrat of the Breakfast Table*,' &c. have been practically used as pen-names.

For further information, see the article ANONYMOUS; Weller, *Lexicon Pseudonymorum* (1886); Cushing, *Initials and Pseudonyms* (1885), and *Anonyms: A Dictionary of Revealed Authorship* (2 vols. 1890); Clegg's *Dictionary of Second-hand Booksellers, &c.* (3d ed. 1891); and Halkett and Laing's *Dictionary of Anonymous and Pseudonymous Literature* (1881–88).

A K.H.B.	Dr A. K. H. Boyd.
A.L.O.E. (= *A Lady of England*)	Charlotte Maria Tucker.
Adeler, Max	Chas. Heber Clark.
Alcibiades	Lord Tennyson in *Punch*, 1846.
Alexander, Mrs	Mrs A. F. Hector.
Amateur Casual	Jas. Greenwood.
Anstey, F.	F. Anstey Guthrie.
Ape ('Vanity Fair')	Carlo Pellegrini.
Atlas ('World')	Edmund Yates.
Aunt Judy	Mrs Alfred Gatty.
Bab	W. S. Gilbert.
Bede, Cuthbert	Rev. Edw. Bradley.
Bell, Acton	Anne Brontë.
" *Currer*	Charlotte Brontë.
" *Ellis*	Emily Jane Brontë.
Bettina	Eliz. von Arnim.
Bibliophile Jacob	Paul Lacroix.
Bickerstaff, Isaac	Dean Swift, and Steele in *Tatler*.
Biglow, Hosea	J. Russell Lowell.
Billings, Josh	Henry W. Shaw.
Bon Gaultier	Sir Theodore Martin and W. E. Aytoun.
Boz	Chas. Dickens.
Breitmann, Hans	Chas. G. Leland.
Brown, Mrs	George Rose.
Browne, Matthew	W. B. Rands.
Browne, Phillis	Mrs Hamer.
Bystander	Goldwin Smith.
C.S.C.	C. S. Calverley.
Caballero, Fernan	Cecilia Bohl von Faber.
Carmen Sylva	Queen of Roumania.
Carroll, Lewis	C. L. Dodgson.
Cavendish	H. Jones.
Caxton, Pisistratus	1st Lord Lytton.
Cham	Amédée de Noé.
Claribel	Mrs Barnard.
Conway, Hugh	F. J. Fargus.
Cornwall, Barry	B. W. Procter.
Country Parson	Dr A. K. H. Boyd. Rev. H. Moule.
Crayon, Christopher	J. E. Ritchie.
" *Geoffrey*	Washington Irving.
Crowquill, Alfred	A. H. Forrester (artist) and C. R. Forrester (author).
Dagonet	G. R. Sims.
Danbury Newsman	J. M. Bailey.
Dash, Comtesse	M. de Sainte-Mars.
Delorme, Joseph	C. A. Sainte-Beuve.
Delta (Δ)	D. M. Moir.
Dods, Meg	Mrs Johnstone.
E.V.B.	Hon. Mrs Boyle.
Elia	Charles Lamb.
Eliot, George	Mrs Mary Ann Cross (*née* Evans).
Ettrick Shepherd	James Hogg.
Fairleigh, Frank	Francis E. Smedley.
Farningham, Marianne	Mary Anne Hearn.
Fern, Fanny	Mrs Sara P. Parton.
Garrett, Edward	Mrs I. Fyvie Mayo.
Gift, Theo	Theodora Boulger.
Gotthelf, Jeremias	A. Bitzius.
Graduate of Oxford	John Ruskin.
Graham, Ennis	Mrs Molesworth.
Gray, Maxwell	Miss M. G. Tuttiett.
Greenwood, Grace	Mrs Lippincott.
Gréville, Henry	Mme. Durand.
Gyp	Comtesse de Martel de Joinville.
H.B.	John Doyle.
H.H.	Mrs Helen Hunt Jackson.
Haliburton, Hugh	J. L. Robertson.
Hamilton, Gail	Mary Abigail Dodge.
Hamst, Olphar	Ralph Thomas.
Harland, Marion	Mrs M. V. Terhune (*née* Hawes).
Hildebrand	N. Beets.
Historicus	Sir W. Vernon Harcourt.
Holbeach, Henry	W. B. Rands.
Hope, Ascott R.	R. Hope Moncrieff.
Ingoldsby, Thomas	Rev. R. H. Barham.
Iron, Ralph	Olive Schreiner.
Janus	Döllinger, Huber, and Friedrich.
Jean Paul	J. P. F. Richter.
Junius	(see article JUNIUS).
Kerr, Orpheus C.	R. H. Newell.
Knickerbocker, Diedrich	Washington Irving.
L.E.L.	Letitia E. Landon.
Latouche, John	Oswald Crawford.
Lee, Holme	Harriet Parr.
Lee, Vernon	Violet Paget.
Lenau, N.	N. Niembsch von Strehlenau.
Lewald, Fanny	now Mme. Stahr.
Little, Thomas	T. Moore.
Loti, Pierre	Julien Viaud.
Ludlow, Johnny	Mrs Henry Wood.
Lyall, Edna	Ada Ellen Bayly.
Maitland, Thomas	R. Buchanan.
Malet, Lucas	Mrs Harrison (*née* Kingsley).
Markham, Mrs	Mrs E. C. Penrose.
Marlitt, E.	Henriette Eugenia John.
Mathers, Helen	Mrs Reeves (*née* Matthews).
Meredith, Owen	Earl of Lytton.
Merlin	Alfred Tennyson in *Examiner*, 1852.
Miller, Joaquin	C. H. Miller.
Multatuli	E. Douwes Dekker.
Nasby, Petroleum V.	D. R. Locke.
Nerval, Gerard de	G. Labrunie.
Nimrod	C. J. Apperley.
North, Christopher	Prof. John Wilson.
Novalis	F. L. von Hardenberg.
O.K.	Mme. Olga de Novikoff (*née* Kiréeff).
O'Dowd, Cornelius	Charles Lever.
Ogilvy, Gavin	J. M. Barrie.
Old Humphrey	G. Mogridge.
Omnium, Jacob	Matt. Jas. Higgins.
Opium Eater	T. De Quincey.
Optic, Oliver	Wm. T. Adams.
O'Rell, Max	Paul Blouet.
Ouida	Louise de la Ramé.
Q.	Douglas Jerrold. A. T. Quiller Couch.
Page, H. A.	Alex. H. Japp.
Parley, Peter	Sam. G. Goodrich; W. Martin; G. Mogridge; W. Tegg; J. Bennett.
Phiz	Hablot K. Browne.
Pindar, Peter	John Wolcot.
Plymley, Peter	Sydney Smith.
Prout, Father	F. S. Mahony.
Quirinus	Dr Döllinger.
Red Spinner	Wm. Senior.
Rob Roy	John Macgregor.
Roving Englishman	E. C. Grenville-Murray.
S.G.O.	Rev. Lord Sydney Godolphin Osborne.
Sand, George	Madame Dudevant (*née* Dupin).
Scott, Leader	Mrs Lucy E. Baxter (*née* Barnes).
Scriblerus, Martinus	Swift, Pope, and Arbuthnot.
Sealsfield, Charles	K. A. Postel.
Selkirk, J. B.	James B. Brown.
Sharp, Luke	Robert Barr.
Shirley	John Skelton.
Sketchley, Arthur	Rev. George Rose.
Slick, Sam	T. C. Haliburton.
Spy	Leslie Ward.
Stchedrin	M. Soltykoff.
Stendhal	Marie Henri Beyle.
Stepniak	S. Kartcheffsky.
Stern, Daniel	Countess d'Agoult.
Stonehenge	J. H. Walsh.
Stretton, Hesba	Sarah Smith.
Surfaceman	Alexander Anderson.
Syntax, Dr	Wm. Combe.
Talvj	T. A. L. von Jacob-Robinson.
Taylor, G.	Professor Hausrath.
Titcomb, Timothy	J. G. Holland.
Titmarsh, Michael Angelo	W. M. Thackeray.
Twain, Mark	Samuel L. Clemens.
Tytler, Sarah	Miss H. Keddie.
Uncle Remus	Joel Chandler Harris.
Urban, Sylvanus	Editor of *The Gentleman's Magazine*.
Vacuus Viator	Thomas Hughes.
Verax	H. Dunckley.
Voltaire	François Marie Arouet.
Ward, Artemus	Chas. F. Browne.
Warden, Florence	Mrs G. James.
Wetherell, Elizabeth	Susan Warner.
Winter, John Strange	Mrs H. E. V. Stannard.
Zadkiel	Capt. R. J. Morrison, R.N.

Pseudopodia (Gr., 'false feet'), blunt, irregular processes of protoplasm thrown out and drawn in again by amœbæ and some other animals. See AMŒBA, PROTOPLASM, RHIZOPODA.

Pseudoscope (Gr. *pseudēs*, 'false,' and *skopeō*, 'I see'), an optical instrument through which, by means of an arrangement of prisms, objects are seen with their relief inverted. What is convex appears concave, and a figure in intaglio appears to be cut in relief. It was discovered by Wheatstone when experimenting on the Stereoscope (q.v.).

Psittacidæ. See PARROT.

Pskov, a decayed town of European Russia, 9 miles SE. of Lake Pskov (50 miles long by 13 broad), by rail 188 miles NE. of Riga and 160 SSW. of St Petersburg. Like Novgorod it was celebrated for its republican institutions after the 12th century. During the 14th and 15th centuries it was one of the Hanse towns, and had then a population three times as large as at present. In 1510 it was annexed to Moscow. During the wars with Lithuania Pskov was a stronghold of great importance. It contains a cathedral and numerous venerable churches and monasteries. Fish, obtained from the lake, and flax are the principal articles of commerce. Pop. 21,684.—The *government* has an area of 17,069 sq. m. and a pop. (1885) of 948,071; (1891) 1,029,053.

Psoralea, a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ. The flowers are blue, purple, or white. Some of the species are natives of India, others of other warm countries.—*P. esculenta*, the *Bread-root* of North America, and *Prairie Apple* of the Canadian boatmen, is a herbaceous perennial, about a foot high, with a carrot-like root, swollen above the middle, and abounding in farinaceous matter. It is used as an article of food, both boiled and raw.

Psori'asis (from the Greek word *psora*, which signifies a cutaneous eruption, supposed by some to be the itch) is now employed to signify a disease characterised by slight elevations of the surface of the skin covered with whitish scales. The eruption begins in small rounded spots, which may remain small, or may enlarge indefinitely, the centre becoming more normal while the inflamed margin continues to extend. The spots are covered by white silvery scales, not easily detached from the skin, which, however, when they are removed, is seen to be red and dry. The parts most often affected are the fronts of the knees and backs of the elbows; whatever other parts may be attacked, these are rarely free from the eruption, and the distribution is always nearly the same on the two sides of the body. Itching is often absent altogether, and very seldom severe. The disease may occur at any age, but usually first manifests itself in youth, rarely before the age of six. It is extremely apt to recur: it is rare for a person to suffer from it only once.

Numerous causes have been assigned for the disease; it has been attributed to scrofula, gout, and many other constitutional states; and doubtless it may be associated with them. But, with the exception of heredity, no cause has been satisfactorily shown to lead to its development. It frequently occurs in persons otherwise in perfect health, and, except in very severe cases, does not interfere in any way with their employments.

If left to itself, the disease generally tends to persist indefinitely. But in the great majority of cases it is very amenable to treatment, both local and constitutional. Locally, ointments containing tar, resorcin, pyrogallic acid, &c. are most in use; internally, arsenic is far the most valuable remedy. Where it has failed, iodide of potassium in large doses, liquor potassæ, and carbolic acid have sometimes succeeded. But some cases resist the most varied and persevering efforts for their cure; and nothing has yet been discovered which will prevent the tendency to recurrence of the disease.

Psyché (Gr., 'the soul'), an exquisite creation of the later mythology of Greece. She was the youngest of the three daughters of a king, and so beautiful that mortals mistook her for Aphrodite (Venus) herself, and did not dare to love, but only to worship her. This excited the jealousy of the goddess, who sent Eros (Cupid) to inspire Psyche with a passion for the most contemptible of all men; but Eros was himself wounded as deeply by her glances as ever he had wounded others with his darts. He accordingly caused her to be carried to a beautiful palace of pleasure, and here every night he visited her, unseen and unknown, and left her before morning broke. Thus Psyche might have enjoyed perpetual delight had she remembered the advice of her unknown lover, who warned her not to seek to know who he was. But her jealous sisters, whom against her lover's injunction she had allowed to visit her, played upon her curiosity, and persuaded her that she was embracing a monster in the darkness of night. Lighting a lamp when Eros was asleep, she saw with rapture that she was the mistress of the most handsome of the gods, but in her excitement she let a drop of hot oil fall on the sleeper's shoulder. This awoke Eros, who upbraided her for her mistrust, and vanished. Psyche gave way to the most passionate grief; she tried in vain to throw herself into a river, then wandered about from temple to temple, inquiring for her lover. At length she came to the palace of Venus, where she was seized by the goddess, and kept as a slave. Eros, however, who still loved her, invisibly helped and comforted the hapless maiden, reconciled her to his mother, and was finally united to her in immortal wedlock. In works of art Psyche is represented as a beautiful maiden with the wings of a butterfly. Her story was considered as an allegory of the progress of the human soul through earthly passion and misfortune to pure celestial felicity; but it must not be forgotten that it is merely a version of one of the most widespread folk-tales in the world. See CUPID, and Zingow's *Psyche und Eros* (1881).

Psychic Forces. See THEOSOPHY; and for the Psychical Research Society, see APPARITIONS.

Psychology may be briefly defined as the science of mental phenomena. After having long occupied a doubtful place as a department of metaphysics, supplemented by many empirical observations, its character as a science dealing with a special order of facts, and many of the laws of occurrence of these facts, may now be said to be established. At the same time opinion is still far from unanimous on many of the most important points of psychological doctrine, especially on such points as involve a philosophical view of the nature of mind.

The chief different ways of conceiving and defining the mental facts with which psychology has to do may be traced to the influence of rival philosophical hypotheses as to the nature of mind. Thus, in the first place, we have the view that psychology deals with the facts of the conscious mind which, when knowing, feeling, or striving, is always conscious of itself as knowing, feeling, or striving—i.e. is self-conscious. This is the view, for instance, of Sir W. Hamilton. But it has many difficulties. We can hardly ascribe self-consciousness to the lower animals or to very young children, and yet some kind of mental life clearly belongs to them: so that it would seem that mental life and self-consciousness cannot be identified. Further, many psychologists (including Hamilton) are of opinion that there are mental phenomena unaccompanied by self-consciousness even in mature human life. And if self-consciousness is thus recognised as belonging to mental life only under certain conditions and at a comparatively developed stage, it will be one of the main purposes of psychology to examine these conditions and trace its growth. In the second place, a materialistic view of mind is connected with the attempt to make brain-physiology play the part of a psychology. It is plain, however, that a sensation or a feeling of pleasure or pain is a fact of an entirely different order from a neural disturbance. The one may accompany or even cause the other (or both may be only different aspects of the same ultimate existence), but the characteristic nature of the mental fact is not reached by the most thorough investigation of its physiological conditions, while the latter are in many cases much more obscure than the phenomena they are adduced to explain. In the third place, an attempt has been made (sometimes apart from any philosophical hypothesis as to the nature of mind) to start with certain mental facts—called presentations, sensations, or feelings—regarded as ultimate or independent, and to trace the laws and manner of their combination and succession. This method has been worked with excellent result by the English Associationist psychologists. By a similar method, and by treating presentations as forces, Herbart and his followers have elaborated a mechanism of the mind and reduced psychology to mathematical form. The difficulty of this mode of conceiving mind is to explain how a series of sensations—or any interaction of presentations—can generate the consciousness of a self persisting through changing states; and even to give any meaning to sensation or presentation without regarding it as experienced by or presented to mind. On these grounds many psychologists, while influenced by the scientific method of the Associationists and of Herbart, hold that presentation or sensation is only conceivable as belonging to a subject or mind. So far, mind must be assumed by the psychologist as implied in the experience of which he has to trace the development. This subject, or mind as the condition of experience, may be admitted to elude psychological observation. As Hume says: 'I never can catch *myself* at any time without a perception, and never can observe anything but the perception'—i.e. it is the empirical *ego*, or mind with its content of experience, which is the object of psychological observation. But the pure *ego*, or subject, is nevertheless implied by every mental fact. Psychology may, in this way, be distinguished from other sciences as dealing with subjective facts, or, rather, with the subjective aspect which belongs to all facts—i.e., as Dr J. Ward puts it, with the phenomena connected with presentation to a subject.

Method of Psychology.—If this view of the subject-matter of psychology be adopted, it is clear that the ultimate source of our knowledge of mental facts must be the knowledge each person has, through self-consciousness, of his own mental states. The mental attitude of attending to these states is called Introspection. The nature and value of introspection have been much disputed. But the arguments of Comte and others to show that the process is impossible, and psychology only another name for a department of physiology, prove too much: for were introspection impossible we should not even know that there are such things as mental states. It may be admitted, however, that the introspective attitude involves an effort of reflection which modifies the mental state we seek to observe. Consequently many obscure elements of mental life may elude its cognisance, and only become known through their effects upon the flow of ideas; while, on the other hand, states of intense mental concentration exclude it, and can only be observed introspectively in the weakened form of memory-images. It is even held by many writers that this is the sole method of introspective observation: that all introspection is retrospection. In this way the results of introspection are apt to lack accuracy, and (as each observer is limited to his own consciousness) they also lack objective or universal validity. To supply these wants the introspective or subjective method has been supplemented by objective observation both of the physiological antecedents and concomitants of mental facts, and of the expressions, products, and records of conscious life. The latter are to be found in the emotional expressions and actions of normal men; in the emotional expressions and actions of children, undeveloped races, the insane, and the lower animals; in language; and in social customs and institutions. To this side of psychological study, which involves the application of the comparative method to psychology, contributions of the greatest value have been made in the *Zeitschrift für Volkerpsychologie und Sprachwissenschaft*, edited by Lazarus and Steinthal. Further, within recent years attempts have been made to apply experimental methods to psychology. Experiments on reaction-time, for instance—i.e. on the time taken to react upon stimuli—lead to the determination of the time taken up by mental operations of different kinds and different degrees of complexity. Similar experimental methods have been adopted for investigating the accuracy of reproduction, the number of things that can be attended to at a time, &c. Laboratories, such as that at Leipzig, of which Wundt is the head, exist both in Germany and in America for the prosecution of these experimental investigations. The results of many experiments have already been recorded; but it would be premature at present to estimate the value of these results for the science of psychology. Amongst the experimenters who keep the bearing of their investigations always in view, mention should be made of Münsterberg (*Beiträge zur experimentellen Psychologie*, 1889 and following years).

Psycho-physics.—The experimental inquiries above referred to may to a large extent be traced to certain investigations (chiefly) of E. H. Weber's on *minima sensibilia* and on the relation between the intensity of the sense-stimulus (which can be measured objectively) and the intensity of the consequent sensation (which cannot be directly measured). His experiments were further carried out and their results formulated and elaborated into the science of psycho-physics by G. T. Fechner (*Elemente der Psychophysik*, 1860; reprinted 1889). By psycho-physics Fechner means the exact science of the relations between body and mind, this science being based upon facts and the mathematical relations they involve. The generalisation arrived at from experiment is by Fechner called Weber's Law, and expressed by him in the following (amongst other) terms: There will be the same sensible difference of intensity between two sensations, provided the relative intensities of the stimuli producing them remains the same. Thus, an increase of 1 to a stimulus whose strength is expressed by 100 will be experienced as of the same intensity as an increase of 2 to a stimulus whose strength is 200, or of 3 to a stimulus whose strength is 300, &c. The literature of psycho-physics is occupied with the experimental verification, the mathematical development, and the interpretation of this law. But neither its experimental basis nor its interpretation is quite satisfactory. Experiment supports it only within a certain range of sensibility. It is limited first of all by what Fechner calls the 'fact of the threshold'—i.e. the fact that a certain amount of stimulus is required to produce any sensible effect whatever; and secondly, at the other end of the scale, when the stimulus is beyond a certain intensity, the relation ceases to hold good, while within these two limits its verification cannot be said to be exact. Further, it is only in the sense of pressure and the muscular sense that we can accurately measure the intensity of the stimulus in the form in which it reaches the nervous end-organs; in hearing and sight the objective stimuli undergo physical or chemical changes in the sense-organ before reaching the extremities of the nerve-fibres. Again, all the experimental methods for establishing the law assume the equality of least sensible differences. Thus, if there be stimuli measured respectively by 100, 101, 200, 202, causing sensations x, x', y, y', such that x' is only just distinguishable from x, y' only just distinguishable from y, it is assumed that $x' - x = y' - y$, an assumption which neglects the important fact that there is no mental content corresponding either to $(x' - x)$ or to $(y' - y)$. Finally, even if the law can be held to be established, it is not clear that it requires to be interpreted (with Fechner) as properly psycho-physical. It may also be held that the law is really physiological, the intensity of the stimulus being modified in this way by irradiation in the nerve-centres; while Wundt has attempted a psychological interpretation of it, maintaining that it holds of the relation between mere sensation and the 'apperception' of the sensation by the direction of attention to it.

Mental 'Faculties.'—The observation and description of mental facts have led to a classification of them, according to their degrees of likeness, into certain orders; and these have been frequently spoken of as different powers or functions of the mind. In the earliest stage of psychological inquiry we even have them described as different parts of the soul. In this way Plato distinguishes desire, anger, and reason, and locates them in the lower part of the body, in the heart, and in the brain respectively. But the classification which had most influence upon subsequent writers was Aristotle's. His distinction of thought and desire is the origin of the dual classification of intellectual and active powers (each with many subdivisions) which was for long almost unanimously adopted. A tripartite classification—Cognition, Feeling, and Desire or Will—was put forward by the psychologists of Kant's time, accepted by Kant, and since his time (in Great Britain since Hamilton's time) has been very generally adopted. The value of such classifications is easily, and has often been, overestimated. In the first place, it is clear that, although such functions or faculties may be distinguished, they do not operate apart from one another. No concrete state of mind consists merely of knowledge or merely of will; nor can it be properly called by one of these names, except as a means of describing it by its most prominent characteristic. In the second place, it has to be borne in mind that it is no explanation of a mental fact to refer it to a mental faculty. To maintain, as Kant, Hamilton, and Lotze did, that there are certain fundamental conscious functions or conscious elements which cannot be reduced to some single function or element, gives no real support to the view which seems to underlie much of the 'faculty-psychology'—the view that mind is a congeries of distinct faculties, and psychology a process of labelling facts and putting each into its proper compartment. To refer phenomena to memory, generalisation, &c. as their causes is to mistake a name for an explanation.

The 'Faculty-psychology' described and demolished by the English Associationists and by Herbart is, however, rather a mode of thought into which certain writers have frequently lapsed than a method which they have consciously adopted and defended. And the quest for a simple and uniform mental element from which all the wealth of conscious life has been derived is not therefore successful, because the faculty-psychology is unsuccessful. Herbart regards the interaction of presentations as accounting for all mental phenomena; in a similar way H. Spencer seeks to derive mind from a succession of somethings which can only be described as analogous to nervous shocks. But the difficulty of both is to pass from this objective element to the feeling of pleasure or pain, aptly described by Hamilton as subjectively subjective, or to the phenomena of Volition. Accordingly, many psychologists who are at one with Herbart and the Associationists in rejecting the conception of faculties as a mode of explaining facts yet hold that the final analysis we can reach of consciousness or of mental phenomena does not enable us to derive subjective feeling (of pleasure or pain) from presentation, or activity from either, the three elements being involved in the simplest state of consciousness (the term 'consciousness,' as distinguished from 'self-consciousness,' being here used as a quite general term for any mental state).

Attention.—Many of the most important controversies of psychology centre in the question of the nature and extent of the activity involved in consciousness. In its simplest form this activity is seen in the subjective reaction involved in apprehending a presentation; in its most developed form it is the act of will which determines a course of conduct upon which momentous issues are known to hang. In the latter case, as well as in the former, the critical point is the direction of Attention. Now attention is generally allowed not to be a special 'faculty,' or separate activity different from the elements of consciousness already described. It is simply consciousness regarded as active and as concentrated on some portion of its objective content, whereby the intensity of that portion is increased. The point in dispute is chiefly whether this active concentration is ultimately determined by the strength of external factors. It is clear that the direction of attention is conditioned by the previous mental groupings of ideas. Further, attention involves a muscular adjustment—at any rate when directed to objects of sense, and also (although in a less marked degree) when directed to a train of thought. These facts are differently interpreted. On the one hand, Bain, Ribot, and others find the basis of attention in the muscular adjustment; on the other hand, the muscular adjustment is looked upon as the organic expression and development of subjective activity; and this subjective activity is held to be involved in the simplest state of consciousness. The one view looks upon the external as determining and even somehow producing the internal. According to the other view the process is one in which a subjective or spiritual factor expresses itself through and gradually extends its control over an organic and physical environment.

Sensation.—Sensations are commonly defined as the simple mental states which result from nervous stimuli. This physiological reference enables us to distinguish the Special Senses, with their clearly defined organs adapted to the reception of different kinds of external stimuli, from Organic or General Sensibility, which arises from the state of the internal organs of the body (such as the alimentary canal, the lungs, and the heart), and from the Motor Sensations. These last (which play so important a part in the development of knowledge) are due to the central excitation of a motor or efferent nerve, and the consequent contraction of the muscle in which it terminates (see MUSCLE, NERVOUS SYSTEM). The sensation both modifies and is modified by the conscious state into which it enters. We have no experience, and can form no valid conception, of the mere sensation. For the subject which experiences it, it is merely an element in a complex and ever-changing whole. This is a point which has been commonly overlooked by the Associationist psychologists. They started with a succession of disconnected mental molecules, called sensations, and attempted to trace the growth of mental life from their combination. But this is to begin with an abstraction.

The earliest stage of mental life would rather seem to be a vague manifold into which distinction is just being brought; and the growth of knowledge consists not only in the addition of new elements, but in drawing new lines of distinction and forming new groupings of elements. And these distinctions and groupings may be said to be determined by the varying intensities of different elements in the changing mental content, or by the continuous redistribution of attention.

Ideation.—The mental content thus varies in the distinctness of its parts, which may even disappear from consciousness and afterwards reappear. This reinstatement in consciousness is called Representation or Ideation, and the represented or ideal contents are called Images. The circumstances determining the succession of ideas and formation of images are, first, new sense-impressions; secondly, voluntary direction of attention; and thirdly, the mutual influence of the mental elements. It is the last of these which is referred to under the title of Laws of Association. In the article ASSOCIATION OF IDEAS an account is given of the way in which one concrete experience recalls another. In every case of association a twofold process would seem to be involved. A portion of the present mental content coalesces with a resembling portion of a past mental state, and the revival of this portion involves the reinstatement in consciousness of the other elements with which it was previously connected. The latter, which is the properly reproductive process, is thus due to the fact that consciousness is not a collection of atomic sensations, but a continuous whole.

Perception is the knowledge by means of sensation of an individual object or thing. The nucleus of the percept is thus one or more present sensations which coalesce with revived or ideal elements belonging to the same sense, and combine with revived or ideal elements belonging to other senses. These presentative and representative elements are bound together and presented as a single mental content, which we refer to a portion of the body or to a thing in space beyond the body, and to which we ascribe qualities corresponding to our sensations. In brief, Perception, as distinguished from Sensation, involves, first, complexity of elements; secondly, localisation; and thirdly, individualisation and objectification. The complexity consists of the elements of present sensation, and of the ideal group with which the former coalesce or combine. The localisation clearly involves the perception of space. The individualisation and objectification may be accounted for by the following considerations: (*a*) The various sensations grouped together in a percept—e.g. the resistance, touch, colour, taste, smell of an orange—are so related that modification of one of them commonly involves modification of the others. Thus they come to be perceived as a group. (*b*) Not only are motor sensations involved in fixing attention on other sensations, but the greatest distinctness of the other sensations is commonly accompanied by conditions which admit also of sensations of touch and resistance. Hence the object comes to be experienced as offering resistance or as an *obstacle.* (*c*) In this way the other sensations come to suggest touch and resistance, and thus to be referred to a thing in space which offers resistance to our muscular energy. This forms the psychological basis of the distinction between primary and secondary qualities of matter.

The above account traces the perception of objects in so far as it is mainly dependent upon active touch—i.e. touch plus its attendant motor sensations. To active sight—i.e. sight plus its attendant motor sensations—a perception is due which differs from the preceding (*a*) in the absence of the sensation of resistance: so that we do not derive from active sight alone a knowledge of objects outside of and opposed to our own bodies, and our apparently direct perception of distance, solidity, &c. by sight is really a derived perception; (*b*) in the vastly greater number of elements simultaneously presented, so that the simultaneity of perception which characterises the developed perception of space is mainly due to visual perception.

Space and Time.—As the preceding paragraph points out, objects or things are perceived as in space. Similarly, our conscious life is apprehended as a succession—i.e. as in time. The whole of our experience may thus be said to be conditioned by Space and Time: the phenomena of external perception by space, those of internal perception by time. The two spheres are sometimes described as the object-world and the subject-world respectively. Regarding both space and time there are several questions which admit of being kept distinct. First of all, there is the question as to their reality—are they real existences, or simply modes of our subjective perception? This is a question which properly lies outside psychology, and belongs to metaphysics. Then there is the question of the way in which we form concepts of space and time. Geometry depends upon such a conception of space. The points, lines, and surfaces of geometry are not percepts, but abstractions from perception, formed as other concepts are formed. What then is that in perception from which we are able to form concepts of space and time? It must itself be a spatial or temporal percept. It is then with regard to the perceptions of space and time that the most difficult psychological question enters. And the question regarding both perceptions is affected by the secular controversy concerning the existence and the function of an *a priori* factor in mind.

Thus we start with two opposed views of the perception of space: first, the Intuitive or Nativist theory, according to which space is an innate idea (or, as since Kant it has more commonly been put, is the form in which we perceive objects), and is not derived from sensations, but is a form of perceiving, belonging *a priori* to the mind, and contributed by it in the production of experience; secondly, the Empirical theory, according to which space is the worked-up product of sensations. The universal and necessary character of the spatial perception has been brought forward in defence of the former theory. But it is important to remember that certain sensations—odours, tastes, and even sounds—are localised only indirectly, as belonging to a visible or tangible object. And this fact at once suggests the lines upon which an empirical analysis of space should be carried out. By Herbart space has been derived from a series of sensations which can be repeated in the same and in reverse order. By Bain it has been held that it is due to muscular sensation—movement giving the perception of empty space, resistance giving that of space filled or body. Sensations both of movement and resistance accompany touch; and sensations of movement accompany sight to an extent which is not nearly equalled in the other senses. In addition to this, however, we must take account of what Lotze calls the 'local signs' which belong to tactual and visual sensations. These local signs are due to the extended nature of the sense-organs of sight and touch, and are elements in sensation by which sensations arising from the stimulation of different portions of the retina (or of the skin) are distinguished from one another. The simultaneous distinctness in sensation which is due to these 'local signs' is gradually interpreted by motor sensations, and out of these elements there gradually emerges the perception of one's own body, by relation to which other things are localised in space. Thus, although the perception of space is implied in that of body, the two perceptions grow to clearness together. Even admitting this empirical analysis, however, it may still be held—as Lotze holds—that there is an *a priori* mental tendency to form the perception of space.

The opposed views of Nativism and Empiricism are applied to the perception of time as well as to that of space. And the perception of time only seems a simpler question than the other because we are apt to confuse the succession of presentations on which it is based with a presentation of succession, which, of course, would be a presentation of time. The elements from which this presentation of time is derived may be somewhat as follows: When a number of presentations are successively presented, each grows fainter as attention passes from it, and hence arises a vague distinction between present and not-present. Afterwards, on the same series being repeated, the second member will be rising in intensity when the first is presented, and therefore in full intensity; when the second is presented, the first will be sinking in intensity, while attention will be passing on towards the third, whose intensity will therefore be rising; and so on throughout the series. Hence the vague distinction of present and not-present becomes more definite as a distinction of past, present, and future, and this is the presentation of time.

Memory and Expectation.—Both of these are distinguished from the mere succession of ideas and images by involving a reference to one's own conscious life as a succession in time. When an image is remembered its various parts have a fixed order and position, it is accompanied by a number of attendant or accessory ideas, and it is recognised as belonging to one's past self. The expected image has not always the same fixed position or number of attendant ideas; but it, too, is referred to self—one's future self, and it is characterised by an element of striving or tension and by an increasing degree of intensity. The phenomena of memory and expectation are a recognised difficulty for the theory which seeks to derive mind from the succession of presentations.

Thought.—In the process of thinking different mental contents are related together—generalised into notions or concepts, discriminated, and, in the higher forms of thought, arranged in an orderly manner under some scientific or other ideal. Thinking is further distinguished from perception and imagination by dealing with classes of things rather than particular objects, and by being mainly voluntary, whereas perception is mainly automatic. But the distinction is not an absolute one. In imagination and even in perception a process of voluntary selection may be involved, and every clear perception involves a conception of a class to which the object is referred. Further, the relating process which is characteristic of thinking may be found, though in a less explicit manner, involved in perception: for the percept has been shown to consist of a variety of elements connected together in definite ways. Carrying the analysis further, we can find no conscious content without such relations. This has been commonly brought out by emphasising the necessity of difference for consciousness. Thus, Hobbes made the assertion that 'to have always the same sensation and to have no sensation at all come to the same thing;' and this has been formulated by Bain into the Law of Relativity, that all consciousness is consciousness of difference: not, indeed (as Bain sometimes puts it), that we are conscious *only* of difference, but that all consciousness involves difference or discrimination; as it may also be shown to involve likeness or assimilation and synthesis.

Relations are thus involved in all consciousness equally with elements related. 'Feelings' and 'relations between feelings' (to use Mr Spencer's terminology) must be regarded as equally ultimate in mind. The English Associationists made consciousness begin with separate units of sensation or 'feeling;' and those writers who have received and carry on the tradition of the Associationists have devoted much attention to determining the nature of these relations. But if the ultimate datum of consciousness is not separate atoms of presentation, but what Dr Ward calls a presentation-*continuum*, and if the growth of mind consists not merely in additions to that continuum, but in drawing new lines of distinction and connection within it, we may see how neither the so-called 'feeling' nor the so-called 'relation between feelings' is independent and conceivable by itself, and how both are simply abstractions from the state of mind which—even at its simplest—is a concrete phenomenon. In other words, what is characteristic of thought as well as what is characteristic of sensation is involved in all consciousness.

Feeling and the Emotions.—The term Feeling is of very ambiguous signification in psychology. But there is a pretty general agreement to use it for the second of the three elements in the tripartite division of mind (although, unfortunately, it has not been restricted to that use). The psychology of feeling has two chief problems to deal with: first, to determine the nature and conditions of pleasure and pain, as contrasted with other elements of mental life; and secondly, to analyse into their elements, and trace the growth of, the complex feelings or emotions. The Emotions are complex states of mind in which a feeling of pleasure or pain is predominant. This feeling is connected, more or less distinctly, with a presented or ideal object, and is complicated with elements of organic sensation, and, usually, with tendencies to action or elements of desire. These complex states of feeling, or emotions, take very various forms, according to the elements of which they are composed, and their mode of origin. The classification of the emotions and the nature and origin of such emotions as sympathy and the moral sentiment are still vexed questions of psychology.

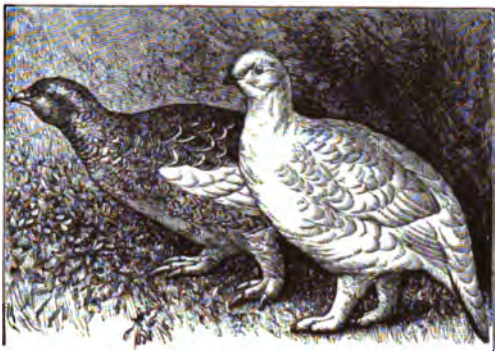
Desire and Volition.—In these phenomena we have the development of the active element in mind complicated with feeling and manifesting itself in muscular activity. Writers who regard this active element as ultimately due to the play of merely presented or external factors have attempted to derive volition from spontaneous movement (Bain) or from reflex action (H. Spencer)—factors which enter consciousness merely as motor presentations. As opposed to this we have the view that the fundamental act of will is the direction of attention to certain ideal elements or groups. Whether this direction of attention is itself determined solely by pleasure and pain is a question which has raised more controversy than perhaps any other question in psychology (see WILL). In Desire there is present the conception of an object or ideal end, accompanied by feeling and by an element of striving. Normally, when the conception of the end has been associated with definite means to its realisation, the desire is followed by a volition or act of will. The development of volition is a process of growing complexity and definiteness. Beginning with the act of attention, the power of will is gradually extended over the bodily movements controlled by muscles in connection with the motor nerves. Movements which are at first random, reflex, instinctive, or merely expressional, are brought within its operation. Further, will grows side by side with reason and imagination, is called into operation not by sense-presentation only, but in response to images and concepts, and can thus be regulated by reason. A double tendency is at work in this development: the associative and automatic tendency of acts frequently repeated to become habitual; and the intellectual tendency by which ends and the acts tending towards them are brought into rational order. In this way the individual comes to act for permanent ends and from fixed principles, and to develop a definite character.

LITERATURE.—The first scientific treatise on psychology was Aristotle's work *De Anima*. In modern philosophy an intuitional and spiritualist theory of psychology is to be found in Descartes and Leibnitz, an empirical and materialistic theory in Hobbes. The Association-psychology, which traces descent from the psychological philosophies of Locke and Hume, and from the physiological psychology of Hartley (*Observations on Man*, 1749), may be read now in the works of James Mill (*Analysis of the Phenomena of the Human Mind*, J. S. Mill's ed. 1869), J. S. Mill (*Examination of Hamilton's Philosophy*, 5th ed. 1878), and A. Bain *The Senses and the Intellect*, 3d ed. 1868; *The Emotions and the Will*, 3d ed. 1880; *Mental and Moral Science*, 3d ed. 1875). Belonging to the same school, but conditioned throughout by the doctrine of evolution, is H. Spencer's *Principles of Psychology* (2d ed. 1870–72). To the Herbartian influence is due the exhaustive text-book of W. Volkmann von Volkmar (*Lehrbuch der Psychologie*, 3d ed. 1884). Independent views, which are yet influenced by Herbart, are worked out by Lotze (*Medicinische Psychologie*, 1852; book iii. of *Metaphysics*, Eng. trans. 1884; *Microcosmus*, Eng. trans. 1885; *Outlines of Psychology*, Eng. trans. 1886) and by J. Ward (article 'Psychology' in *Ency. Brit.*, 9th ed.). Experimental psychology is represented by the works, among others, of Wundt, Ebbinghaus, Münsterberg, Ribot, Pierre Janet, and by many contributions to German, French, Italian, English, and American journals. A useful summary of results is given by G. T. Ladd, *Elements of Physiological Psychology* (1887). Founded largely upon these is the brilliant work of W. James, *Principles of Psychology* (1890). Important text-books are Sully's *Outlines of Psychology* (1884) and *The Human Mind* (1892), Baldwin's *Handbook of Psychology: Senses and Intellect* (2d ed. 1890) and his *Elements* (1893), Dewey's *Psychology* (1889), J. C. Murray's *Handbook of Psychology* (1885), Höffding's *Outlines of Psychology* (Eng. trans. 1891), and Maher's *Psychology* (R. Catholic, 1890). Wundt's *Lectures on Animal and Human Psychology* were translated in 1894: C. Lloyd Morgan has published *An Introduction to Comparative Psychology* (1894) and *Psychology for Teachers* (1893); and G. T. Ladd a *Primer of Psychology* (1894). See also PHILOSOPHY, and other articles cited there.

Psychrometer, an instrument for measuring the tension of aqueous vapour in the atmosphere: a wet and dry bulb Hygrometer (q.v.).

Ptah. See EGYPT, Vol. IV. p. 234.

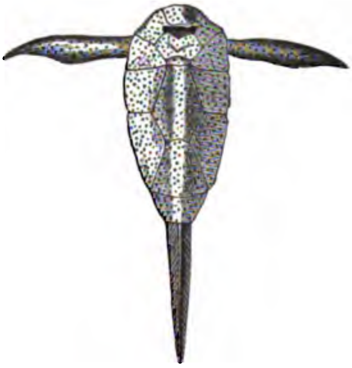
Ptarmigan (*Lagopus*), a genus nearly allied to the true Grouse (q.v.), differing chiefly in having the toes as well as the legs thickly clothed with short feathers. Hence the name Lagopus, a name used by Pliny, from the resemblance of the foot to that of a hare. The species are natives of the northern parts of the world, of elevated or of arctic regions. With the exception of the 'Red Grouse' (*L. scoticus*), the species change colour on the approach of winter, assuming a white or nearly white plumage. All are esteemed as food. The Common Ptarmigan (*L. mutus*) occurs in a few parts of Scotland, but not in England or Ireland. It is resident in the Lofoden Islands, in Scandinavia, on the Ural and the Altai ranges, &c., and occurs on the Alps and the Pyrenees. The winter-plumage is pure white, except a black band above the eyes of the male, and some black on the under feathers of the tail. In both sexes the wings are always white, but have dark shafts to their quills. In summer the males are predominantly grayish brown above, with blackish head, shoulders, and breast, with white belly, with black tail-feathers tipped with white. In the females a tawny colour predominates. In autumn, again, the plumage is different, with numerous streaks of slate-gray on the upper parts. The white winter-plumage is doubtless protective amid the snow, and may be the result of the cold; the summer-plumage is not less harmonious with the surroundings. It seems that some moulting is associated with each of the changes, but precise observations are wanting. A rough nest is scraped in the ground; the eggs (eight to ten) are laid in May, and have a buff colour. Ptarmigans are monogamous, but sometimes gregarious. They feed on tender shoots and berries. Among the related species are the following: *L. rupestris* (Siberia, Arctic America, &c.), *L. scoticus*, or Red Grouse, *L. leucurus* (Rocky Mountains), *L. hemileucurus* (Spitzbergen), and *L. albus*, or Willow-grouse (in both hemispheres). Most of the 'ptarmigan' sold in British markets are willow-grouse. See GROUSE, and Howard Saunders, *British Birds*.



Common Ptarmigan (*Lagopus mutus*), summer and winter plumage.

Pteria. See BOGHAZ-KEUI.

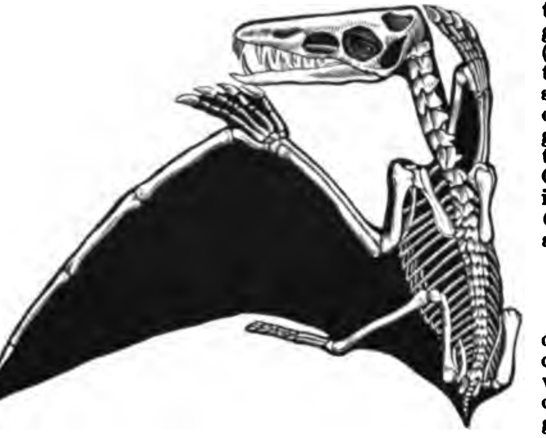
Pterichthys (Gr., 'wing-fish'), a genus of extinct Ganoid fishes, remains of which occur in Devonian strata. The head and body were covered with bony sculptured plates, and the pectoral fins (to the wing-like appearance of which the name refers) were large and prominent.



Pterichthys.

Pterocles, or PTEROCLETES. See SAND-GROUSE.

Pterodactyl (Gr., 'wing-finger'), a remarkable winged reptile, the remains of which are met with in the Jurassic and Cretaceous systems. There are numerous forms of Pterodactyl which are included in the extinct order Ornithosauria. The head was relatively large and snout-like, the long jaws being furnished with simple and pointed teeth, implanted in separate sockets. The eye-orbit was very large, the sclerotic having generally a ring of bony plates, and the nostrils approximated to the orbits. The neck was long and bird-like, consisting of procœlous vertebræ which were longer than the dorsals—the latter varying from seventeen to twenty in number. From three to six vertebræ are anchylosed to form the sacrum. The tail is generally short, but long-tailed forms are also met with. The scapular arch and keeled sternum in their general characters resemble those of the carinate birds. There are four digits on each limb—the outer digit of the manus (corresponding to the fifth of the typical series) being immensely elongated for the support of a membranous expansion (*patagium*), which was also attached to the sides of the body to embrace the hind limbs and tail. The other digits of fore and hind limbs terminated in curved claws. Most of the bones are hollow like those of birds. The body was probably naked.



Pterodactylus crassirostris.

Many forms of Pterodactyl are known, in some of which the skull is less bird-like than that shown in the accompanying illustration. In Rhamphorhyncus the extremities of the jaws are usually edentulous, and were perhaps sheathed in horn; the base of the jaws, however, was furnished with teeth which were inclined forwards. In the same form the tail was long, and provided at the extremity with a leaf-like steering membrane. In Dimorphodon the jaws are provided with strong teeth in front and much shorter ones behind; and the tail was long.

Some pterodactyls were small—Ptenodraco being not larger than a sparrow. Others were about the size of a woodcock. Yet others, however, were much larger—some having a spread of wing of 5 or 6 feet, and even of 25 feet in the case of certain forms from the Cretaceous rocks of England. The form of its extremities shows that 'the Pterodactyl was capable of perching on trees, of hanging against perpendicular surfaces, and of standing firmly on the ground, when, with its wings folded, it might crawl on all fours, or hop about like a bird.'

Ornithosaurians are well represented in the Mesozoic strata of Europe and North America. One of the richest repositories of their remains is the famous lithographic stone of Solenhofen, in which the fossils usually occur in a fine state of preservation—even the impression of the membranous wing being sometimes clearly seen. See Nicholson and Lydekker's *Palæontology*.

Pteromys. See Flying Animals.

Ptero'poda (Gr., 'wing-footed'), a class or sub-class of molluscs, having two lobes of the 'foot' developed into wing-like swimming organs. They live in the open sea, and are carnivorous. Distributed in all seas, they often occur in immense shoals, and afford food to fishes and Cetaceans. The body is bilaterally symmetrical, but this is doubtless secondarily acquired. In some (Thecosomata) the viscera are covered with a delicate shell; the others (Gymnosomata) are naked, but all the larvæ have shells. The thin calcareous or gristle-like shells are abundant in the Ooze (q.v.) of some regions. It is very likely that the Pteropods should be ranked not as a separate class of molluscs, but as a sub-class of Gasteropods. Of the Thecosomata the genera Hyalea and Cymbulia are representatives, as Clio and Pneumodermon are of Gymnosomata. Fossil Pteropods appear even in the Cambrian strata. See Pelseneer, *Challenger* Report (1889). Some Pteropods are sometimes called 'sea-butterflies.'

Ptolemaic System. See Ptolemy.

Ptolema'is. See Acre (St Jean d').

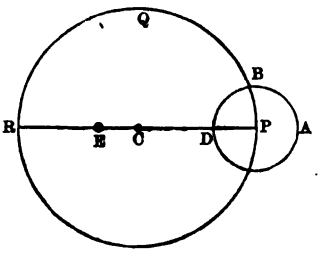
Ptolemy, name of the Macedonian kings of Egypt. The first, a son of Lagos, was called *Soter* ('Saviour') by the Rhodians, whom he defended against Demetrius Poliorcetes. He became one of the greatest of the generals of Alexander the Great (q.v.), and on Alexander's death became ruler of Egypt. For the other Ptolemies, his successors, see Egypt, Vol. IV. p. 241; and for their patronage of literature, Alexandrian School.

Ptolemy, properly Claudius Ptolemæus, a celebrated astronomer and geographer, was a native of Egypt, though it is uncertain whether he was born at Pelusium or Ptolemais in the Thebaid. Nothing is known of his personal history, except that he flourished in Alexandria in 139 A.D., and there is probable evidence of his having been alive in 161. The chief of his writings are the *Μεγάλη Σύνταξις τῆς Ἀστρονομίας*, which, to distinguish it from the next mentioned, seems to have been denominated by the Greeks and by the Arabs after them *megistē*, 'the greatest,' whence was derived the name *Almagest* (with Arab article *al*, 'the'), by which it is generally known; the *Tetrabiblos Syntaxis*, with which is combined another work called *Karpos* or *Centiloquium*, from its containing a hundred aphorisms —both works treating of astrological subjects, and held by some on this account to be of doubtful genuineness; a treatise on the phenomena of the fixed stars, or a species of almanac; and the *Geographia*, his great geographical work, in eight books. The rest of his works are of inferior importance, and consist of descriptions of various kinds of Projections (q.v.), the theory of the musical scale, chronological and metaphysical treatises, and a summary of the hypotheses employed in his great work, the *Almagest*.

Ptolemy, both as an astronomer and geographer, held supreme sway over the minds of almost all the scientific men from his own time down till the 16th-17th century; but, and in astronomy specially, he seems to have been not so much an independent investigator as a corrector and improver of the work of his predecessors. In astronomy he depended almost entirely on the labours of Hipparchus. But, as his works form the only remaining authority on ancient astronomy, the system they expound is called the *Ptolemaic System*, after the author.

As a geographer Ptolemy is the corrector and improver of the works of a predecessor, Marinus of Tyre, about whom, except from Ptolemy's writings, little is known. Ptolemy's improvements and suggestions are at once more valuable and correct; but it is sometimes difficult to separate his data from those of Marinus. His geography is divided into eight books, all of which, with the exception of the first, eighth, and a portion of the seventh, are nothing more than a catalogue of places, with their latitude and longitude (to 12ths of a degree), with a brief general description prefixed to each continent and country or tribe, and interspersed here and there with remarks of a miscellaneous character on any point of interest. The rest of the work contains details regarding his mode of noting the positions of places—by latitude (*mēkos*) and longitude (*platos*)—with the calculation of the size of the sphere of the earth, and of the extent of surface then known. The latitudes were calculated from Ferro (q.v.) in the Canaries, chosen as the westernmost part of the world; but he counted it only 2½ degrees W. of Cape St Vincent, instead of the real distance, 9° 20′. He took the parallel of Rhodes for his chief line of latitude, thinking it occupied the mean position in the zone of climate into which he divided the earth. He describes the mode adopted by him of projecting the surface of a hemisphere on a flat surface, and shows its superiority over the projections of Eratosthenes, Hipparchus, and Marinus. He also constructed a series of twenty-six maps, together with a general map of the world, in illustration of his work. See MAP.

The PTOLEMAIC SYSTEM of astronomy, so called from Ptolemy, its chief expounder, was really originated long before his time, and was, in fact, merely an attempt to reduce to a scientific form the common and primitive notions concerning the motions of the heavenly bodies. It was implicitly adopted by Plato, Aristotle, Hipparchus, and (with the exception of the Pythagoreans, and probably of Pythagoras himself) all the eminent physicists and philosophers of ancient times; passing from them to the Byzantines and Arabs, who, especially the latter, were the means of disseminating it through western Europe, where it continued to be the universally established doctrine till the 16th century. The primary and fundamental doctrines of this system are that the earth is the centre of the universe, and that the heavenly bodies revolve round it in circles, and at a uniform rate. These notions, which are naturally suggested by the first general aspect of things, having, previous to any accurate observation, established themselves as unquestionable axioms, phenomena which were found on closer examination to be inconsistent with them were explained by the introduction of additional hypotheses. The belief that the earth is the centre of the universe was supported by its accordance with the relation of the primary elements of which the material world was supposed to be composed. Thus, earth, the most stable of the elements, held the lowest place, and supported water, the second in order; above water was placed air, and then fire, ether being supposed to extend indefinitely above the others. In or beyond the ether element were certain zones or heavens, each heaven containing an immense crystalline spherical shell, the smallest enclosing the earth and its superincumbent elements, and the larger spheres enclosing the smaller. To each of these spheres was attached a heavenly body, which, by the revolution of the crystalline, was made to move round the earth. The first or innermost sphere was that of the moon, and after it in order came those of Mercury, Venus, the Sun, Mars, Jupiter, Saturn and the fixed stars, *eight* in all. To this system later astronomers added a *ninth* sphere, the motion of which should produce the Precession of the Equinoxes (q.v.), and a *tenth* to cause the alternation of day and night. This tenth sphere, or *primum mobile*, was supposed to revolve from east to west in twenty-four hours, and to carry the others along with it in its motion; but the Ptolemaic astronomers do not venture to explain how this was done, although, since the axis of motion of the *primum mobile* was that of the equator, its extremities being the poles of the heavens, while that of the ninth sphere was the axis of the ecliptic, some explanation was certainly necessary. As observations of the heavens increased in accuracy it was found that the heavenly motions were apparently not uniform, and this was explained as follows: The acceleration of the sun on one side, and retardation on the other side of his orbit is only apparent, and results from the earth not being in the centre of the sun's sphere, C (see fig.), but at E, and consequently his motion appears to be slowest at P and quickest at R. The alternate progression and regression of the planets was accounted for by supposing them to move, not directly with their crystallines, but in a small circle, whose centre was a fixed point in the crystalline, and which revolved on its axis as it was carried round with the latter; thus (fig.) the planet was carried round the small circle ABD, as that circle was carried round PQR (now supposed to represent the planetary crystalline). The planet while in the outer portion of its small circle would thus have a forward, and in the inner portion a backward motion. The larger circle was called an *eccentric*, and the smaller an *epicycle*. This theory of eccentrics and epicycles satisfied the early astronomers; but further investigation showed its incompleteness, and in later times it was found necessary to explain newly-discovered discrepancies by heaping epicycle upon epicycle till a most complex entanglement resulted. As soon as astronomers came to understand and test the Copernican Theory (see COPERNICUS), this venerable and disorderly pile of hypotheses, which had received the papal seal of infallibility, and had in various forms held supreme sway over the minds of men for twenty centuries, at once crumbled to atoms and sunk into oblivion. See ASTRONOMY.



The *Almagest* and the *Geography* were the standard text-books to succeeding ages, the first till the time of Copernicus, the second till the great maritime discoveries of the 15th century showed its deficiencies. They have passed through numerous editions, the best of which are, for the *Almagest* and the most of Ptolemy's minor works, that by Halma (Paris, 4 vols. 1813–28); and for the *Geography*, the Latin versions of 1482 and 1490, published at Rome, the *editio princeps* of the Greek text by Erasmus (1533), the Elzevir edition (1619), those of Wilberg and Grashof (1844), Nobbe (1845), Müller (Paris, 1883), and the photographic reproduction of the MS. in the monastery of Mount Athos by Langlois (Paris, 1866). The catalogue of stars has been frequently reprinted separately, the best edition being that of Francis Baily, in vol. xiii. of the *Memoirs of the Royal Astronomical Society* (1843).

Ptomaines. It has been known for a very long time that food which has undergone putrefaction may, under certain circumstances, act as a violent poison, setting up severe catarrh, and producing symptoms of a more general nature. Stale mussels, fish, and sausages have even a popular reputation on account of their poisonous qualities. A ptomaine was first obtained by Marquardt in 1865, and described by him as similar to coniine; in 1869 Sülzer and Sonnenschein isolated a crystallisable ptomaine which resembled in its qualities atropine and hyoscyamine. Of recent years attention has been called to this question from another point of view, and one of special interest to the medical jurist. At a trial at Rome, on the occasion of a supposed murder, a material was extracted from the body which had markedly poisonous qualities, similar to those of delphinine. It was supposed by those who undertook the prosecution that this poison had been administered to the deceased, but on the side of the defence it was pointed out that the extract, though similar in some respects to delphinine, was in others quite distinct, producing on the frog's heart very different effects.

Attention having been called to the subject, scientific investigators, especially those of Italy and Germany, busied themselves in extracting these poisonous materials, ptomaines (Gr. *ptōma*, 'a corpse'), from putrescent animal matters, and investigating both their chemical and physiological properties. These ptomaines can hardly be said to form a very distinct group of bodies from a chemical point of view, for some, like putrescine and cadaverine, are amines; others are amido-acids, like creatinin; and neurine, which has choline and muscarine closely allied to it, is trimethyl-vinyl-ammonium-hydroxide. It is even questionable whether they may be said to possess an alkaline reaction, at one time supposed to be a common property of all ptomaines, and one which related them to the vegetable alkaloids, for Salkowski has recently shown that creatinin, a body that has been long known and apparently carefully investigated, when obtained pure gives no reaction with litmus-paper, nor does it possess the power of combining with acids like a base. Brieger, too, has pointed out that it is scarcely possible to look upon ptomaines as powerful reducing agents, since many of them, especially those rich in oxygen, are deficient in this power.

Neither from a physiological point of view can we look upon the ptomaines as *sui generis*, and in the first case because many of them are produced by the action of organisms *during their life*. As well-known examples let us instance creatinin and neurine, which are produced every day in our living bodies, showing that during the putrefactive process we cannot be said to find substances which stand alone, and are invariably different from those formed during digestion and assimilation. Finally, in respect to their poisonous properties, not only are some of them perfectly harmless or poisonous only in a minor degree, but it is highly probable that some of the most poisonous products of the action of putrefactive and other organisms are bodies (albumoses) of quite a different chemical constitution. It is therefore probable that in a few years, when more positive information is at our command, the term ptomaine will either be dropped altogether or restricted in its usage. In the meantime scientific men are actively investigating these bodies, and throwing much light on several involved problems of chemical physiology and preventive medicine.

See Selmi, *Sulle Ptomaine ed Alkaloidi Cadaverici* (Bologna, 1878); Panum, 'Das putride Gift, die Bacterien' (Virchow's *Arch.*, Bd. 60, § 301); Nencki, 'Zur Geschichte der basischen Fäulnissproducte' (*Journ. f. pract. Chemie*, Bd. 26); Brieger, *Ueber Ptomaine* (Berlin, 1885); also the article PYÆMIA.

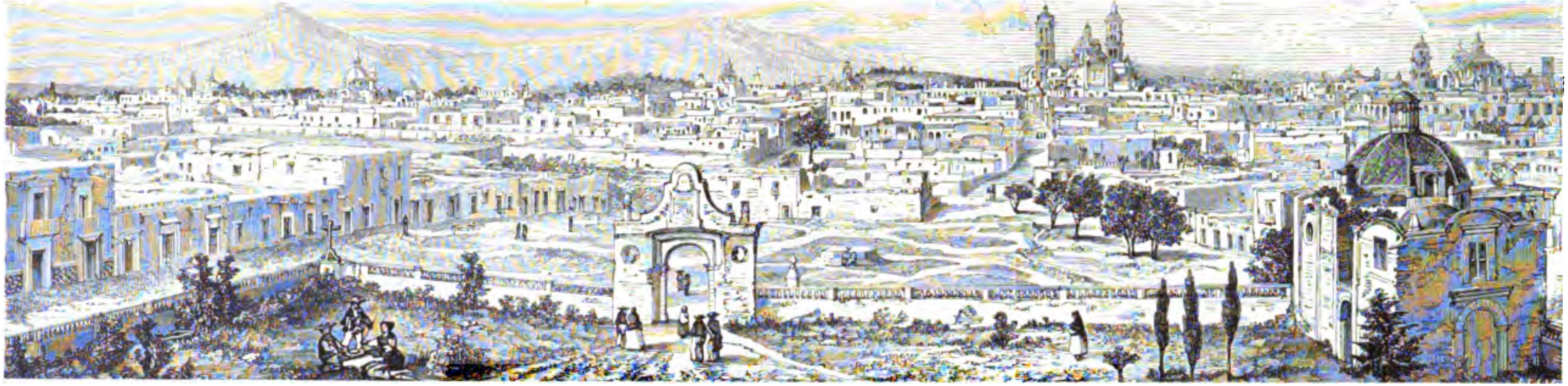
Ptosis (from the Gr. *piptō*, 'I fall') signifies a drooping or falling of the upper eyelid, and arises from weakness of the muscle which elevates it, or from palsy of the third or *motor oculi* nerve. If it is congenital, or occurs without any apparent cause, and resists medical treatment, it may be removed by a surgical operation, by which the eyelid is brought under the action of the occipito-frontal muscle, which receives its nervous power from another source.

Ptyalin, PTYALISM. See SALIVA.

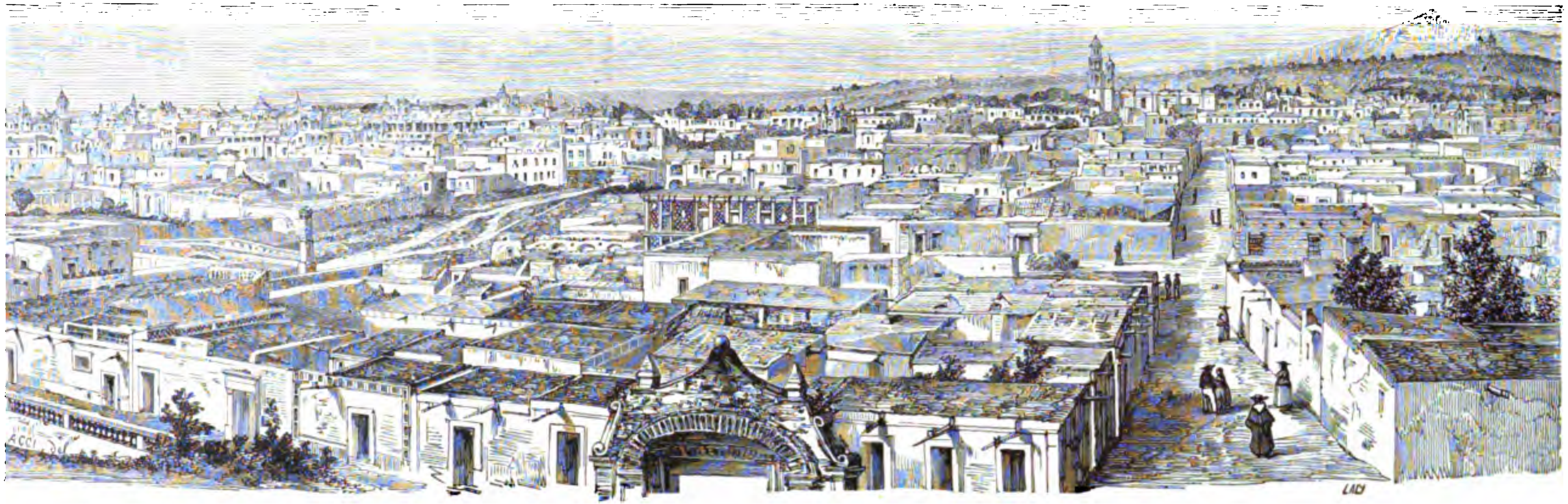
Puberty is the period of life at which the reproductive organs in both sexes begin to be functionally active, and is marked by other important changes in the structure and functions of the body. Among the peoples of northern Europe it begins in girls at from twelve to fourteen, and in boys about two years later. In girls both growth and development are about this period much more rapid than in boys; the breasts enlarge, and the figure becomes full; the temperament changes; and the menstrual flow begins to appear. In boys the most obvious changes are the breaking of the voice and the growth of hair on the face. The changes begun at this time are not fully completed nor the bodily and mental vigour of adult life established for at least eight or ten years after the commencement of puberty. The health during this period is specially liable to be disturbed by adverse influences, particularly in the female sex; and overstrain, both of the physical and mental powers, should be carefully guarded against.

Publicani (from Lat. *publicum*, 'that which is public or belongs to the state'), the name given by the Romans to those persons who farmed the public revenues (*vectigalia*). These revenues were put up to auction by the censors, and were 'sold' for a period of five years. They were derived chiefly from tolls, tithes, harbour-duties, the tax paid for the use of public pasture-lands, mining and salt duties; and from the special taxes they collected, publicani were classified as *decumani*, *pecuarii* or *scriptuarii*, and *conductores portoriorum*. As the state required them to give security for the sum at which they had purchased the collecting of the taxes, and as this sum was usually much greater than the wealth of any single individual, companies (*societates*) were formed, the members of which took each so many shares and were thus enabled to carry on conjointly undertakings far beyond the capabilities of the separate shareholders. Every *societas* had also a head-manager (*magister*), who resided at Rome, and transacted all foreign correspondence with the inferior officers who directly superintended the collection of the taxes. The publicani belonged to the order of *equites*, and formed from their immense profits a powerful capitalist class. Under the empire the land-tax and poll-tax came to be collected by officers of state—in senatorial provinces, the quaestor; in imperial provinces, an imperial procurator assistant to the governor; while in provinces like Judæa, administered by an eques, the governor was himself at the same time procurator. The customs, on the other hand, even in the days of the empire, were still commonly leased out to publicani, and so undoubtedly in Judæa. No doubt territorial princes like Herod Antipas also employed this method of collecting their taxes.

The lessees again had their subordinate officials, who would usually be chosen from the native population. But even the principal lessees in later times were not necessarily Romans. Zaccheus, the tax-gatherer of Jericho (Luke, xix. 1, 2), was a Jew. The tariffs were often very indefinite, opening a door to arbitrariness and rapacity. Hence in New Testament phraseology the terms *publicans* and



A VIEW OF THE CITY OF PUEBLA FROM THE WEST.



A VIEW OF THE CITY OF PUEBLA FROM THE EAST.

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sinners are synonymous, while in the rabbinical literature tax-gatherers appear in a still less favourable light.

Public Health Acts. See Hygiene.

Public-houses. See Inn, Licensing Laws.

Public Lands. See Homestead, Indian Territory, Pre-emption, United States.

Public Prosecutor. See Prosecutor.

Public Schools. The nine great public schools of England are Eton, Harrow, Rugby, Winchester, Westminster, Shrewsbury, Charterhouse, St Paul's, and Merchant Taylors'. See the special articles on each, and Education.

Public Worship Regulation Act. See Ecclesiastical Courts.

Puccinotti, Francesco, author of the *Storia della Medicina* and of other works which give him a high place in medical literature, was born at Urbino in 1794, and, thanks to the Scolopian Fathers, was already an accomplished classical scholar when in 1811 he repaired to Pavia for a thorough course of mathematics, physics, and natural science, in which metaphysics, ethics, and civil history were not neglected. From these studies he passed on to that of medicine at the Roman University, and graduated with much distinction in 1816. The local malaria first engaged his attention. A work ardently opposing the prevalent Brunonian doctrine, and advocating a return to the rational medicine of Hippocrates, produced a salutary effect on his contemporaries, and was followed up by his able treatises on Pernicious Fever (1821) and on Inductive Pathology (1828). Academic honours now fell thick on him, and he passed from one medical chair to another, till, compromised in the patriotic movement of 1831, he was deposed from the professorship of Pathology in the university of Macerata. Excluded from academic, he redoubled his literary activity, which bore fruit in his still classic treatises on medical jurisprudence and on nervous maladies. In 1835–37 he made a special study of the cholera epidemic at Leghorn, at the same time giving to the world his masterly translation of Aretæus. In 1838 the Tuscan Archduke appointed him professor of Medical Jurisprudence in Pisa University, and there he published his *Lezioni Speziali sui Mali Nervosi*, his work on the *Cachexiæ*, and on the maladies induced by the rice-culture (*Risaie*), and, above all, his masterpiece, the *Storia della Medicina*, in three volumes, representing the labour of twenty years. He died, 8th October 1872, in Florence, and, by special decree of the municipality, was buried in the 'Westminster Abbey of Tuscany,' the church of Santa Croce.

Puck, or Robin Goodfellow, a familiar figure in the fairy-world of old English folklore, immortalised by Shakespeare in the *Midsummer Night's Dream*. His characterisation here keeps close to popular tradition in the merry tricks and mischievousness attributed to him. The name is really a generic term for a fairy, and we recognise it further in the Icelandic *puki*, the Irish *pooca*, the Welsh *pwcca*, even the Cornish *pixie*, and the Puk and Niss Puk of the Frisians and Danes. The Pucks occasionally perform kindly domestic functions, are small and dwarf-like in appearance, attach themselves to particular households, and are easily propitiated by offerings of cream and kindly names like the Irish 'good people,' the Scotch 'good neighbours.' They may assume the form of a horse, a hound, or the like, and are even confounded with such dancing lights as the Will-o'-the-Wisp or Jack o' Lanthorn. Obvious analogies suggest themselves with the Silesian Rubezahl, the Scotch Brownie, the Norse Troll, whose more malignant aspects connect them with the wider world of Demonology (q.v.). Robin Goodfellow once filled a prominent place in the popular imagination—we meet him at full length in the 1628 black-letter tract, *Robin Goodfellow; his mad pranks, and merry Jestes, full of honest mirth, and is a fit medicine for melancholy* (repr. in Halliwell). Henslowe's Diary tells us that Chettle wrote a drama on his adventures; we find him again in Drayton's *Nymphidia*, Burton's *Anatomy of Melancholy*, Ben Jonson's *Masque of Love Restored*. As Lob, Hobgoblin, and the Lubber-fiend also the allusions to him in our earlier literature are endless.—The name *Puck* was taken for its title by the well-known New York counterpart to *Punch*.

See J. O. Halliwell's *Illustrations of the Fairy Mythology of A Midsummer Night's Dream* (Shakesp. Soc. 1845); W. J. Thoms's *Three Notelets on Shakespeare* (1865); and W. C. Hazlitt's *Fairy Tales, &c., illustrating Shakespeare and other English Writers* (1875).

Pud, or Pood, a Russian weight which contains 40 Russian pounds, equivalent to 36 pounds avoirdupois.

Pudding-stone. See Conglomerate.

Puebla, the third city of Mexico, capital of a state of the same name, stands on a fruitful plain, 7120 feet above sea-level, and 68 miles (by rail 116) SE. of the city of Mexico. In the vicinity are Orizaba, Popocatepetl, and other lofty mountains. It was founded in 1531, and is one of the handsomest towns in the republic, with broad, straight, clean streets; many of the houses, which are generally three stories high, have quaint fronts of red and white tile-work. The city contains nearly fifty churches, theological, medical, art, and normal schools, a museum of antiquities which dates from 1728, two large libraries, a number of hospitals, &c. On the great square stands the cathedral, a Doric building with two towers, the interior of which is decorated in the most sumptuous manner with ornaments of gold and silver, paintings, statues, &c. Puebla has a thriving trade, and an air of cheerful activity, not common in Mexico, pervades the place. In 1889 there were twenty-two factories; the chief articles produced are cottons, paper, iron, glass, porcelain, leather. Pop. (1889) 78,530. Puebla was besieged for two months by the French, and then taken by storm, 17th May 1863.

Pueblo, capital of Pueblo county, Colorado, on the Arkansas River, at the mouth of Fountain Creek, 117 miles by rail S. by E. of Denver. Through its iron and steel industry it has rapidly become the second city of the state and an important railway centre; immense quantities of raw materials and fuel abound in the vicinity. The principal establishments are those of the Colorado Coal and Iron Company, which include two blast-furnaces, steel-works, a rail-factory, bar- and nail-mills, and a pipe-foundry. In 1890 a Mineral Palace was erected to hold a permanent exhibit of Colorado's mineral productions—from stone and coal to pure gold—valued at almost $1,000,000. Pop. (1880) 3217; (1890) 24,558.

Pueblos (Span. *pueblo*, 'village'), a semi-civilised family of American Indians in New Mexico and Arizona, dwelling in large single habitations, which are sometimes capacious enough to contain a whole tribe. These edifices—which are often five or six stories high, and from 130 to 433 yards long, with many rooms (53 to 124) on each floor—are commonly constructed of adobe or sun-dried brick; the ground-floor is invariably without doors or windows, entrance being effected by a ladder leading to the second story; and indoors ladders take the place of staircases everywhere. A somewhat pyramidal aspect is given to the whole building by each successive story receding a few feet from the line of that below it. Each family of the tribe has a separate apartment, and there are also large rooms for general council-chambers and for tribal dances. In New Mexico there are nineteen such villages, with over 8000 occupants, who are skilful agriculturists, employing irrigation ditches extensively, and rear horses, cattle, and sheep. Spinning and weaving and the manufacture of pottery also are carried on. The Moquis of Arizona are a related tribe, numbering some 1800, in seven villages built on the summit of isolated hills. The Pueblos are under Roman Catholic missionaries, and are making steady progress in civilisation and education, although on their Christianity they have grafted many of their old pagan beliefs and customs, to which they obstinately cling. They were first visited by the Spaniards about 1530, at which period their habits and their habitations were very much the same as to-day. It is evident, however, from the wide area over which the ruins of old pueblos and remains of ancient pottery have been found, that they were at one time very much more numerous than they are now.

Puente Nacional, a town of Colombia, in Santander department, on the Rio Suarez. Coal and iron are mined, and there are some trifling manufactures. Pop. 12,000.

Puerperal Fever. In its most general sense this term may be applied to any acute febrile disease affecting women during the puerperal or lying-in state. In this sense it might be taken to include the febrile states induced by the poisons of scarlatina, typhus, and other zymotics. But, while the zymotic poisons induce manifestations in the puerperal woman in some respects widely differing from the results of their action in the non-puerperal state, their features are quite distinct and recognisable, and the special characteristics of their action depend on the peculiar condition of the subject for the time being, and not on any difference in the specific character of the poisons. The term puerperal fever is now in its narrower sense restricted to that special acute febrile disease resulting from the septic infection of the puerperal woman, and may be considered to be synonymous with the term puerperal septicæmia.

It is a frequent and much dreaded disorder, and accounts for a very large number of the deaths arising from child-bearing. Its dread character and symptoms were recognised by Hippocrates and by him regarded as due to the suppression of the lochia or discharge after childbirth—a view which held ground for nearly 2000 years—for in 1680 Sydenham taught practically the same opinion. From this time until 1847 various views as to its cause and nature prevailed. But in this year the true nature of the cause was recognised by Semmelweiss of Vienna, who noticed that in a clinic in the maternity which he conducted, and which was attended solely by midwives, puerperal fever scarcely ever occurred, while in another attended by students, many of whom came straight from the dissecting-room, its ravages were appalling. From this he argued, after careful analysis of his observations, that the students brought into the maternity a poison that induced in the women they attended and examined the disease, which was conspicuous by its absence in the ward attended by the midwives only. Abundant evidence has accumulated since to show that his views were correct, and it has been shown that of all the causes of this malady the poison termed cadaveric (i.e. derived from the decomposing dead body) is one of the most active and fatal. Modern research has shown us that the activity of this and other septic poisons is due to the influence of microbic organisms or 'germs,' and we are well aware that a great variety of such germ-bearing substances exist, each capable of inducing the symptoms and condition which we recognise under the name of puerperal septicæmia. Thus, while the results are to all intents the same, the causes may vary considerably in their ultimate nature, and may be derived from a variety of sources; for example, the cadaveric poison already referred to, the pus from a septic abscess, sewage gas, &c. It would seem that the septic poison may be introduced into the system in two different ways, and this distinction has an important clinical and practical bearing. (1) The so-called Heterogenetic mode includes those cases in which the poison is applied to the tissues of the patient directly, as from the hands of the accoucheur. The microbe then enters the tissues and produces its effects by developing in and influencing the vitality of the tissues themselves. (2) The so-called Autogenetic mode. In this case a piece of the retained placenta, blood-clot, or slough remains in the genital tract. Putrefactive changes set in as the result of microbic infection, and the products of the putrefaction enter the system and exert their morbid influences upon it. In this class of cases the patient as it were manufactures the immediate poison in her own body (hence the term). But it will be evident that in both the ultimate cause is the presence of microbic organisms. The symptoms may occur in from two to fourteen days after labour. They begin with a rigor or 'chill,' followed by a rapid rise of pulse and temperature. Thereafter pain in the abdomen usually sets in and the lochia become fetid or suppressed. The local manifestation of the disease consisting of inflammatory changes varies in kind, degree, and site. Almost all the organs may be involved, more especially the uterus, peritoneum, kidney, liver, &c. In some cases the influence of the poison is so overpowering and rapid that death ensues before any gross change in the tissues occurs, but usually there is abundant evidence of the extent of the anatomical changes.

Once the disease is fairly established the prognosis is grave in a high degree. The chances of recovery where the treatment is appropriate and vigorous are very much greater in the autogenetic variety than in the other. The seat of the mischief can be attacked, and the decomposing matter either entirely removed, or the putrefactive process stopped by the use of efficient antiseptics. Where the sepsis has been introduced directly (heterogenetic form) the possibility of direct interference is almost *nil*, and the matter resolves itself into a contest between the vitality of the victim and the activity of the poison, in which the former often succumbs.

The preventive treatment (*prophylaxis*) of this scourge is, however, one of the triumphs of modern medicine. Up to 1870 the special home of puerperal septicæmia was the lying-in hospital, where the atmosphere and furniture were saturated with the septic material derived from the emanations and excreta of previous patients. Such institutions were seldom long free from outbreaks of this scourge, and from time to time epidemics arose with a virulence and effect that made the total mortality appalling. But from 1870 and onwards the increasing knowledge of the influence of germ poison in disease-production and the power of antiseptics in keeping this influence in check began to tell, with the result that such outbreaks are now entirely unknown and the mortality is practically reduced to *nil*. No better illustration of this advance can be found than the experience in the Royal Maternity Hospital of Edinburgh. In 1879 the new hospital was opened, and though it was constructed on the most advanced sanitary ideas several fatal cases occurred during the first three or four months after its opening. The source of the mischief was never discovered; but a vigorous antiseptic and aseptic course was instituted in the management of the practice, and since then no single case of septicæmia has occurred.

A similar result has been attained in the great maternity hospitals on the Continent, and indeed it is found everywhere that the more rigorous the antiseptic practice the more nearly perfect is the immunity from the disease. In no department of practical medicine have the discoveries and teaching of Lister produced more brilliant results. For while it might well have been said that until recently a woman in entering a maternity hospital took her life in her hands, it now appears that since antiseptics in midwifery have been rigorously adopted a woman is actually safer in such an institution than in her own home. For while careful antiseptic practice is practically a routine in the hospital, it is apt to be faulty in a private house by reason of some constructional fault in the dwelling or ignorance or carelessness on the part of the attendants. And thus, while septicæmia is practically stamped out of hospital practice, it is still far too common in private.

The chief points attended to in hospital practice are (1) the thorough cleanliness of the bedding and clothes of the patient—all soiled articles being at once removed and disinfected before being washed. (2) The scrupulous cleansing of the wards and delivery rooms from time to time. (3) The extreme personal cleanliness of all attendants—accoucheur and nurses—the hands being carefully disinfected on every occasion before a patient is touched. (4) The rigid exclusion from the clinics of all who are in attendance on infectious or septic cases or in the post-mortem or dissecting rooms. (5) The prevention of septic absorption by the free use of antiseptic lotions and dressings. While such practice can, with due care, be constantly maintained in hospital, it is obvious that the conditions of private practice render its application more difficult; and while antiseptics have rendered the disease immensely less frequent, it is doubtful if we can hope for the almost complete immunity in private which we have attained in hospital practice.

Puerperal Insanity comprehends the forms of mental derangement which may attack a woman during pregnancy, parturition, and the puerperal period. The occurrence of insanity during pregnancy is extremely rare; it is much more frequent during the early puerperium, and is liable to occur, but with less frequency, during the whole period of lactation. The affection presents many varieties, such as acute mania (which is probably the commonest), delusional mania, melancholia, &c. As regards frequency, it would seem that about 8 per cent. of all cases of insanity have a puerperal origin. This is derived from a very large number of cases, and the proportion in different places varies greatly. A very large proportion of the cases show a hereditary tendency to insanity, but it occurs to a great extent among those in whom no such taint can be recognised. Primiparæ are more frequently the victims than those who have borne several children; and there seems no doubt but that it is more apt to appear in those whose physical state has become depressed from one cause or other.

Illegitimacy seems to exert a potent influence in the production of this disorder. This comes out in Clouston's statistics. He says that 25 per cent. of all insane puerperal women are unmarried. This apparent close relation may be somewhat misleading, because while these unfortunates are no doubt the subjects of great mental distress, and often of physical hardships leading to lowered vitality—conditions which certainly favour the development of this disorder—yet it must be borne in mind that this is the very class who most frequently seek the shelter of lying-in hospitals, from whose wards the statistics are chiefly derived. It may generally be said that a depraved state of the nutritive system precedes attacks of insanity, and whatever tends to induce this favours the development of an insane attack. About 70 per cent. of those attacked become acutely maniacal. There is great excitement, incoherence, and often great and dangerous violence. There is continuous garrulity, and the language is frequently markedly profane or obscene. Violent explosions occur from time to time, often characterised by homicidal and suicidal tendency.

The melancholic form is characterised by an attitude and expression of great mental depression, speech is slow, and replies can only be elicited with difficulty. The eyes are lustreless and downcast, and the whole bearing suggests profound dejection. Suicidal attempts are not uncommon in the melancholic forms, and must always be guarded against. The symptoms usually appear within the first seven days after labour, and may develop with great rapidity. In both the melancholic and maniacal forms there is an aversion to food, the tongue becomes coated, and the secretory and excretory functions are greatly disordered. Sleeplessness is very pronounced, and hysterical outbursts, delusions, and hallucinations occur, and mania or melancholia rapidly supervenes. It is satisfactory to know that in spite of the violence of this disorder the chances of ultimate recovery are very great. Upwards of 80 per cent. recover entirely. Most of the maniacal cases get well within eight weeks, the melancholic within six months. In a small proportion of the cases recovery is deferred until nine months, after which the chances of complete recovery are considerably diminished. In this connection it should be noted that the rapidity of recovery depends on appropriate treatment being early begun. Experience shows that the majority of cases in which treatment is early begun get rapidly well, and that the chances of recovery are diminished in proportion as the treatment is deferred. Repugnant then as may be the removal of the patient to an asylum, there can be no doubt that, in the great majority of cases, this is the proper course to adopt. When one recalls the fact that most of the cases have a suicidal or homicidal tendency which it is often difficult to guard against in a private house, and at the same time understands that early recovery depends on early treatment, the propriety of the patient's early removal scarcely admits of question.

See Clouston, *Mental Diseases*; Bevan Lewis, *Text-book of Mental Diseases*; Lloyd, 'On Insanity and Diseases of the Nervous System in the Child-bearing Woman' (*American System of Obstetrics*, vol. ii.).

Puerto Bello. See PORTOBELO.

Puerto Cabello, a seaport of Venezuela, in Carabobo state, 78 miles W. from Carácas. It stands on a long, low, narrow peninsula on the Caribbean Sea, and has a safe, deep, and roomy harbour, defended by a fort and batteries. It is the port of Valencia, which is 34 miles distant by rail. There is an active foreign trade, which averages 1¼ million sterling annually; the chief exports are coffee, cacao, indigo, cinchona, cotton, sugar, divi-divi, and copper ore. Pop. 10,145.

Puerto Cortez, a port of Honduras (q.v.).

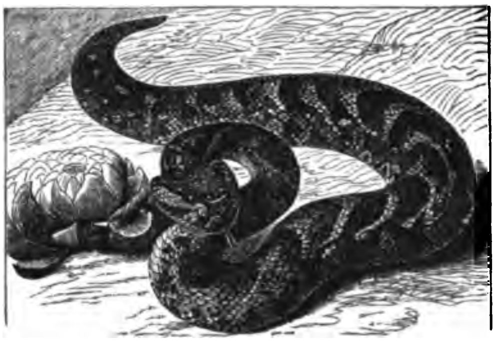
Puerto de Santa Maria, a seaport of Spain, stands at the mouth of the Guadalete, on the Bay of Cadiz, 22 miles by rail (all round the bay) NE. of Cadiz and 8 SW. of Xeres. It is one of the principal export harbours for sherry, and manufactures silk, soap, hats, leather, spirits, beer, &c. The bull-fights here in May are among the most famous in the country. Pop. 22,125.

Puerto Plata, the chief port of the Dominican Republic, on the north coast of the island of Hayti. It has an open roadstead, but exports a good deal of tobacco, mahogany, sugar, coffee, cocoa, divi-divi, &c. The value of imports and exports in 1888 was £284,964; in 1889, £233,981. Pop. 15,000.

Puerto Principé, an important inland town in the east of the island of Cuba, 40 miles SW. of its port, Nuevitas, with which it is connected by railway. It manufactures cigars, and carries on a busy trade. Pop. 46,641.

Puerto Rico. See PORTO RICO.

Puff-adder (*Clotho* or *Echidna arietans*), one of the most venomous and dangerous vipers of South Africa. Its popular name refers to its habit of puffing itself up when irritated. It attains a length of 4 or almost 5 feet, and is often as thick as a man's arm. Its head is very broad; its tail suddenly tapered; its colour brown, chequered with dark brown and gray or white. The puff-adder is very sluggish, and often lies half buried in the sand of the desert, its head alone being raised above ground. Its poison is used by the Bushmen for their arrows. The River-jack (*Clotho nasicornis*) is also South African; the male bears a scaly spine between the nostrils.



Puff-adder (*Clotho arietans*).

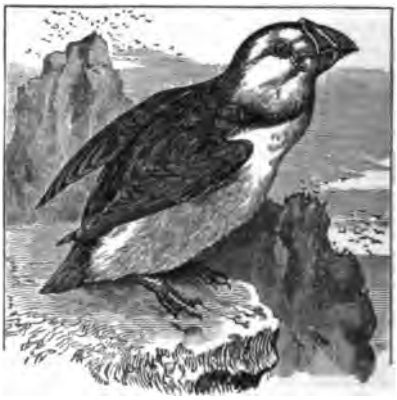
Puffball (*Lycoperdon*), a Linnean genus of Fungi, now divided into many genera, belonging to the section Gasteromycetes. They mostly grow on the ground, and are roundish, generally without a stem, at first firm and fleshy, but afterwards powdery within; the powder consisting of the spores, among which are many fine filaments, loosely filling the interior of the *peridium*, or external membrane. The peridium finally bursts at the top, to allow the escape of the spores, which issue from it as very fine dust. Some of the species are common everywhere. Most of them affect rather dry soils, and some are found only in heaths and sandy soils. The most common British species is *L. gemmatum*, generally from one to two and a half inches in diameter, with a warty and mealy surface. The largest British species, the Giant Puffball (*L. giganteum*), is often many feet in circumference, and filled with a loathsome pulpy mass when young; but in its mature state its contents are so dry and spongy that they have often been used for stanching wounds. Their fumes, when burned, have not only the power of stupefying bees, for which they are sometimes used, in order to the removal of the honey, but have been used as an anæsthetic instead of chloroform. The same properties belong also to other species. Some of them, in a young state, are used in some countries as food, and none of them is known to be poisonous.

Puff-birds (*Bucconidæ*), a family resembling Kingfishers in form, but living on insects like Flycatchers; they also resemble the Bee-eaters, and are found only in South and Central America. See BARBET, and Schlater's *Monograph of the Jacamars and Puff-birds* (1882).

Puffendorf. SAMUEL, BARON VON PUFFENDORF (or Pufendorf), writer on jurisprudence, was born on 8th January 1632, at Chemnitz, in Saxony. He began the study of theology at Leipzig, but in 1656 went to Jena to study national law and mathematics. Whilst acting as tutor to the sons of the Swedish ambassador at Copenhagen war broke out (1658) between Denmark and Sweden, and Puffendorf was thrown into prison. During the eight months he was kept there he thought out his *Elementa Jurisprudentiæ Universalis*. It was dedicated to the Elector Palatine, who appointed Puffendorf to the professorship of the Law of Nature and Nations at Heidelberg. He next exposed the absurdities of the constitution of the Germanic empire in *De Statu Reipublicæ Germanicæ* (1667), which raised a storm of controversy. In 1670 he was called to fill the chair of the Law of Nations at Lund, and there wrote the work on which his fame now rests, *De Jure Naturæ et Gentium* (1672), a work based upon the system of Grotius (q.v.), but completed and extended in the line of Hobbes' speculations. Some years later the king of Sweden made him his historiographer, with the dignity of a councillor of state. In his official character he published a dry history of Sweden, from the expedition of Gustavus Adolphus into Germany to the death of Queen Christine. In 1688 the Elector of Brandenburg invited him to Berlin to write the history of the life and reign of the Great Elector. He died in that city on 26th October 1694.

See Lorimer, *Institutes of Law of Nations* (vol. i. 1883); H. von Treitschke, in *Preussische Jahrbücher* (1875); and Droysen, *Abhandlungen zur neueren Geschichte* (1876).

Puffin (*Fratercula*), a genus of birds of the Auk family, characterised by a gaily-coloured bill—red, orange-yellow, and bluish gray—with a horny frontal sheath divided by transverse grooves into several distinct pieces. At the end of the breeding season these furrows deepen, and the sheath is shed. There is in fact an annual moult of the bill-sheath and of the horny plates above and below the eyelids. In form, size, and colour the new bill-sheath differs markedly from the old one. The genus Fratercula embraces three



Puffin (*Fratercula arctica*).

species, of which only one, the Common Puffin (*F. arctica*), a bird a little larger than a pigeon, frequents the rocky shores of the Atlantic Ocean. It occurs in many parts of England and in Wales, while on the coast and islands of Scotland and Ireland it is often abundant, especially at the breeding season, when the birds congregate in large colonies. The egg, which is of a dull white marked with pale brown or lilac, is laid sometimes in a crevice of a cliff, sometimes in the burrow of a rabbit, or in a cavity made for the purpose. The nestling, which is covered with sooty black down, remains in the nest for three weeks, and is fed on small fishes. The adult birds feed on crustaceans and other marine animals. On land they waddle rather than walk, but they swim and dive well, and their flight is rapid though seldom high. In various localities the puffin is popularly called *Sea-parrot*, *Coulterneb*, and *Tammienorie*. In the Pacific the genus is represented by the Horned Puffin (*F. corniculata*). There also is found the closely allied genus Lunda, with bright yellow bill. The eggs of the puffin are much sought after, and the flesh of the young birds is used as food. For details as to the strange moulting and renewal of the bill, see *Zoologist* (July 1878).

Pug-dog. This breed of dog is generally supposed to have been brought over from Holland, where it is very common. Its origin there is unknown. The pug may be described as a miniature bulldog, though he differs in the shape of his ears, which should fall forward like a terrier's, and of his tail, which should curl tightly against his quarters. The broad under-jaw and wide skull of the bulldog are rarely seen, but should be present in a perfect specimen. Some years prior to 1860, when the pug was fashionable, Mr Morison of London and Lord Willoughby d'Eresby paid great attention to the breeding of pugs, and founded two distinct strains known as the Morison and Willoughby pugs. Large prices were paid for pure specimens of either strain, but when the fashion in ladies' dogs took another direction prices came rapidly down. The two strains have been so often recrossed that it is difficult to obtain a pure specimen now. The pug is only fit for a house-dog, as he is useless for any active work. Beyond a tendency to get very fat he is well fitted for this, as his short, smooth coat is easily cleaned, and he is a handy size.

Puget Sound, a large inland sea in the northwest of Washington, U.S., communicating with the Pacific by the Admiralty Inlet and Juan de Fuca Strait. It is divided into several branches, penetrates far into the interior, and is everywhere navigable for the largest vessels, which in most places can ride close to the shores, and load or unload without wharves. Great quantities of pine and fir are shipped from a country rich in timber.

Pugilism, or BOXING (Lat. *pugil*, 'a boxer;' compare 'pugnacity,' from *pugnus*, 'a fist'). 'To box' is almost as old as our language itself: no special explanation is required to show what boxing is; every one knows that it is fighting—real or mimic—with the hands alone, all weapons being foreign to the 'science.' As pugilism, in what has always been its highest standard—prize-fighting—is now supposed to be extinct, it may be of interest to give a brief sketch of its past, when it played a more important part—or was thought to do so—than it does now in the formation of the national character.

Although now the taste for it seems quite as firmly implanted in the colonies and in the United States, England has been emphatically the home of pugilism; and it is certain that in no other country at any time was such a fair, manly, and humane system of combat established as that under which the English settled their quarrels, especially after the rules of the prize-ring were issued. These, known now as the 'old rules,' dated from the time of the first recognised champion of England, in whose name they were framed to ensure regularity and fair-play in prize-fights, and, as a necessary consequence, in all others, the P.R.—an accepted abbreviation for Prize Ring—being the standard authority in such matters, the royal academy of athletics, as it were. This was soon after 1740, and the rules held good for nearly a century; but in 1838, after a fatal battle, they were revised, entirely in the direction of diminishing the danger of such contests. At the same time it should be remarked—and those unacquainted with the subject may possibly be surprised to learn—that fatal results to prize-fights were extremely rare, and in most instances occurred through what may be termed accidental or secondary causes. In Broughton's rules 'minute time' was allowed between the rounds—each bout of the struggle being called a 'round,' and lasting until one or both of the men were down; but this was altered in the new rules to half a minute. It was properly decided that if a man could not recover himself sufficiently in that time to face his antagonist he must be so weak or stupefied that further fighting would be dangerous. In Broughton's time, too, the seconds were allowed to carry their principals to the 'scratch;' this was forbidden by the new rules on the same grounds as the previous alteration. The purpose of both sets of rules was to secure fair-play and to foster a kind of rude chivalry, objects not without value when we remember the classes most likely to come under their influence, and the angry quarrels either code was intended to regulate. No man was to be struck while he was down; and no man might be struck below the belt—the belt in practice being a handkerchief tied tightly round the waist. With prize-boxers these handkerchiefs were the 'colours' of the men, chosen by themselves and worn by their partisans. Kicking, biting, and the horrible 'gouging'—once so frequent across the Atlantic, but now happily seldom heard of, owing to the spread of pugilism—were all 'foul,' and their practice instantly lost a man the battle. There were two seconds, or, as they were sometimes called, bottle-holders, to each man: their duty was to lift their principal when he fell; to carry him to his corner—always selected by tossing a coin, the winner of the toss naturally choosing the side of the ring which placed him with his back to the sun; to sponge or sprinkle him with water; to wipe the perspiration or blood from his face; and, as their second title implies, to refresh him with sips from the water or brandy bottle. They used also to carry in their jacket pockets a supply of powdered resin, which the boxer would rub on his hands to enable him to clench them tightly when he grew tired; but this practice was made 'foul' by the new rules. The 'scratch,' to which allusion has been made, was a mark in the centre of the ring which the combatants had to 'toe,' face to face, before hostilities could commence. It was also an indispensable formality for the men and their seconds to shake hands prior to the first round, all six crossing hands to do so, something like one of the figures in the Caledonian quadrilles; this prevented anything like a sudden rush by either of the men upon his unprepared foe. The 'ring' itself was a square of 24 feet, marked out by four corner and four middle stakes, round which ran two ropes at a height from the ground of 2 and 4 feet respectively.

For many years prize-fighting maintained an enormous popularity, and an existence which, if not actually legal, was scarcely to be distinguished from it. The popularity perhaps remains, but the legality or the want of it is so settled that the P.R. is generally regarded as a thing of the past; and even boxing may be prohibited. 'Boxing' was once equivalent to 'pugilism,' the general term for 'fistic' manœuvres, but is now almost exclusively reserved for 'sparring' with padded gloves. These, of course, are used to prevent the injuries which the naked knuckles might inflict, although a very respectable amount of punishment can be dealt even with the largest gloves. Broughton was followed by a series of champions, amongst whom the most famous were probably John Jackson (1769–1845)—known as Gentleman Jackson; Jem Belcher; Tom Cribb (1781–1848), the most fearless, honest, and simple-minded of gladiators; Spring; and Tom Sayers (1826–65), with whom the series practically closed. All these have been honoured with handsome monuments, especially Jackson and Cribb, who lie respectively in Brompton Cemetery (London) and Woolwich churchyard; while the funeral of Sayers was almost a national demonstration, the heterogeneous procession which followed being one of the longest, if not actually the largest ever seen even in London. Another boxer, John Gully (1783–1863), might have been champion, but he retired from the ring and actually became M.P. for Pontefract (1832–37), an owner of extensive coal-mines, and, what to many of his admirers was a fact of much greater importance, his racers thrice won the Derby; and he began life as a journeyman butcher! The popular idol at one time was Jack Shaw (1789–1815), the life-guardsman, a pugilist of herculean strength, but not so polished in science as some of his compeers. His patrons offered to buy him out of the regiment when it was ordered abroad, and to back him for the championship; but the heroic guardsman refused, and, with thousands of his comrades, fell in winning the crowning victory for his country. It is said that he killed, or placed *hors de combat*, ten French cuirassiers at Waterloo before he was himself slain. Many men of the highest standing have deemed it essential to preserve the prize-ring. The great Duke of Wellington was its firm supporter; Sir Robert Peel and Lord Palmerston lent their influence to it, and Lord Byron, who was a pupil of Jackson, refers to him in really a respectful style in the notes to *Don Juan*. George Borrow's fight with the 'Flaming Tinman' is truly Homeric; and he lauds boxing as he lauds all things English. Thackeray, too, whose nose is said to have been broken in a school fight with a future church dignitary, devoted one of his *Roundabout Papers* to the fight between Sayers and Heenan. It would occupy too much space to continue this catalogue of admirers, but did we do so it would show how different was the popular tone of thought not so very long ago.

The P.R. may undoubtedly claim to have furnished an item in English history; for when the allied sovereigns visited London after the peace of 1814—the most important and brilliant gathering of potentates on record—it was deemed fitting by the highest authorities to show them a display of boxing, supported by the best pugilists of the day—a display greatly admired by the visitors. A year or two later the Grand-duke of Prussia saw a prize-battle and shook hands with the victor. The Shah of Persia in 1873 was also greatly delighted with a similar exhibition. The real decadence of the ring dates from the establishment of police in every county of England, which rendered it well-nigh impossible to 'get a fight off;' the leading patrons of the sport withdrew disgusted at the continual disappointment, leaving the boxers to the influence of a very different class. From the absence of any legal restraint, there had always been danger of disorder and riot, to check which no adequate force could be provided; yet latterly such scenes grew more frequent and worse in character, so that the demand from its opponents for the suppression of the ring gained in strength, while the efforts of those who would preserve it were proportionately weakened.

As with most other extensively followed games, the prize-ring had a dialect of its own, a 'flash lingo,' a few specimens of which may amuse the reader. The fists were 'mauleys,' and when both boxers struck with the same hand at the same time, the blow was called, aptly enough, a 'counter-hit,' or only a 'counter.' When one struck with the right and the other with the left at the same time, the blow was a 'cross counter.' 'Countering' was the most exciting, and the severest mode of inflicting punishment. The head was the 'knowledge-box' or 'canister;' the nose, the 'conk' or 'beak.' Teeth were 'ivories;' the ear, the 'listener' or 'lug;' eyes were 'ogles;' blood was, of course, 'claret,' with occasional changes to Burgundy and other wines. A man knocked down was 'floored,' or 'sent off his pins.' The fight itself was a 'mill;' a 'merry mill' was the favourite description. Our last illustration from this 'scientific slang' shall be to explain that to 'cross' a fight was to sell it, so that those in the secret knew beforehand which man would win, and could bet accordingly. Those not familiar with the sport are always fond of imputing this conduct to all boxers, but in reality it was exceedingly rare, and almost impossible to carry out without exciting suspicion. It must in fairness be allowed, whatever view may be taken of pugilism, that nowhere in the world has higher courage, more resolute pluck, been shown than within the ropes and stakes of the prize-ring, where the boxer's dogged 'game' has often shown how even the most apparently hopeless struggles can be turned into victories. Even now the fight, on 31st May 1860, between the disabled, and thus practically one-armed Tom Sayers, and his gigantic antagonist, Heenan, is spoken of as though it was but of yesterday.

See Egan's *Boxiana* (5 vols. 1818); *Fistiana* (1863); *American Fistiana* (New York, 1876); 'Pendragon,' *Modern Boxing* (1878); H. D. Miles, *Pugilistica* (2 vols. 1880); J. B. O'Reilly, *Ethics of Boxing and Manly Sport;* and Pollock and Grove's *Fencing, Boxing, and Wrestling* (Badminton Library, 1889).

Pugin, AUGUSTUS WELBY, architect, was born in London on 1st March 1812, the son of a French architect, Augustin Pugin (1762–1832), in whose office, after schooling at Christ's Hospital, he was trained, chiefly by making drawings for his father's books on Gothic buildings. Whilst working with Sir C. Barry he designed and modelled a large part of the decorations and sculpture for the new Houses of Parliament (1836–37). Early in life he became a convert to Roman Catholicism; and most of his plans were made for churches and other edifices belonging to members of that community, the most successful being perhaps a church at Ramsgate, Killarney Cathedral, Adare Hall in Ireland, and the Benedictine chapel at Douai. He died insane at Ramsgate, on 14th September 1852. He enriched the literature of his profession by *Contrasts . . . between the Architecture of the 15th and 19th Centuries* (1836), a *Treatise on Chancel Screens* (1851), and *The True Principles of Christian Architecture* (1841). See B. Ferrey's *Recollections of A. W. Pugin and his Father* (1861).

His son, EDWARD WELBY PUGIN (1834–75), succeeded to his father's practice, and was the architect of many Roman Catholic churches, &c.

Pug-mill. See BRICK.

Puisne Judges. See COMMON LAW.

Pulaski, CASIMIR, a Polish count who fell in the American revolution, was born in Podolia, 4th March 1748, took an active part in the war against Russia, and lost his estates and was outlawed at the partition of Poland in 1772. In 1777 he went to America, and for his conduct at the Brandywine was given a brigade of cavalry, which he commanded until March 1778. He then organised 'Pulaski's legion,' a corps of lancers and light infantry, in which he enlisted even prisoners of war and deserters. In May 1779 he entered Charleston, and held it until the place was relieved; a furious assault which he had made on the British was repelled, but he afterwards followed and harassed them until they left South Carolina. At the siege of Savannah on the 9th of October he fell in the assault at the head of the cavalry, and died on board the brig *Wasp* two days later. In 1824 Lafayette laid the corner-stone of a monument to Pulaski, in Savannah, which was completed in 1855.

Pulci, LUIGI, an Italian poet, born at Florence, 3d December 1432, and died in 1484 (or 1487), was an intimate friend of Lorenzo de' Medici and of Politian. He is the author of a celebrated poem, *Il Morgante Maggiore* ('Morgante the Giant'), a burlesque epic of which Roland is the hero. This poem is one of the most valuable sources for the early Tuscan dialect, the niceties and idioms of which have been employed by Pulci with great skill (see ITALY, Vol. VI. p. 254). The first edition appeared at Venice in 1481, and the book has since been frequently reprinted. Pulci wrote further a humorous novel (printed in *Classici Italiani*, Milan, 1804) and several humorous sonnets.—His brother BERNARDO (born *circa* 1430) wrote an elegy on the death of Simonetta, mistress of Julian de' Medici, and the first translation of the *Eclogues* of Virgil.—LUCA, another brother (born 1431), wrote a poem in honour of Lorenzo de' Medici's success in a tournament; *Il Ciriffo Calvaneo*, a metrical romance of chivalry; *Driadeo d'Amore*, a pastoral poem; and *Epistole Eroiche*.

Pulex. See FLEA.

Pulicat, a town of British India, 20 miles N. of Madras, the first settlement of the Dutch in India; pop. 4967. It stands on an island in a large inlet of the sea called the Lake of Pulicat.

Pulko'wa, a village of Russia, 10 miles S. of the site of a magnificent observatory (59° 46′ 18″ N. lat. and 30° 19′ 40″ E. long.), the 'St Petersburg observatory,' built by the Czar Nicholas in 1838–39. In 1882 one of the largest telescopes in the world was erected here.

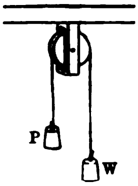


Fig. 1.

Pulley, one of the mechanical powers, consists of a wheel, with a groove cut all round its circumference, and movable on an axis; the wheel, which is commonly called a *sheave*, is often placed inside a hollow oblong mass of wood called a *block*, and by the sides of this block the extremities of the axle of the sheave are supported; the cord which passes over the circumference of the sheave is called the *tackle*. Pulleys may be used either singly or in combination; in the former case they are either *fixed* or *movable*. The *fixed pulley* (fig. 1) gives no mechanical advantage; it merely changes the direction in which a force would naturally be applied to one more convenient: thus, W can be raised without lifting it directly by merely pulling P down. The *single movable pulley*, with parallel cords, gives a mechanical advantage = 2 (fig. 2); for a little consideration will show that, as the weight, W, is supported by two strings, the stress on each string is ½W, and the stress on the one being supported by the hook, A, the power, P, requires merely to support the stress on the other string, which passes round C. The fixed pulley, C, is only of service in changing the naturally upward direction of the power into a downward one. If the strings in the single movable pulley are not parallel there is a diminution of mechanical advantage—i.e. P must be more than half of W to produce an exact counterpoise; if the angle made by the strings AB and BC is 120°, P must be equal to W; and if the angle be greater than this there is a mechanical disadvantage, or P must be greater than W. The following are examples of different combinations of pulleys, generally known as the first, second, and third systems of pulleys. In the first system one end of each cord is fastened to a fixed support above; each cord descends, passes round a pulley (to the lowest of which the weight, W, is fastened), and is fastened to the block of the next pulley, with the exception of the last cord, which passes round a fixed pulley above, and is attached to the counterpoise, P. The tension of a string being the same in all its parts, the tension of every part of the string marked (1) in fig. 3 is that which is produced by the weight of P; consequently, as the last movable pulley is supported on both sides by a string having a tension, P, the tension applied in its support is 2P. The tension of the string marked (2) is therefore 2P, and the second movable pulley is supported by a force equal to 4P. It may similarly be shown that the force applied by the strings marked (4) in support of the last pulley (which is attached to W) is 8P. Hence we see that, according to this arrangement, 1 lb. can support 4 lb. if two movable pulleys are used; 8 lb. if there are three movable pulleys; 16 lb. if there are four movable pulleys; and if there are n movable pulleys 1 lb. can support 2^n lb. It must be noticed, however, that in practice the weight of the cords, and of the pulleys, and the friction of the cord on the pulleys must be allowed for; and the fact that in this system all of these resist the action of the power, P, and that to a large extent, has rendered it of little use in practice.—The second system is much inferior in producing a mechanical advantage, but it is found to be much

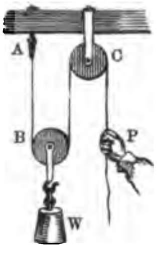


Fig. 2.

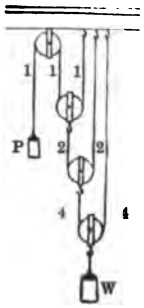


Fig. 3.

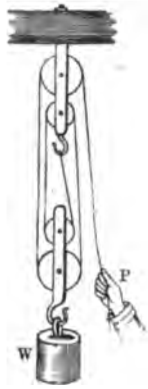


Fig. 4.

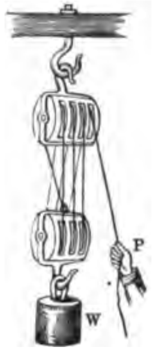


Fig. 5.

more convenient in practice, and is modified according to the purpose for which it is to be used; two prevalent forms are given in figs. 4 and 5. In this system one string passes round all the pulleys, and, as the tension in every part of it is that produced by the weight of P, the whole force applied to elevate the lower block with its attached weight, W, is the weight P multiplied by the number of strings attached to the lower block; in fig. 4 W = 4P, and in fig. 5 W = 6P, the pulleys in the upper block being only of use in changing the direction of the pulling force. This system is the one in common use in architecture, in dockyards, and on board ship, and various modifications of it—such as White's pulley, Smeaton's pulley, &c.—have been introduced; but the simpler forms shown above have been found to answer best.—The third system (fig. 6) is merely the first system inverted, and it is a little more powerful, besides having the weight of the pulleys to support the power, instead of acting in opposition to it, as in the former case.—The mechanical advantage can be traced out by finding from the form of the combination the ratio between the run of the tackle over the last sheave and the vertical ascent of W, when motion is set up. Theoretically, the larger the number of movable pulleys in any one combination the greater is the mechanical advantage afforded by it; but the enormous friction produced, and the want of perfect flexibility in the ropes, prevent any great increase in the number of pulleys.

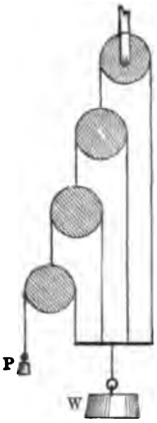


Fig. 6.

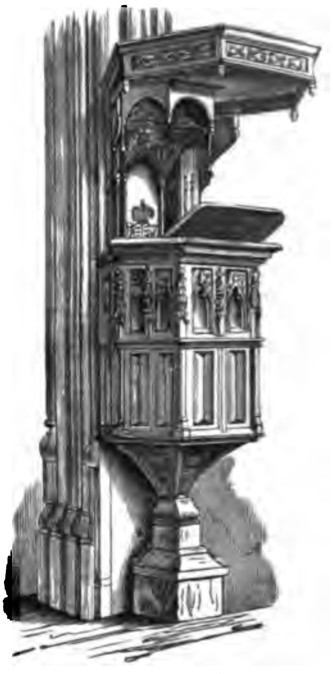
Pullman, George Mortimer, the inventor of the well-known 'cars,' was born in New York state in 1831, engaged in the business of moving and raising buildings, and as early as 1859 made his first sleeping-cars, and in 1863 the first on the model with which his name is now associated (see Railways). The Pullman Palace-car Company was formed in 1867, under his presidency, and now operates nearly 2500 cars. In 1880 he founded the industrial town which bears his name. It is now embraced within the city limits of Chicago.

Pulmonaria. See Lungwort.

Pulmonates, a section of the Gasteropoda (q.v.).

Pulo-Penang. See Penang.

Pulpit (Lat. *pulpitum*), an elevated tribune or desk, from which sermons, lectures, and other solemn religious addresses are delivered. In great churches the pulpit is commonly placed on the north side of the nave against the wall, or in juxtaposition with a pillar or buttress (see also Ambo). The pulpits of the Low Countries and of Germany are often masterpieces of elaborate carving in wood and stone, frequent subjects for treatment being the Conversion of St Paul, the Call of Peter and Andrew, and Adam and Eve (as in the wood-carved pulpit by Verbruggen in St Gudule at Brussels). Sometimes the canopy or sounding-board is the part most elaborately adorned by carving in wood or stone, as in the pulpit at Fotheringhay, Northamptonshire. Amongst the masterpieces of Niccola Pisano are the beautifully wrought marble pulpits of the baptistery at Pisa, and of the cathedral at Siena. Some are adorned by bronze-work. The pulpit (in Arabic, ***mimbar***) forms one of the scanty appliances of Mohammedan worship. See Dollman's *Examples of Ancient Pulpits in England* (1849).



Pulpit (Fotheringhay, Northamptonshire, 1440).

Pulque, a favourite beverage of the Mexicans and of the inhabitants of Central America and some parts of South America; made from the fermented juice of different species of Agave (q.v.).

Pulsatilla, or Pasque Flower, a species of Anemone (*A. pulsatilla*), of the natural order Ranunculaceæ. The species is a perennial herb with doubly pinnatifid or doubly trifid leaves, and a simple one-flowered scape. It is narcotic, acrid, and poisonous. The pulsatilla is a native of many parts of Europe, and of chalky pastures in several parts of England. It has widely bell-shaped bluish-purple flowers. Other species of Anemone have similar properties, *A. pratensis* and *A. patens*, the former a native of Europe generally, the latter of Siberia. They all emit, when bruised, a pungent smell, and contain, as their principal constituent, a peculiar pungent essential oil, which, in combination with *Anemonic Acid*, forms an acrid and very inflammable substance called *Anemonine* or *Pulsatilla Camphor*, and is sometimes used in medicine. *Pulsatilla* is a favourite medicine of the homœopathists. Easter eggs are coloured purple in some places with the petals of the pasque flower.

Pulse (Lat. *puls*), a name for the edible seeds of leguminous plants, as *corn* is the name for the edible seeds of grasses. Peas and beans are the most common and important of all kinds of pulse; next to them may be ranked kidney-beans, lentils, chick-peas, pigeon-peas, &c. The best kinds of pulse are very nutritious, but not easy of digestion, and are very apt to produce flatulence.

Pulse (Lat. *pulsus*, 'a pushing or beating'). The phenomenon known as the arterial pulse or arterial pulsation is due to the distension of the arteries consequent upon the intermittent injection of blood into their trunks, and the subsequent contraction which results from the elasticity of their walls. It is perceptible to the touch in all excepting very minute arteries, and, in exposed positions, is visible to the eye. The pulse is usually examined at the radial artery at the wrist, the advantages of that position being that the artery is very superficial, and that it is easily compressed against the bone. It is usual and convenient, though not quite accurate, to include under the term the conditions observed between the beats, as well as those produced by them.

The condition of the pulse depends mainly on two factors, each of which may vary independently of the other: *first*, the contraction of the heart, which propels the stream of blood along the artery; and *second*, the resistance in the small arteries and capillaries, which controls the rate at which it leaves the artery. The first determines the frequency and rhythm of the pulse and the force of the beats; but the tension of the artery between them and their apparent duration depend mainly upon the peripheral resistance. 'Feeling the pulse,' therefore, gives important information besides the rate of the heart's action, and implies much more than the mere counting of pulsations. Dr Broadbent says, 'A complete account of the pulse should specify (1) the frequency—i.e. the number of beats per minute, with a note of any irregularity or intermission or instability of the rhythm; (2) the size of the vessel; (3) the degree of distension of the artery between the beats; (4) the character of the pulsation—whether its access is sudden or gradual, its duration short or long, its subsidence abrupt or slow, note being taken of dicrotism when present; (5) the force or strength of both the constant and variable pressure within the artery, as measured by its compressibility; (6) the state of the arterial walls.'

The *frequency* of the pulse varies with age, from 130 to 140 per minute at birth to 70 to 75 in adult males, and with sex, being six or eight beats more in adult females. In some individuals it deviates considerably from this standard, and may even be habitually below forty or above ninety without any signs of disease. It is increased by exertion or excitement, by food or stimulants, diminished in a lying posture or during sleep. In disease (acute hydrocephalus, for example) the pulse may reach 150 or even 200 beats; or, on the other hand (as in apoplexy and in certain organic affections of the heart), it may be as slow as between thirty and twenty.

The normal regular *rhythm* of the pulse may be interfered with either by the occasional dropping of a beat (intermission), or by variations in the force of successive beats, and in the length of the intervals separating them (irregularity). These varieties often occur in the same person, but they may exist independently of each other. Irregularity of the pulse is natural to some persons; in others it is the mere result of debility; but it may be caused by the most serious disorders, as by disease of the brain, or by organic disease of the heart.

The other qualities of the pulse are much more difficult to recognise, though of no less importance. The degree of *tension* or resistance to compression by the fingers varies greatly: in a soft or 'low-tension' pulse the artery may be almost imperceptible between the beats; in a hard or 'high-tension' pulse it may be almost incompressible. An unduly soft pulse is usually an indication of debility; an unduly hard one is most characteristic of disease of the Kidneys (q.v.) and gout. But the tension, like the frequency of the pulse, undergoes considerable variations in health from temporary causes, and may in certain individuals be habitually above or below the average without actual disease.

The *force* of the beats is a measure of the vigour and efficiency of the heart's action. A strong pulse is correctly regarded as a sign of a vigorous state of the system; it may, however, arise from hypertrophy of the left ventricle of the heart, and remain as a persistent symptom even when the general powers are failing. As strength of the pulse usually indicates vigour, so *weakness* of the pulse indicates debility. Various expressive adjectives have been attached to special conditions of the pulse, into the consideration of which our space will not permit us to enter. Thus, we read of the jerking pulse, the hobbling pulse, the corded pulse, the wiry pulse, the thrilling pulse, the rebounding pulse, &c. The full significance of changes of the pulse in disease can only be appreciated by considering them in connection with the other signs and symptoms of the case. See MEDICINE (Vol. VII. p. 115), CIRCULATION, HEART, PALPITATION; and especially *The Pulse*, by Dr Broadbent (1890).

Pulsometer. See PUMPS.

Pulszky, FRANCIS AURELIUS, Hungarian politician and author, was born at Eperies, 17th September 1814, and after a course of legal studies travelled abroad, publishing (1837) a successful book on England. In 1848 he was appointed to a government post under Esterhazy, but, suspected of sharing in the revolution, fled to London, where he wrote for the papers. When Kossuth came to England Pulszky became his companion, and went with him to America (described in *White, Red, and Black*, 1852). His wife wrote *Memoirs of a Hungarian Lady* (Lond. 1850), and *Tales and Traditions of Hungary* (1851). He was condemned to death by the Austrian government in 1852, but, after living in Italy from 1852 to 1866, was pardoned in 1867. He has sat in the parliament, and been director of museums and libraries throughout the country. His autobiographic memoirs (4 vols. 1879–82) were translated into German. See F. W. Newman, *Reminiscences of Two Exiles* (1889).

Pulteney, WILLIAM, Earl of Bath. This statesman, descended from a Whig family, was born in 1682, the son of Sir William Pulteney, member of parliament for Westminster. He was a student of Christ Church College, Oxford, where his oratorical power was early displayed. He entered parliament as member for Heydon, Yorkshire, and was a most graceful and brilliant speaker, full of epigram, and a master of all the arts of parliamentary attack. At first, and for many years, the friend and colleague of Walpole, he finally became so disgusted with that minister's indifference to his claims that in 1728 he placed himself at the head of a small group of malcontent Whigs styled the 'Patriots,' and was henceforth Walpole's bitterest and perhaps most formidable opponent, being the leader of the coalition against him in the Commons as Carteret was in the House of Lords. He was Bolingbroke's chief assistant in the paper called the *Craftsman*, which involved him in many political controversies, and called forth some of his finest pamphlets. In 1731 he wrongly ascribed to Lord Hervey the authorship of a scurrilous pamphlet; a duel was the consequence, fought with swords in St James's Park, when both combatants were slightly wounded. On the resignation of Walpole in 1741 Pulteney was sworn of the Privy-council, and soon afterwards created Earl of Bath; and from that time his popularity was gone. Horace Walpole places him amongst his *Royal and Noble Authors*, but though his prose was effective and his verse graceful, he was probably still better known as the author of a very popular political song, 'The Honest Jury, or Caleb Triumphant,' than by his more serious writings. He died in 1764, a wealthy but disappointed man. See Lecky, *History of England*, ii. 417 *et seq.*, and *Walpole*, by John Morley.

Pultowa, or POLTA'VA, a town of Russia, situated on a tributary of the Dnieper, by rail 88 miles SW. of Kharkoff and 449 NE. of Odessa. It manufactures tobacco and leather, and has four annual fairs, the most important in July, when wool, horses, cattle, leather, hides, and coarse woollens and other stuffs are sold to the amount of £2,500,000 annually. Pop. 43,214. The town is a bishop's seat, and is famous as the scene of Charles XII.'s defeat by Peter the Great on 27th June 1709.

Pultusk, a town of Poland, 32 miles N. of Warsaw. Here Charles XII. of Sweden defeated the Saxons in 1703, and here, too, on December 26, 1806, was fought a fierce battle between the Russians and the French, the latter being ultimately victorious. The town was destroyed by fire in 1875. Pop. 19,946.

Pulvermacher's Chains. See ELECTRICITY (MEDICAL).

Puma, or COUGUAR (*Felis concolor*), a large Carnivore distributed in North and South America between 60° N. and 50° S. lat., but rare in those parts which have been long settled. It is sometimes called the American 'lion,' 'panther,' ('painter'), or 'catamount,' and is about the size of a leopard. The fur is thick and close, dark yellowish red above, lighter on the sides, and reddish white on the belly; the muzzle, chin, throat, breast, and insides of the legs are more or less white. But the colouring varies a little in different localities. Young pumas have dark-brown spots in three rows on the back, and scattered markings elsewhere. The long tail is covered with thick fur, and is slightly coiled. The pumas have very diverse haunts—the forest, the bush, and the grassy pampas; they have no fixed lairs, but roam about by night from place to place in search of prey. They are agile in their movements, and can leap and spring well, but swim only under compulsion. Many kinds of mammals fall victims to the pumas, and they are the more disastrous to flocks and herds because of their habit of killing many more than they devour. To the booty which they have secured but merely tasted they will afterwards return. They rarely attack man, but one puma has been known to kill fifty sheep in a night, drinking a little of the blood of each; hence their extermination in many regions. The two sexes live apart, but pair in winter and summer. Two or three young are born at once, and are left a good deal to themselves, though after the first birth the mothers are certainly affectionate. In spite of its restless and voracious instincts the puma may be readily tamed, and is said to become gentle. The skin is sometimes used, and the flesh is occasionally eaten.

Pumice, a general term for the cellular, spongiform, filamentous, or froth-like parts of lavas. This highly porous and froth-like structure is due to the abundant escape of vapours through the rock while it was in a state of fusion. Under the microscope the rock is seen to be a glass, crowded with minute gas or vapour cavities and abundant crystallites. Owing to its porous structure pumice readily floats in water. It is usually a form of some highly acid lava, such as obsidian; but now and again basic lavas give rise to pumice (Canary Islands, Hawaii). The latter is dark brown or black, and often shows metallic tarnish; the former, which is much the more common, is white or gray, and sometimes yellow. It is a hard but brittle rock, and is much used for polishing wood, ivory, metals, glass, slates, marble, lithographic stones, &c., and in the preparation of vellum, parchment, and some kinds of leather. Among other purposes to which it is applied is the rubbing away of corns and callosities. Great quantities are exported from the Lipari Isles to all parts of Europe. Pumice occurs as the crust of some kinds of lava, and is often ejected in the form of loose cinders during volcanic eruptions. Sometimes immense quantities are thrown into the sea and are often floated for great distances. Eventually the cinders get water-logged and sink to the bottom. Abundant fragments were dredged up from abysmal depths by the *Challenger* expedition. After the eruption and earthquake in the Straits of Sunda in 1883, the seaport of Folok Batoung was closed with a barrier of pumice 19 miles long, two-thirds of a mile broad, and from 13 to 16 feet deep.

Pumpernickel, a kind of rye-bread (made of unbolted flour), much used in Westphalia. The etymology is disputed.

Pumpkin. See GOURD.

Pumps, machines for lifting liquids to a higher level, include (1) the Lift or Suction Pump, (2) the Lift and Force Pump, (3) the Pulsometer, (4) the Chain-pump, (5) Spiral Pumps, (6) the Centrifugal Pump, (7) the Jet-pump, (8) the Persian Wheel, (9) Scoop-wheels.

(1) *The Lift or Suction Pump* (fig. 1).—A is the cylinder (the 'barrel'), closed or open at the top; B is a pipe (the 'suction-pipe') communicating with the water to be raised; C is a 'discharge-pipe,' which may be reduced to a mere spout; D is a valve, opening upwards only; E is another valve, also opening upwards only, and borne by F; F is the 'bucket,' a hollow cylindrical piece of wood or metal which is made, by leather or by hemp or other packing, to fit the barrel just so closely that water cannot travel between the bucket and the barrel; G is the piston-rod, driven by hand, steam, windmill, or animal power, and moving the bucket up and down in the barrel. Each upward stroke of the piston at first lifts air, of which none can travel back past the bucket; a partial vacuum is produced in B; water ascends in B until the external atmospheric pressure is balanced by the partial atmospheric pressure below D plus the weight of the water column in B; as F now descends, air gets to the upper side of the valve, and is lifted on the upstroke, and so on; so that, if the valve D be not more than at most 33 feet above the water below (in practice 25 feet or less), water will be, step by step, pushed up B by the external atmospheric pressure until the valve D is under water; thereafter the succeeding strokes of the pump operate on the water above D and force it into the discharge-pipe, C, the external atmospheric pressure keeping the space below D filled with water. The power expended is applied (1) in lifting water; (2) in overcoming the pump-friction; (3) in overcoming the water-friction; and, (4) where the pump is ill-shaped, in producing eddies and broken water. A lift-pump must be very carefully proportioned and constructed in order to utilise, in water-lifting, one-half of the whole power expended in working it. Such pumps must work slowly, so that the valves may close properly; and an air-vessel is, if C be not a mere spout, required on C so as to minimise shock and render the outflow less intermittent, by the compression and elastic expansion of the air contained in it. The outflow is also regulated by driving two or three pumps off the same shaft and properly timing their relative motions.

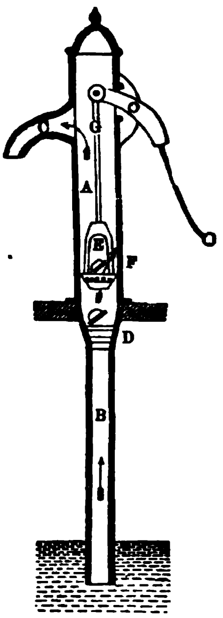


Fig. 1.

(2) *The Lift and Force Pump* (fig. 2).—The piston is solid, and the valve E, instead of being carried by the piston, is fitted in the discharge-pipe. During the downward motion of the piston water is forced past the valve E; it cannot return; and water may thus be forced to considerable heights. Sometimes (fig. 3) the piston is made to fit, not the barrel, but the stuffing-box, B, which can be tightened down on it so as to make the fit good. An air-vessel, or a loaded hydraulic press called an 'accumulator,' is fitted on the discharge-pipe so as to minimise shock and intermittence; and double pumps are very generally employed, either directly driven by steam-engine pistons or driven by a flywheel. Force-pumps are used for deep wells and mines, hydraulic presses, boiler feeds, creasoting timber, hydraulic lifts, steam fire-engines both land and marine, and hydraulic power supply.

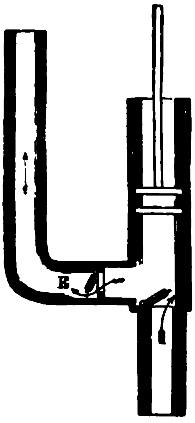


Fig. 2.

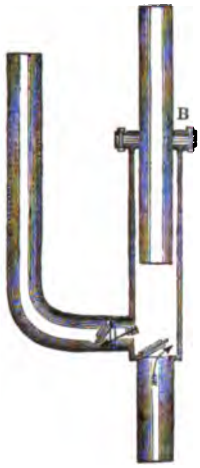


Fig. 3.

(3) *The Pulsometer.*—Two chambers, A and B, converge above and communicate with a single steam-pipe; a ball-valve shuts off either A or B, but not both at the same time, from the steam; A and B each have a discharge outlet and a suction inlet, both these having valves. The whole is filled with water; the steam drives water from, say, A into the discharge-pipe: condensation takes place and the ball-valve is pulled over, so as to shut off the steam from A: the steam then acts in B in the same way as it had done in A, while in the meantime A, where there is a partial vacuum, is being filled with water from the suction-pipe. The two chambers thus act alternately. The whole contrivance can be hung by chains and let down to the required position; and it is greatly in use in contractors' work.

(4) *The Chain-pump.*—This pump is formed of plates called lifts or buckets, fastened, now generally by their centres, to an endless chain and moving upwards, in a case or 'barrel' which is in places constricted so as just to let the buckets pass. Chain-pumps are noisy and somewhat apt to break down; but they can lift very gritty or muddy material. Dredging-machines (q.v.) with their buckets are a variety of this device.

(5) *Spiral Pumps.*—An Archimedes' Screw (q.v.) is rotated round its axis so as to make water slip up the inclined plane of the screw. They are very economical in power, and they work so regularly that they act as meters.

(6) *Centrifugal Pumps* (figs. 4 and 5).—The water enters by the supply-pipes, A, A, which lead to the central orifices of the fan, B, B; it then traverses the passages, C, C, formed by the vanes and the side covering-plates, D, of the fan. The fan is made to rotate from the shaft, E. The water acquires a rotatory motion while passing through the passages of the rotating fan; it then enters the whirlpool-chamber, F, and is discharged by the pipe, G, at the circumference of F; and the velocity of rotation of the fan determines the height to which the water will rise in the discharge-pipe. This velocity cannot conveniently be made to exceed a certain limit; hence the utility of centrifugal pumps is practically limited to low lifts; but as they can be made very large they can deal with enormous quantities of water; and they are much used for pumping in docks, canals, marsh and polder draining, land-reclaiming, and the like. As they have no valves they are little liable to become choked. In nearly all modern centrifugal pumps the whirlpool-chamber, F, the purpose of which was to reduce the ultimate velocity of outflow and correspondingly to increase the pressure, is dispensed with; and the same end is attained without wasting energy through friction in the vortex, F, by shaping the vanes of the fan so as to reduce the velocity. See Cotterill's *Applied Mechanics.*

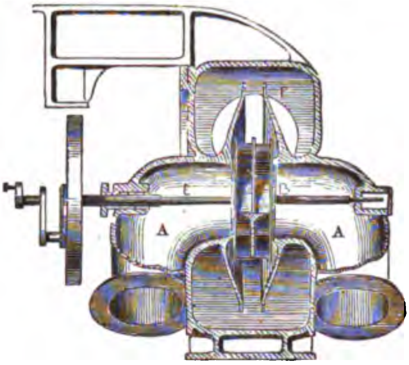


Fig. 4.

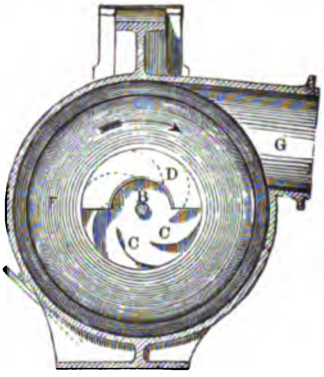


Fig. 5.

(7) *The Jet-pump*, now not much used, is practically a Giffard's Injector (q.v.) worked by water from a height instead of by steam.

(8) *The Persian Wheel.*—An under-shot wheel (mill-wheel in which the water flows under the wheel) in which little buckets are carried by the rim of the wheel so as to pick up water from the stream and deliver it at the top of the wheel.

(9) *Scoop-wheels* or flash wheels: equivalent to breast water-wheels with reversed action; driven by windmills or by steam, they raise water in their buckets and deliver it a few feet higher up; in some cases they have curved blades, and the water is delivered at the centre of the wheel.

See *Pumps and Pumping Machinery*, by Frederick Colyer, C.E. (Lond. 1886); also see AIR-PUMP.

Pun, the name given to a play upon words that agree or resemble each other in sound but differ in sense, a verbal quibble by means of which an incongruous and therefore ludicrous idea is unexpectedly shot into the sentence—as, for example, in the answer to the grave question, 'Is life worth living?' —'That depends on the liver.' We find this form of witticism in Aristophanes and Cicero, and in old England it was not unknown even in the pulpit. The sermons of Bishop Andrewes and the *Church History* and other works of Thomas Fuller abound in puns of all degrees of goodness and badness; they meet us strangely enough even in the gravest situations in the tragedies of Shakespeare, and there is at least one in Liddell and Scott's *Greek Lexicon*. Dr Johnson said that the man who would make a pun would pick a pocket; but this sentence bears too hard upon the best beloved of English writers, Charles Lamb, a hardened punster, not to speak of Sydney Smith, Hook, Hood, the prince of punsters, and Bishop Wilberforce. Boswell, while relating Dr Johnson's dislike to puns, ventures his own opinion that 'a good pun may be admitted among the smaller excellencies of conversation.' But a pun of the best kind has a value infinitely higher than this: there is tenderness as well as wit in Fuller's phrase of the Holy Innocents of Bethlehem—'the *infantry* in the noble army of martyrs.'

See *Spectator*, No. 61, L. Larchey's *Les Joueurs des Mots* (1866), and Holmes's *Autocrat of the Breakfast Table*. The Hon. Hugh Rowley's *Puniana* (1867) and *More Puniana* (1875) contain many hundred examples, among them a few good puns.

Punch, a beverage introduced into England from India, and so called from being usually made of five (Hindi, *panch*) ingredients—arrack, tea, sugar, water, and lemon-juice. As now prepared, punch is a drink the basis of which is alcohol of one or more kinds (especially rum), diluted with water, flavoured with lemon or lime-juice and spices, and sweetened with sugar; sometimes other ingredients are added according to taste, especially wine, ale, and tea. 'Rack-punch' takes its name from Arrack (q.v.). Milk-punch is prepared beforehand (of rum and brandy with milk), bottled, and served cold—even iced. Whisky-toddy, made with whisky, hot water, and sugar, is a kind of punch, the name *toddy* being Hindustani.

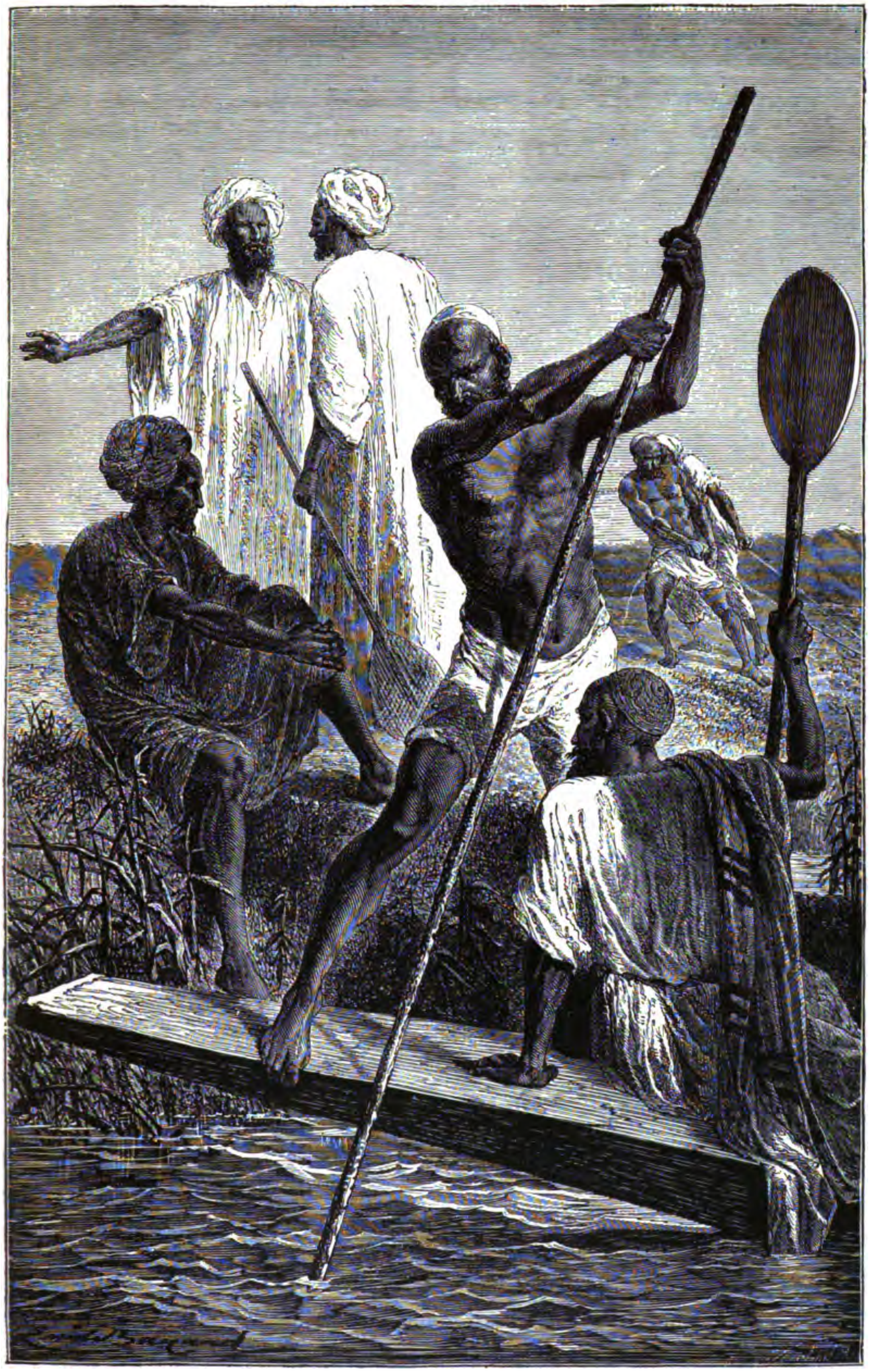
Punch, with his wife Judy and dog Toby, the chief characters in a popular comic puppet-show, of Italian origin, the name being a contraction of Punchinello, for Pulcinello, the droll clown in Neapolitan comedy. The word is a diminutive from *pulcino*, 'a young chicken.' The identification with Pontius Pilate, as well as of Judy with the betrayer Judas, is entirely without foundation. Many believe the modern Punch to have originated in a survival of the Maccus, the fool or clown of the ancient Atellanæ (q.v.), just as the Italian Arlecchino and Brighetta are of their other Oscan characters. But the line of descent is certainly obscure enough, and it is at least not improbable that some trace of the old *Ludi Osci*, transmitted through the Vice of the mystery plays, may lurk in the modern drama of the hook-nosed hunchback Punch and his unfortunate wife Judy. The full-grown modern drama, which can scarcely be looked on as a school of the domestic virtues, is ascribed to an Italian comedian, Silvio Fiorillo, about 1600. The exhibition soon found its way into other countries, and was very popular in England during the 17th century. Its popularity seems to have reached its height in the time of Queen Anne, and Addison has given in the *Spectator* a regular criticism of one of the performances. In 1812 Ouseley saw at Tabriz in Persia a Gypsy puppet-show very like our Punch and Judy. See also MARIONETTES.

The performance of Punch, as generally represented, requires the assistance of only two persons —one to carry the theatre and work the figures, the other to bear the box of puppets, blow the trumpet, and sometimes keep up the dialogue with the hero of the piece. The movements of the puppets are managed simply by putting the hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head.

Punch, or the LONDON CHARIVARI, the English comic journal *par excellence*, is a weekly magazine of wit, humour, and satire in prose and verse, copiously illustrated by sketches, caricatures, and emblematical devices. It draws its materials as freely from the most exalted spheres of foreign politics as from the provincial nursery; and, dealing with every side of life, is not less observant of the follies of Belgravia than of the peculiarities of Whitechapel. *Punch* gives due place to Irish bulls and dry Scotch humour, and does its best to present them in the raciest vernacular. Stern in the exposure of sham and vice, *Punch* is yet kindly when it makes merry over innocent foibles. Usually a *censor morum* in the guise of Joe Miller, a genial English Democritus who laughs and provokes to laughter, *Punch* at times weeps with those that weep, and, *jocis remotis*, pays a poetical tribute to the memory of the departed great. The wittiest of serial prints was founded in 1841, the first number appearing on the 17th July of that year, and, under the joint editorship of Henry Mayhew and Mark Lemon, soon became a household word, while ere long its satirical cuts and witty rhymes were admittedly a power in the land. *Punch* is recognised as an English institution, and in corners of Europe where an Englishman rarely comes the frequenters of the café may be seen puzzling over the esoteric wit and wisdom of Cockayne. Their contributions to *Punch* helped to make Douglas Jerrold, Gilbert à Beckett, Tom Hood, Albert Smith, Thackeray, Shirley Brooks, Tom Taylor, and F. C. Burnand famous; as their illustrations did H. K. Browne, Doyle, Leech, Tenniel, Du Maurier, Keene, Linley Sambourne, and Furniss. It should be noted that this genial comic paper has done memorable service in purifying the moral standard of current wit in England. For the alternative name, see CHARIVARI; and see CARICATURE, and the articles on the chief contributors, LEMON (MARK), &c.

Punchestown, a racecourse close to Naas, 20 miles SW. of Dublin by rail. Here are held about the middle of April the steeplechases of the Kildare Hunt. There are also stone monuments near.

Punctuation is the art of marking the divisions of a sentence by means of conventional signs —the full stop or period (.), colon (:), semicolon (;), comma (,), dash (—), mark of exclamation (!), mark of interrogation (?), inverted commas (" "), and brackets—( ), [ ]. Broadly speaking, there are two principal systems of punctuation, the grammatical and the logical. The system most frequently followed in British printing-houses is neither of these, being a set of empirical rules, in which the logical element is almost entirely wanting, the grammatical is present to some extent, but the ruling factor is apparently arbitrary fancy. Commas are too often held in profound contempt, being scattered at random amongst the words as if from a pepper-box. These lawless little adjuncts can be found, in the *best-printed* books, insinuating themselves between subject and verb in even short sentences. The printing-offices of the United States are to some extent uniform in their practice. The system they follow is much better than those in



BOATMEN OF PUNJAB.

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Britain, and is based principally upon grammatical laws. The old-fashioned method of putting in a comma (or even a stronger stop) wherever a reader would naturally pause to take breath when reading aloud (as at this point of this sentence) has little in reason to commend it. Punctuation is confessedly difficult, partly owing to the vast differences in the style of different writers, and partly owing to the conflicts between logical meaning and grammatical word-arrangement which in some cases are inevitable. Given a sensible system, practical experience is the best teacher. In theory little more can be done than to lay down a few general maxims for guidance.

In the first place, follow a logical method of sentence subdivision: let the first and foremost aim be to bring out the meaning clearly and unambiguously, in so far as this can be done with the help of stops. Use commas and semicolons sparingly, especially commas; use them, indeed, only where they are absolutely necessary. The sentence should stand on its own feet, not rest upon a long array of comma crutches. It is not as a general rule necessary to set commas to fence or adorn every adverbial clause. Especial care is required in punctuating sentences that contain relative clauses. If the relative sentence is entirely subordinate to the main sentence, or if it gives additional information, separate it by a comma or commas; if on the other hand it belongs essentially to the structure of the thought expressed by the main sentence, put no comma. For example, in 'the man who had an impediment in his speech,' written without the comma, the relative clause points out this particular man and distinguishes him from some other or others who have been also spoken of: it fulfils in fact the function of an article or demonstrative pronoun. In the same sentence printed with the comma, 'the man, who had' &c., the relative clause gives an entirely new piece of information, and is no longer demonstrative. The colon is generally put before a long quotation. It would be well to confine the use of it to this and to one other case—namely, to part a general statement from the immediately following particular application of it or exemplification of it in detail. As for dashes, it is difficult to summarise the rules for their use. They are commonly employed to indicate a sudden break or change in the grammatical structure or the logical development of the sentence, as well as to put ironical emphasis upon a word or words thrown to the end of the sentence, as in Heine's phrase, 'Göttingen is noted for its professors and its—sausages;' but even this would be better without such a clumsy advertisement of the humour. A dash may precede an enumeration of mere names or dates or objects expressed in very brief terms. One dash may also be put before and one after a short clause that merely explains in other words or makes clearer a statement that has just been made; both dashes, and not one dash and some other stop, should be used, except where the second would fall at the end of a sentence. But for this purpose, especially where the parenthetical nature of the added explanatory clause is more prominent, brackets are frequently employed. Semicolons are most appropriately used in compound sentences or sentences that embrace antithetical statements. In the former class of sentence they should mark off the subordinate sentences from the main sentence or co-ordinate sentences from one another; in the latter class they should separate the antithetical sentences, which generally begin with 'but' or some equivalent. The mark of exclamation has another besides its legitimate use: it is frequently put after absurd or highly improbable statements. The mark of interrogation too has a secondary use: placed in brackets immediately after a word it throws doubt upon its correctness, either as according with fact or as being philologically or grammatically correct.

Of course these are only general rules. Many exceptions even to them must necessarily occur. The golden rules in all cases of doubt are two: (1) let logic or, better, common sense be the supreme guide; (2) punctuate so as to bring out the sense best. It is greatly to be desired that British printing-houses would come to some agreement as to a uniform and systematic method of punctuation. See H. Beadnell's *Spelling and Punctuation* (4th ed. 1891).

Pundit (Hindi, *pandit;* Skr. *pandita*, 'a learned man'), in India a teacher, especially a Brahman learned in Sanskrit and in Hindu literature, law, and religion. Of late native pundits have done good service as geographical explorers in districts, such as Tibet, not accessible to Europeans.

Pungwe, a river of Portuguese East Africa, forming the principal waterway to Manicaland and Mashonaland; its mouth is situated some 25 miles NE. of Sofala and 130 SW. of the Zambesi delta. After some diplomatic difficulties between Britain and Portugal, it was agreed (1891) by Portugal that British commerce should have unimpeded access by this route to the British sphere in the interior, the Pungwe being made freely navigable for British vessels. In 1894 nearly 200 miles of the railway to the interior had been laid. See BEIRA.

Punic Wars. See CARTHAGE.

Punishment will be found described in the articles in this work on Criminal Law, Imprisonment, Prisons (p. 420), Flogging, Execution, Pillory, &c. See also the description of Tortures, Boot, Guillotine, Thumb-screw, Branks, Jougs, Ducking-stool, Stocks, &c.; the articles on the several crimes; and W. Andrews, *Old-time Punishments* (1891). The question of future punishment is treated in the article HELL.

Punjab, or PANJAB (*pănj-ab*, 'five rivers;' the *Pentapotamia* of the Greeks), a separate province of India, occupying the north-west corner, is watered by the Indus and its five great affluents —the Jhelum, Chenab, Ravi, Beas, and Sutlej. It is bounded on the W. by Afghanistan, on the N. by Cashmere, on the E. by the Jumna and the North-western Provinces, and on the S. by Rajputana and Sind. The area under direct British administration is 106,632 sq. m.; that of the native states, thirty-four in number, under British control is 35,817 sq. m. Pop. (1881) 18,850,437 in British province and 3,861,683 in the dependent states; (1891) 20,803,000 in British territory and 4,256,670 in the feudatory states. The capital is Lahore, but both Delhi (formerly in North-western Provinces) and Amritsar (the religious capital of the Sikhs) are larger. The whole of the northern parts are traversed by spurs from the Himalayas, which enclose deep valleys. On the west the Sulaiman Mountains run parallel to the Indus. In the south the surface is not broken by any important eminence, except the Salt Range, varying from 2000 to 5000 feet high, between the Indus and the Jhelum. The country, divided into six doabs, or interfluvial tracts, and frequently spoken of as the plains of the Indus, has a general slope towards the south-west. The climate in the plains is most oppressively hot and dry in summer, reaching in May 87·4° to 116·6° F. in the shade at several stations; but is cool, and sometimes frosty, in winter. Little rain falls except in the districts along the base of the Himalayas. The soil varies from stiff clay and loam to sand; but, in general, is sandy and barren, intermixed with fertile spots. The rivers afford abundant means of irrigation.

The indigenous vegetation is meagre. Trees are few in number and small, and fuel is so scarce that cow-dung is much used in its stead. Wheat of excellent quality is produced in considerable quantities, and indigo, sugar, cotton, tobacco, opium, tea, rice, barley, millet, maize, and numerous vegetables and fruits are grown. The manufacturing industry—cottons, wood-work, iron, leather, gold and silver lace, silk, and shawls—is very considerable, and is carried on for the most part in the great towns, as Amritsar, Lahore, Multan, &c. Punjab exports indigo, grain, salt, metals, spices, tea, tobacco, manufactured cottons, hides, and leather to Kabul, Cashmere, Turkestan, and Tibet; and imports dyes, goats' wool, raw silk, fruits, ghee, horses, furs, timber, and shawl cloth. The total value of this trade reaches annually £2,299,900. The inhabitants are of various races, chiefly Sikhs, Jats, Rajputs, and Pathans. Of the whole population, nearly 56 per cent. are Mohammedans; Hindus constitute nearly 38 per cent.; and Sikhs 6 per cent. The Jats are the most prominent race, and are said to have formed the 'core and nucleus' of the Sikh nation and military force. For the history of the Punjab, see SIKHS.

Punkah, a gigantic fan for ventilating apartments, used in India and tropical climates. It consists of a light frame of wood, covered with calico, from which a short curtain depends, and is suspended by ropes from the ceiling; another rope from it passes over a pulley in the wall to a servant stationed without; the servant pulls the punkah backwards and forwards, maintaining a constant current of air in the chamber.

Puno. See PERU, pp. 79–80.

Punt, a heavy, oblong, flat-bottomed boat, useful where stability and not speed is needed. Punts are much used for fishing and wild-fowling. Some are fitted for oars; but the more usual mode of propulsion is by poles operating on the bottom.

Punta Arenas, (1) the chief port of Costa Rica on the Pacific, stands on a 'sandy point' jutting into the Gulf of Nicoya, and is connected by railway with Esparza, 14 miles east-north-east. The principal export is coffee, and after that india-rubber, hides, dye-woods, and tortoiseshell. Pop. 8000.—(2) A town in Patagonia (q.v.).

Pupa (Lat., 'a doll'), the stage which intervenes between the larva and the adult in the life of insects with complete metamorphosis. *Chrysalis, aurelia, nymph* are almost synonymous terms, but pupa is more general and is sometimes applied to stages in the metamorphosis of other animals besides Insects (q.v.).

Pupil. See INFANT, and EYE, Vol. IV. p. 507; for Pupil-teachers, see EDUCATION.

Puppet. See MARIONETTES.

Purána (Sansk., 'old') is the name of that class of religious works which, besides the Tantras (q.v.), is the main foundation of the actual popular creed of the Brahmanical Hindus (see INDIA, Vol. VI. p. 106). According to the popular belief, these works were compiled by Vyása, the supposed arranger of the Vedas (q.v.), and the author of the Mahábhárata (q.v.), and possess an antiquity far beyond the reach of historical computation. A critical investigation, however, of the contents of the *existing* works bearing that name must necessarily lead to the conclusion that in their present form they not only do not belong to a remote age, but can barely claim an antiquity of a thousand years, though they contain materials much more ancient. Cosmogonic and theogonic doctrines, epic stories, legendary lore, and miscellaneous and encyclopædic matter constitute their contents. They all recognise the Hindu trinity, but are of sectarian tendency; the claims of one god or one holy place being in the various books or parts of them insisted on as worthy of special, if not exclusive, reverence. The Puránas are usually said to be eighteen in number (with a subordinate Upa-purána to each); and these are subdivided into three groups of six. The first two are devoted to Vishnu and to Siva; the third, which should have fallen to Brahma, is mainly devoted to the several forms of Vishnu, Krishna, Devi, Ganesa, and Surya. They are written in epic couplets, and the eighteen chief Puránas are calculated to contain 400,000 couplets.

See VISHNU, SANSKRIT LITERATURE; Dr John Muir's *Sanscrit Texts* (1858–71); the Vishnu Purána trans. by H. H. Wilson (1840; 2d ed. by Fitzedward Hall, 1864–77); the Bhágavata Purána, edited, with a French translation, by Burnouf and Hauvette-Besnault (4 vols. Paris, 1840–84), and, with a Sanskrit commentary, by Shridhar Pandit (3 vols. Bombay, 1887); the Márkandeya and Agni Puránas, in the *Bibliotheca Indica*, by Banerjea and Rájendraláh Mitra.

Purbeck, ISLE OF, a peninsular district of Dorsetshire, 12 miles long and 5 to 9 broad, is bounded N. by the river Frome and Poole Harbour, E. and S. by the English Channel, and W. by the little stream of Luckford Lake, which runs from Lulworth Park to the Frome. The coast is bold and precipitous, with St Albans Head, 360 feet high; inland a range of chalk downs curves east and west, attaining a maximum height of 655 feet. The geology of the 'isle' is very interesting. The Purbeck Beds are a group of strata forming the upper members of the Jurassic System (q.v.); the Purbeck Marble, belonging to the upper section of these, is an impure fresh-water limestone, composed almost wholly of the shells of *Paludina carinifera* (see DIRT-BEDS). Nearly a hundred quarries are worked; and the quarrymen still form a curious kind of trades' guild. Of old the 'isle' was a royal deer-forest. Swanage and Corfe Castle are the chief places.

See Robinson's *A Royal Warren, or Rambles in the Isle of Purbeck* (1882), and J. Braye's *Swanage* (1890).

Purcell, HENRY, the most eminent of English musicians, was born at Westminster in 1658, and was son of Henry Purcell, one of the gentlemen of the Chapel Royal appointed at the Restoration. He lost his father at the age of six, and was indebted for his musical training to Cooke, Humfrey, and Dr Blow. His compositions at a very early age gave evidence of talent. In 1680 he was chosen to succeed Dr Christopher Gibbons as organist of Westminster Abbey; and in 1682 he was made organist of the Chapel Royal. He wrote numerous anthems and other compositions for the church, which were eagerly sought after for the use of the various cathedrals, and have retained their place to the present day. Purcell's dramatic and chamber compositions are even more remarkable. Among the former may be mentioned his opera *Dido and Æneas*, written at the age of seventeen, his music to the *Tempest*, his songs in Dryden's *King Arthur*, his music to Howard's and Dryden's *Indian Queen*, to D'Urfey's *Don Quixote*, &c. A great many of his cantatas, odes, glees, catches, and rounds are yet familiar to lovers of vocal music. In 1683 he composed twelve sonatas for two violins and a bass. Purcell studied the Italian masters deeply, and often made reference to his obligations to them. In originality and vigour, as well as richness of harmony and variety of expression, he far surpassed both his predecessors and his contemporaries. His style foreshadows that of Handel. His church music was collected and edited from the original MSS. by Vincent Novello, in a folio work which appeared in 1829–32, with a portrait and essay on his life and works. A complete edition of his works, many of which are still in MS., was undertaken by the Purcell Society, instituted in 1876. Purcell died of consumption in 1695, and was buried in Westminster Abbey.

Purchas, SAMUEL, was born at Thaxted in Essex in 1577, and educated at St John's College, Cambridge. He was presented by the king in 1604 to the vicarage of Eastwood, which he soon resigned to his brother, as the chosen labour of his life required residence in London. Later he became rector of St Martin's, Ludgate, and chaplain to Archbishop Abbot, and died in September 1626, if not in a debtor's cell, yet in difficulties. His great works were *Purchas his Pilgrimage, or Relations of the World and the Religions observed in all ages* (1613; 4th ed. much enlarged, 1626), and *Hakluyt's Posthumus, or Purchas his Pilgrimes: containing a History of the World, in Sea Voyages and Land Travels by Englishmen and others* (4 vols. folio, 1625). The fourth edition of the former usually accompanies the latter as if a fifth volume, although a quite distinct work. Purchas himself thus describes the two books: 'These brethren holding much resemblance in name, nature, and feature, yet differ in both the object and the subject. This [the *Pilgrimage*] being mine own in matter, though borrowed, and in form of words and method; whereas my Pilgrimes are the authors themselves, acting their own parts in their own words, only furnished by me with such necessaries as that stage further required, and ordered according to my rules.' Another work is *Purchas his Pilgrim: Microcosmus, or the History of Man; relating the wonders of his Generation, varieties in his Degeneration, and necessity of his Regeneration* (1619).

Purchase-system. See COMMISSIONS (ARMY).

Purfleet, a village of Essex, on the north bank of the Thames, 15 miles by rail E. by S. of London and 8 miles E. of Woolwich, contains government powder-magazines, built in 1781.

Purgation. See ORDEAL.

Purgatives. See APERIENTS, CONSTIPATION.

Purgatory (Lat. *purgatorium*, from *purgo*, 'I cleanse') is the name given to a place of purgation, in which, according to the Roman Catholic and Oriental churches, souls after death either are purified from venial sins (*peccata venalia*) or undergo the temporal punishment which, after the guilt of mortal sin (*peccata mortalia*) has been remitted, still remains to be endured by the sinner (see ATONEMENT). The ultimate eternal happiness of their souls is supposed to be secured; but they are detained for a time in a state of purgation, in order to be fitted to appear in that Presence into which nothing imperfect can enter. Catholics hold as articles of their faith (1) that there is a purgatory in the sense explained above, and (2) that the souls there detained derive relief from the prayers of the faithful and from the sacrifice of the mass. The scriptural grounds alleged by them in support of this view are 2 Macc. xii. 43-46, Matt. xii. 32, Luke, xii. 48, 1 Cor. iii. 11-15, 1 Cor. xv. 29; as well as certain less decisive indications contained in the language of some of the Psalms. And in all these passages they argue not alone from the words themselves, but from the interpretation of them by the Fathers. The direct testimonies cited by Catholic writers from the Fathers are very numerous, from the days of Clement and Origen down; amongst the Latins Augustine being one of the most important (though at times he speaks doubtfully); in Gregory the Great the doctrine is found in all the fullness of its modern detail. The epitaphs of the catacombs, too, supply Catholic controversialists with some testimonies to the belief of a purgatory, and of the value of the intercessory prayers of the living in obtaining not merely repose, but relief from suffering, for the deceased; and the liturgies of the various rites are still more decisive and circumstantial. Beyond these two points Catholic faith, as defined by the Council of Trent, does not go; and the council expressly prohibits the popular discussion of the 'more difficult and subtle questions, and everything that tends to curiosity, or superstition, or savours of filthy lucre.' As to the existence of purgatory Greek and Latin churches are agreed; and they are further agreed that it is a place of suffering; but, while the Latins commonly hold that this suffering is 'by fire,' the Greeks do not determine the manner of the suffering, but are content to regard it as 'through tribulation.' The decree of union in the Council of Florence (1439) left this point free for discussion. Equally free are the questions as to the situation of purgatory; as to the duration of the purgatorial suffering; as to the probable number of its inmates; as to whether they have, while there detained, *a certainty* of their ultimate salvation; and whether a 'particular judgment' takes place on each individual case immediately after death.

The mediæval doctrine and practice regarding purgatory were among the leading grounds of the protest of the Waldenses and other sects of that age. The Reformers as a body rejected the doctrine. Protestants generally reply to the arguments of Roman Catholics on the subject of purgatory by refusing to admit the authority of tradition or the testimonies of the Fathers, and at the same time by alleging that most of the passages quoted from the Fathers, as in favour of purgatory, are insufficient to prove that they held any such doctrine as that now held by the Roman Catholic Church, some of them properly relating only to the subject of prayer for the dead (see PRAYER), and others to the doctrine of Limbus (q.v.). That the doctrine of purgatory is the fair development of that which maintains that prayer ought to be made for the dead Protestants generally acknowledge. As to the alleged evidences from Scripture, they are commonly set aside by Protestants as irrelevant or wholly insufficient to support such an inference. The doctrine of purgatory in its historical connection with other eschatological doctrines is touched on in the article HELL.

Purging Nut. See PHYSIC NUT.

Purgstall. See HAMMER-PURGSTALL.

Puri. See JUGGERNAUT.

Purification of the Blessed Virgin Mary, FEAST OF, a festival in commemoration of the 'purification' of the Blessed Virgin Mary, in accordance with the ceremonial law of Lev. xii. 2. This ceremony was appointed for the fortieth day after childbirth, which, reckoning from December 25 (the nativity of our Lord), falls upon February 2, on which day the purification is celebrated. The history of Mary's compliance with the law is related in Luke, ii. 22-24. The date of the introduction of this festival is uncertain. The first trace of it is about the middle of the 5th century, and in the Church of Jerusalem. In the Western Church it was known to Bede. Its introduction in the Roman Church in 494 was made by Pope Gelasius the occasion of transferring to a Christian use the festivities which at that season were annexed to the pagan festival of the Lupercalia. See CHURCHING OF WOMEN.

Purim, a Jewish secular rather than religious feast, in honour of the deliverance of the nation, recorded in the Book of Esther, held on 14th to 15th Adar. Apparently it spread but slowly; still Josephus tells us that by his time it was observed over all the Jewish world. Most modern scholars consider it an adaptation of a similar Persian feast, *Furdigan* ('Pōrdiyān'), and Lagarde has shown that the two names are identical. See ESTHER.

Puritans, a name first given, according to Fuller, in 1564, and according to Strype in 1569, to those clergymen of the Church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by Archbishop Parker and his coadjutors. The history of Puritanism within the church is sketched at ENGLAND (CHURCH OF), Vol. IV. pp. 358–359. In spite of the sharpest repressive measures, the principles of the party amongst the clergy who believed that the church did not separate itself markedly enough from Roman Catholicism and needed further reformation gradually spread among the serious portion of the laity, who were also called Puritans. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, 'the vicious multitude of the ungodly called all Puritans that were strict and serious in a holy life were they ever so conformable.' This is the sense in which the Elizabethan dramatists use the word. From this very breadth of usage one sees that there were different degrees of Puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism; while a third party, the Brownists or Independents, were out-and-out dissenters, opposed alike to Presbyterianism and Episcopacy. During the reigns of James I. and Charles I. the spirit of Puritanism continued more and more to leaven English society and the English parliament, although the most violent efforts were made by both monarchs to extirpate it. Up till the time of the Synod of Dort (1618–19) both the Puritans and their opponents in the church had been substantially Calvinist; the strong tendency towards Arminianism amongst churchmen raised a new ground of controversy between the Puritans and the other sections of the church, both Laudian and Latitudinarian. The policy of Laud and the outrages practised by Charles on the English constitution led many who were not at all Genevan in their ideas to oppose both church and king for the sake of the national liberties. In the memorable 'Westminster Assembly of Divines' (1643) the great majority of the ministers were Presbyterians. But the more advanced Puritans, who were predominant in the army and the parliament, ultimately triumphed in the person of Cromwell (q.v.). The Restoration (1660) brought back Episcopacy, and the Act of Uniformity (1662) threw the Puritans of the church into the position of dissenters. Their subsequent history is treated under the different forms of dissent. Before the Civil War broke out so great were the hardships to which the Puritans were exposed that many of them emigrated to America, to seek liberty and peace on the solitary shores of the New World. There they became the founders of the New England states, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of Puritanism in its evil as well as its good more thoroughly express itself than in Massachusetts. In Scotland Puritanism dates rather from the 'Second Reformation' of 1638 than from the original establishment of Presbyterianism after the Reformation.

See Neal's *History of the Puritans* (ed. by Toulmin, 5 vols. 1822); the histories by Stowell (1849; new ed. 1878) and Marsden (1850); Bacon, *The Genesis of the New England Churches* (New York, 1874); Ellis, *Puritan Age in Massachusetts* (Boston, 1888); the works cited at S. R. GARDINER, with his *Constitutional Documents of Puritan Revolution* (1890); the articles in this work on INDEPENDENTS, BROWNE, PRESBYTERIANISM, WESTMINSTER ASSEMBLY, PRYNNE, MARPRELATE, HAMPTON COURT, SMECTYMNUUS; on ELIZABETH, JAMES I., CHARLES I., CROMWELL, MILTON; on LAUD, PARKER, GRINDAL, WHITGIFT; and on the Puritans HOWE, BAXTER, OWEN. In Nichol's edition of the Puritan divines (26 vols. 1861 *et seq.*) other names included are those of Manton, Adams, Goodwin, and Clarkson.

Purkinje's Figure, named after the physiologist J. E. Purkinje (1787–1869), professor at Breslau and at Prague; see EYE, Vol. IV. p. 512.

Purl, a beverage made by warming a pint of ale with a quarter of a pint of milk, and adding some sugar and a wine-glassful of gin, rum, or brandy.

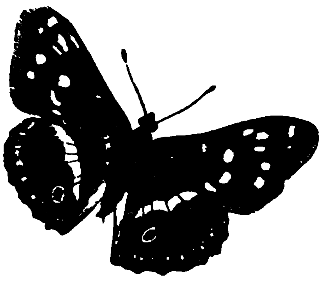
Purley. See TOOKE (HORNE).

Purniah, a town of British India in the presidency of Bengal, 230 miles NNW. of Calcutta, has a trade in jute. The native town is very unhealthy. Pop. 15,016.—The *district* has an area of 4956 sq. m. and a pop. of 1,848,687.

Purple Colours. Painters in oil and water colours produce various shades of purple by mixing certain red and blue pigments. For work in oil French ultramarine, often called French blue, is mixed with vermilion or some madder red (madder carmine is best), or one of these reds with cobalt blue if a pale purple is wanted. For permanent purples in water-colours the same blues are used; but one of the madder reds, not vermilion, should be mixed with them. A much richer purple than any of the above mixtures will give is produced by Prussian blue and one of the lakes from cochineal—viz. carmine or crimson lake—but it is not permanent. This purple, as well as that obtained by mixing Indian red with indigo, also fugitive, was much used by water-colour painters in past years. Purple madder is the only simple purple pigment available for the artist which is durable, and it is unfortunately costly. All purples are changed to neutral and gray tints by the addition of any yellow pigment. For house-painting moroon lake with a little French blue gives a useful purple; but some of the above mixtures also are occasionally used.

There are several ways of dyeing textile fabrics of a purple colour. The most famous of all ancient dyes was the Tyrian purple, which is said to have been discovered at Tyre many centuries before the Christian era. Among the Romans this colour was exclusively employed for dyeing the imperial robe. It was obtained from shellfish belonging to the genera Murex, Purpura, and Buccinum; at least it has been supposed that it was prepared from one or more species of each of these. The colour was so costly that in the time of Augustus one pound of it sold for what would amount to £36 sterling. About the year 1851 what is believed to be the same or a closely similar purple was obtained from uric acid by a peculiar treatment (see MUREX; DYEING, Vol. IV. p. 139; and PHŒNICIA). Archil (q.v.) seems to have been the only simple purple dye known in the middle ages. Purple of Cassius is a compound of gold and tin used in colouring Glass (q.v.), and in porcelain and enamel painting. It was discovered at Leyden by Andrew Cassius about 1683. A preparation of this colour was formerly used for painting miniatures in water-colour; but for this purpose purple madder, being cheaper, has taken its place.

Purple Emperor (*Apatura iris*), one of the largest of British butterflies, and one of the most richly coloured. The expanse of wings is from 2¼ to 3¼ inches. The wings are strong and thick, and the flight is very vigorous. The male flies especially high, and will perch on lofty trees. The caterpillar is green and feeds on sallow.



Purple Emperor.

Purples. See WHEAT.

Purple Wood, or PURPLE HEART, the heartwood of *Copaifera pubiflora* and *C. bracteata*, a very handsome wood of a rich plum colour. The trees producing it are natives of British Guiana, and its chief use in England has been for making ramrods for guns.

Pur'pura, a genus of marine Gasteropods, from some species of which (e.g. *P. patula*), as well as from Murex, the famous Tyrian purple dye was derived. *P. lapillus* (the Dog Whelk) is common on most British coasts, and from it also the dye is procurable. See WHELK.

Purpura, or THE PURPLES, is a malady which is often erroneously placed amongst the diseases of the skin. It is in reality a blood disease, and is characterised by the appearance of small round spots, of a deep purple colour, which are seen first and most abundantly on the legs, and afterwards extend to the arms and trunk. They are accompanied by no local pain, are not effaced by pressure (being due to a drop of blood extravasated beneath the cuticle or in the structure of the skin itself), do not rise above the surrounding surface, and are sometimes intermixed with livid patches resembling bruises; and, before disappearing, both the round spots and the patches undergo the same change of colour which a bruise undergoes. These spots are not peculiar to the skin, but occasionally occur upon internal surfaces and in the tissues of viscera. Passive hæmorrhages from the mucous membranes frequently accompany the external symptoms. There is usually much debility, and often a great tendency to faintness. The duration of the disease varies from a few days to a year or more. Slight cases are devoid of danger, and even the hæmorrhagic cases usually recover, unless the bleeding has been excessive or the blood has been extravasated into a vital organ.

Precisely similar appearances occur in the course of other diseases, especially scurvy, severe anæmia, scarlet fever, and smallpox. But the name purpura should be restricted to the cases in which no such disease is discoverable.

The causes of purpura are obscure. The treatment which succeeds best varies in different cases, but the main indication always is to correct the condition of the blood. Arsenic, turpentine, acetate of lead, gallic acid are the drugs which are generally most beneficial; rest in bed, light diet, and laxatives are desirable at the commencement. When there is reason to believe that the disease is dependent upon depressing influences a nutritious diet, tonics, and stimulants are required; but chalybeates should be avoided. If the hæmorrhage proceeds from accessible parts, local measures, such as the employment of ice or strong astringents, should also be had recourse to.

Purser, the name formerly given to the officer in the navy who had the charge and issue of the provisions, slops, soap, tobacco, &c., and who also kept the ship's books; the title was one of the oldest in the service, but the holders of it for long only ranked as warrant-officers, and their duties and responsibilities were in many respects very ill-defined. In the old war-days they were looked upon with great dislike by the seamen, as they were credited with enriching themselves at the expense of the men, and unquestionably the opportunities for sharp practice in their duties were considerable, as also for making money by methods which were not always legitimate; much of this, however, was due to the laxity of the system of victualling and of keeping the ship's accounts in those days. In 1844 this branch of the service was completely reorganised, paymaster being substituted for the title purser; and the officers composing it are now drawn from a much higher class than formerly, coming generally from the same station in life as the combatant officers. See PAYMASTERS.

Purslane (*Portulaca*), a genus of plants of the natural order Portulaceæ, having a bifid calyx, four or six petals, eight or sixteen stamens, and a capsule dividing around the middle. Common Purslane (*P. oleracea*) grows in cultivated and waste grounds on the seashore in almost all tropical and subtropical parts of the world. It is cultivated as a pot-herb. It is a short-lived annual, with spreading and rather procumbent stems, and obovate fleshy leaves, which, as well as the young shoots, are frequently used in salads. The young and tender shoots are pickled in France like gherkins. Purslane is not so common in British gardens as it once was. Some species of Portulaca, such as *P. grandiflora*, of which there are several brilliant varieties, and *P. gilliesii*, are choice half-hardy annuals occasionally cultivated in British gardens. They are reared in hotbeds in spring and planted out in the flower-garden in the end of May, or they are grown in pots exclusively for the purpose of decorating the greenhouse.

Pursuivant. See HERALD.

Pus is a well-known product of inflammation, and occurs as a thick yellow creamy fluid, differing from all other morbid exudations in containing a large number of corpuscles, having a soft and fatty feeling when rubbed between the fingers, a peculiar odour, usually an alkaline reaction, and a specific gravity of about 1·032. Like the blood, it consists of certain definite microscopic elements, and of an intercellular fluid or serum in which they swim.

Of microscopic elements we have (1) the pus-corpuscles, which, both in their microscopical and chemical relations, seem to be identical with the lymph-corpuscles, or colourless blood-cells; in diameter they range from ·004 to ·005 of a line, and each corpuscle consists of a cell-wall, which often appears granular, of viscid transparent contents, and of one or more nuclei, which can be rendered much more apparent by the addition of acetic acid. The other elements are (2) molecular granules and (3) fat-globules. The serum of pus is perfectly clear, of a slightly yellow colour, closely resembling blood-serum, and coagulates on heating into a thick white mass.

The chemical constituents of pus are water (varying from 769 to 907 in 1000 parts), albumen (from 44 to 180), fats (from 9 to 25), extractive matter (from 19 to 29), and inorganic salts (from 6 to 13), in addition to which mucin, pyin, glycin, urea, &c. are occasionally present. Of the inorganic or mineral constituents the soluble salts are to the insoluble in the ratio of 8 to 1, and the chloride of sodium (the chief of the soluble salts) is three times as abundant as in the serum of the blood. The mode of formation of pus is described in the article SUPPURATION.

Pusey, EDWARD BOUVERIE, was born in the year 1800 at Pusey in Berkshire. He was descended from a family of Flemish refugees; his father was the youngest son of the first Viscount Folkestone, and had assumed the name of Pusey when the estates in Berkshire were bequeathed to him by the last representatives of the Pusey family. He was educated at Eton and Christ Church, Oxford, and was elected a Fellow of Oriel College in 1823. As soon as he had completed his studies at Oxford he passed to Germany, partly to study German, which was in the Oxford of those days practically an unknown tongue, partly to study oriental languages, and partly to become acquainted with the latest forms of German theological teaching. In 1827 he returned to England, and in the following year the Duke of Wellington appointed him regius professor of Hebrew at Oxford, a position which he retained until his death. Although his fame in other respects has caused his Hebrew lecturing to be forgotten, he laboured most unweariedly in the duties of his chair, and attracted a great number of pupils. His first work was an essay in which he sketched the causes that contributed to the Rationalistic character of recent German theology. He acknowledges his indebtedness to Professor Tholuck for some portions of this essay, but the elaborate proof of his position was his own work executed with characteristic thoroughness. It was severely commented on as leaning very decidedly in the direction of the Rationalistic teaching with which it dealt: the charge was greatly exaggerated, besides being caused in part by vagueness of expression throughout the volume. His main position was unassailable: German Rationalism he maintained was the consequence of the spiritual deadness of the orthodox Lutheranism of the day. He was misunderstood as if he had attacked the creed of the Lutherans in its orthodox portions: as a matter of fact he only wished to attribute Rationalism to the want of life in the Lutheran body. But many of his statements were in later years very unsatisfactory to himself, and he withdrew the work from circulation. The whole aim of his life was to prevent the spread in England of Rationalism such as that with which he had become familiar in Germany. Hence, when in 1833 John Henry Newman with the same object began the issue of the *Tracts for the Times*, Pusey very soon joined him; and they, with Keble, were the leaders of this eventful effort. Their object was not to attack the statements of Rationalistic teachers; there was as yet no call for that in England; but they desired to stir up in the Church of England a spiritual vitality and power which would be of itself the best preservative against the infection of the Rationalistic spirit. For this purpose they attempted not to reform, but to restore; they appealed to the idea of the church, to its divine institution, to its services, to its sacraments, to its formulas of faith, to its history, and to the examples of the holiest lives in former generations. They endeavoured to make the church live again before the eyes and minds of men as it had lived in times past. In this connection Pusey wrote his contributions to the *Tracts for the Times*, especially those on Baptism and the Holy Eucharist. His sermons also were vigorous appeals to live the Christian life, and careful expositions of the doctrines which the church from the first had taught. With a similar purpose also in 1836 he commenced the translation of the writings of the ancient fathers of the Christian church under the title of the *Oxford Library of the Fathers*. Dr Pusey's chief contributions to it were a translation of St Augustine's Confessions and of several of the works of Tertullian. The result of these efforts—to which, with the exception of his professorial duties, Dr Pusey entirely devoted himself—was most conspicuous, and extended far beyond the ranks of those who were called by their opponents either Newmanites or Puseyites. But the work was checked by the action of the authorities at Oxford. First Newman's celebrated Tract 90 was condemned in 1841, and in 1843 Pusey was suspended for three years from his office of preaching in Oxford. The occasion of this suspension was a sermon on the Holy Eucharist which he preached before the University, and which a board of six doctors of divinity, without allowing Pusey a hearing, or specifying the points on which he was supposed to be in the wrong, pronounced to be contrary to the teaching of the Church of England. As soon as an opportunity offered Pusey reiterated his teaching, and this time he was unmolested. But before his suspension was over Newman had joined the Roman Catholic communion, and with him went several of his leading disciples. All rumours pointed to the certainty of Pusey soon following; but those who knew him best were assured that never for one moment did he entertain any thought of leaving the Church of England. With Keble he at once set himself to reassure those who were reeling under the blow of Newman's departure; and it was mainly the moral weight of Pusey's work and character which prevented the powerful efforts of Newman between 1833 and 1841 from resulting in a catastrophe greater than any which the English Church has ever experienced. Pusey's unfailing loyalty to the church and deep conviction of God's presence with it, his buoyant hopefulness even in the darkest days, and his great patience cheered and settled many anxious hearts, and stopped others who were on the point of following Newman. His attitude would have had a yet wider result, except for the sad events which followed in rapid succession in the ten years subsequent to Newman's secession. The new power which a civil court had acquired over doctrinal suits—which was exhibited in the judgment in the Gorham case—the constant attacks of bishops and others upon the Oxford movement, the practical inhibition of Pusey from all ministerial work in the diocese of Oxford by Bishop Wilberforce, whereby it was made to appear that the church disowned his teaching—these and other less important but significant events caused the departure to the Roman Church of another band of distinguished men, including Archdeacon (Cardinal) Manning and Archdeacon Wilberforce. But still Pusey laboured on, carefully defining the exact position of the English Church, as against Roman claims on the one hand and against Zwinglianism and Erastianism on the other.

Only the chief of his numerous writings during this period can be alluded to. They included a lengthy letter on the practice of confession, *The Church of England leaves her children free to whom to open their griefs* (1850), a treatise the form of which makes it appear to belong to a moment of controversy, although the matter is really of permanent value; a general defence of his own position in *A Letter to the Bishop of London* in 1851; a work on *The Royal Supremacy not an arbitrary authority, but limited by the laws of the Church of which Kings are members*, in 1850; a larger book on *The Doctrine of the Real Presence*, as contained in the Fathers (1855), and as taught in the Church of England (1857). In this class of writings may be included also Dr Pusey's *Eirenicon* (part i. in 1865, ii. in 1869, iii. in 1870). The object of these volumes was to clear the way for reunion between the Church of England and the Church of Rome on the basis of Catholic, as distinct from Roman Catholic, doctrine and practice.

The reform of Oxford University, which was undertaken after the report of the first Royal Commission on the Universities, and which destroyed for ever the integrity of the originally most intimate bond between the University and the Church, greatly occupied Pusey's mind. His evidence before the commission, his remarkable pamphlet on the comparative advantages of *Collegiate and Professorial Teaching and Discipline*, and his assiduous work on the Hebdomadal Council for many years are proofs of the interest that he took in the welfare of his university, and of the importance that he attached to a close connection between education and religion.

From 1860 onwards the tide had turned. The teaching for which the Tractarians had laboured and suffered was at that time beginning to be recognised, and those disciples of the Oxford movement who had survived the shock of the events of the last twenty years were spreading its principles throughout the country. But the fruits of the intolerance and persecution of which Oxford had been the scene were also ripening in the form of the spread of religious indifference, based on Rationalistic views of revelation. This was the enemy which from the first Pusey had dreaded. He had at least the satisfaction of knowing that, as a result of the movement in which he had taken so prominent a part, the inner life of the English Church was far better able to bear the onset of such a foe, and to estimate the moral and spiritual ravages which it would make, than was the Lutheran body of the 18th century, or even the Church of England in 1830. Against such teaching he contended for the rest of his life. All his later sermons before the university and most of his later books deal with it. It was with this purpose that he prosecuted Professor Jowett for his statements in his commentary on St Paul's Epistles, and that he took so prominent a part in the later controversy about the Athanasian Creed. His chief works in this connection are the *Lectures on the Book of Daniel*, and *What is of Faith as to Everlasting Punishment?* The former, delivered in 1863, vigorously attack those writers who would assign to the Book of Daniel a date as late as the 2d century B.C. Apart from the marks which the lectures bear of the heated controversy of the time when they were delivered, they are a monument of the author's intellectual power, wide reading, and solid learning. The other book is against the denial of everlasting punishment: its sobriety and fullness, the familiarity which it shows with all the issues raised in the controversy, its deep religious feeling, its calm and calming tone make it one of the most remarkable of Pusey's works. Of a kindred character, although in a different field, are the last two university sermons which he wrote—on the relation of science to faith and on the nature of prophecy.

Two other works must be noticed. Pusey inherited from his predecessor in the Hebrew chair the task of completing *A Catalogue of the Arabic Manuscripts in the Bodleian Library* (1835). It was a most toilsome duty, and occupied his time for six years. Pusey's *Commentary on the Minor Prophets* (1860–77) was his contribution to a commentary on the whole Bible which he had in his mind for many years, and on which he enlisted the labours of Keble and many others. Pusey alone completed his task; death, advancing years, or the claims of other duties prevented the others from contributing their share.

In private life Pusey was a man of warm affection, and widely known for his gentleness, sincerity, and humility. He rarely went into society in early life; at first he withdrew from it for purposes of study and to save more money to give to the poor, but from the time of his wife's death in 1839 he avoided all social amusements. But he was always accessible to any one who wished his advice on religious questions; in fact, he was constantly sought as a spiritual guide by persons of every station. His charity was bounded only by his income; besides abundant gifts to poor people, he spent large sums of money in helping to provide churches in East London, in building St Saviour's, Leeds, and in founding and supporting sisterhoods. His capacity for study and for literary work was immense. He worked only at what it was his duty to study, but within that line he spared neither time nor pains in thoroughly mastering every detail. His power of keeping his main object before his mind without being confused by its details, and of grouping the details in their due position, can be seen in almost any of his works. Opponents of all schools gave him the credit of being confused; but an occasional confusion in his manner of expressing his thoughts did not prevent him from knowing his own mind with singular clearness. He died on 16th September 1882.

The Life of Pusey by Canon Liddon, left unfinished at his death in 1890, was subsequently completed by the Canon's literary executors.

Pushkin, ALEXANDER SERGEIEVICH, a celebrated Russian poet, was born at Moscow, 26th May 1799, and educated at the imperial lyceum of Tsarskoe Selo. In 1817 he entered the service of the government, but on account of his liberal opinions was for some time banished to Bessarabia. In 1820 he published a romantic poem, *Ruslan and Liudmila*. Next came his *Prisoner of the Caucasus* (1822), his *Fountain of Bakhchiserai* (1826), *Tzigani* ('The Gypsies,' 1827), and *Eugene Onegin* (1828; Eng. trans. 1881), a clever novel in verse somewhat after the style of Byron's *Beppo*. In 1829 he published *Poltava*, which has Mazeppa for its hero. About the same time he wrote his fine tragedy *Boris Godunov*. Besides these works of considerable length, he was the author of many graceful lyrical poems, deservedly popular throughout Russia. He also left some prose writings, consisting of a *History of the Revolt of Pugachev* (in the reign of Catharine), several tales, and miscellaneous essays. He was appointed Russian historiographer with a pension of 6000 roubles. He was mortally wounded in a duel, and expired at St Petersburg, January 29 (February 10) 1837. Pushkin is considered the greatest poet whom Russia has yet produced. His writings show versatility, a powerful imagination with vigour of expression. In his *Eugene Onegin*, a Don-Juanesque poem, he is both humorous and pathetic, and many of his smaller pieces display wonderful elegance and finish.

The last-named poem was translated into English verse by Spalding (1881); the *Daughter of the Commandant* was translated in 1891; and a translation of the *Poems*, with introduction and notes by Ivan Panin, appeared at New York in 1889. Pushkin's name is also spelt Poushkin and Pouchekin. See the section on the literature under RUSSIA, and works there cited.

Pushtu, or PUKHTU, the language of the Afghans proper (see AFGHANISTAN), is, according to Darmesteter, not intermediate between the Iranic and Indic branches of the Aryan stock, but is directly derived from the Zend, with Persian, Hindustani, and Arabic admixture. See Trumpp's *Pashtô Grammar* (1873), Strangford's *Letters and Papers* (1878), and Darmesteter's *Chants Populaires des Afghans* (1890).

Pustule, a circumscribed elevation of the cuticle, containing pus: in fact, a small abscess in the skin. Pustules occur in many skin diseases—eczema, acne, scabies, ecthyma, boils, &c.; also very prominently in smallpox. For Malignant Pustule, see ANTHRAX.

Puteaux, a town 2 miles from the western boundary of Paris, on the left bank of the Seine, opposite to the Bois de Boulogne. Many Parisians have fine villas here. There are manufactures of dyestuffs and chemicals, dyeing, and calico-printing. Pop. 15,106.

Pute'oli. See POZZUOLI.

Putnam, a town of Connecticut, on the Quinnebang River, 56 miles by rail ENE. of Hartford, with a number of cotton-factories and woollen-mills. Pop. (1880) 5827; (1890) 6512.

Putnam, ISRAEL, a general of the American Revolution, was born in what is now Danvers, Massachusetts, 7th January 1718. In 1739 he bought a farm between Pomfret and Brooklyn, Connecticut, and for many years devoted himself to its cultivation, gaining meanwhile a high reputation for courage by such personal exploits as following a she-wolf into her lair and killing her single-handed. In 1755 he left as a captain in a contingent of 1000 men which Connecticut sent to repel a threatened French invasion of New York, and was present at the battle of Lake George. In 1758 he was captured by the savages, tortured, and then bound to a tree, and was about to be burned to death when a French officer scattered the fire-brands and rescued him. In 1759 he received a regiment, in 1762 he went on the dreadful West India campaign which resulted in the capture of Havanna, and in 1764 he helped to relieve Detroit, then besieged by Pontiac (q.v.). Ten years of quiet at home succeeded, during which he made his farmhouse into an inn, and was conspicuous among the 'Sons of Liberty.' In 1775, after Concord, he was given the command of the forces of Connecticut, and was ranking officer on the day of Bunker Hill, though not in actual command at either the redoubt or the rail-fence. He was next appointed by congress one of the four major-generals, and held the command at New York and in August 1776 at Brooklyn Heights, where he was defeated by General Howe on the 27th. He afterwards held various commands, and in 1777 was appointed to the defence of the Highlands of the Hudson. While at Peekskill a lieutenant in a loyalist regiment was captured as a spy and condemned to death; and, on Sir Henry Clinton's sending a flag of truce threatening vengeance if the sentence should be carried out, Putnam wrote a brief and characteristic reply: 'Headquarters, 7th August 1777.—Edmund Palmer, an officer in the enemy's service, was taken as a spy lurking within our lines; he has been tried as a spy, condemned as a spy, and shall be executed as a spy, and the flag is ordered to depart immediately.—Israel Putnam.—P.S.—He has accordingly been executed.' In 1778, in western Connecticut, Putnam made his famous escape from Governor Tryon's dragoons by riding down the stone steps at Horseneck. The next year he had a stroke of paralysis, and the rest of his life was spent at home. He died 19th May 1790. See Life by Increase N. Tarbox (1876), and article by Professor John Fiske in Appleton's *Cyclopædia of Amer. Biog.* (1888).

His cousin, RUFUS PUTNAM, born 9th April 1738, served against the French from 1757 to 1760, and then settled as a farmer and millwright. On the outbreak of the war he received a lieutenant-colonel's commission, and rendered good service as an engineer. In 1778 he helped his cousin to fortify West Point. Afterwards he commanded a regiment till the end of the war, and in 1783 he was promoted to brigadier-general. In 1788 he founded Marietta, Ohio; in 1789 he was appointed a judge of the supreme court of the North-west Territory; and from 1793 to 1803 he was surveyor-general of the United States. He died in Marietta, 1st May 1824.—Israel's grand-nephew, GEORGE PALMER PUTNAM, born in Brunswick, Maine, 7th February 1814, in 1840 became partner in the book-firm of Wiley & Putnam, New York, established a branch in London in 1841, and in 1848 returned to the United States and started business alone. In 1852 he founded *Putnam's Magazine*. In 1863 he retired from business, but in 1866 he established the firm of G. P. Putnam & Sons (now G. P. Putnam's Sons). He died 20th December 1872. He wrote and compiled several books, and was the author of the first *Plea for International Copyright* (1837) printed in America.

Putney, a suburb of London, in Surrey, 6 miles WSW. of Waterloo, on the south side of the tidal Thames, which, here nearly 300 yards broad, is crossed by a new granite bridge (1884–86), leading to Fulham, and founded and opened by the Prince of Wales. It is a great rowing place, the starting-point of the Oxford and Cambridge boat-race; and from its ready access to Town, the river, Putney Heath, and Wimbledon Common, has grown rapidly of recent years, its principal feature that there are no poor. The parish church, with a 15th-century tower and the chantry of Bishop West of Ely, was mainly rebuilt in 1836; in the churchyard is Toland's grave. Putney is the birthplace of Thomas Cromwell and Gibbon, the residence of Mr Theodore Watts and Mr Swinburne, and the deathplace of Pitt and Leigh Hunt. From Putney's old bridge Mary Wollstonecraft tried to drown herself; and on Putney Heath Pitt fought his duel with Tierney (1798), Castlereagh his with Canning (1809). Pop. (1851) 5280; (1881) 13,235; (1891) 17,771.

Putrefaction is the term given to the decomposition of organic substances when accompanied by an offensive smell. It was long supposed to be ordinary chemical change due to the complexity, resulting instability, and affinity for oxygen of organic matter. It is now known to be the result of the living activity of certain minute plants called Bacteria (q.v.), which also cause Fermentation (q.v.) and many diseases (see GERM). The spores of these plants are present in great numbers in the lower levels of the air, in water, and on the surface of the earth; and, as they are only about ·001 mm. in diameter and two to four times as long, it is not surprising that they were not seen, and that putrefaction was supposed to be spontaneous. But, if we boil an infusion of organic stuff and so kill the bacteria in it, and, while the steam is coming freely off, close it up with a plug of cotton wool, which, while allowing free access to air, prevents any germs or spores from reaching the fluid, it will remain without any change for years, but will begin to putrefy in a day or two if the plug be removed. A low temperature, although it will not kill the bacteria, will stop their growth and the resulting destructive changes; hence the use of freezing food on shipboard. Salicylic, carbolic, and other acids also check growth, but there seem to be only a few poisons, such as corrosive sublimate, chlorine, and bromine, that actually kill. Drying stops growth and kills the developed plant in a few days, but the spores will live for a long time in a dried condition. The effect of oxygen is various: some species require it, while others are hindered in their growth by it; and a high pressure of oxygen will kill even those kinds that need a certain amount in a few days. Of the precise chemical changes that take place as a result of the life of bacteria we are still largely ignorant; the chief final results of these changes are described under FERMENTATION. For an investigation in the causes of putrefaction, see Tyndall's *Floating Matter of the Air* (1881).

Putrid Fever. See JAIL FEVER.

Putty, a composition of *whiting* and *drying* oil worked into a thick paste, used by painters and glaziers, which in time becomes very hard.

Putty-powder is the binoxide or dioxide of tin, SnO_2. It is prepared from the scum or crude oxide which forms on the surface of melted tin, which is removed and purified by calcination, and then ground to powder. Putty-powder is used for polishing stone, glass, and other substances; also for making white enamel and for giving to glass an opaque white colour.

Putumayo, or IÇA, a tributary of the Amazon, rises in Colombia on the eastern side of the Andes, and flows south-east for 950 miles, joining the Amazon in the west of Brazil. It is the principal navigable stream between Brazil and Colombia.

Puy, LE, or LE PUY-EN-VELAY, a town of France (dept. Haute-Loire), 70 miles SW. of Lyons by rail, consists of the new town in a valley and the old town, this latter one of the most picturesque in France. Puy (Berry, *pui* or *peu*, 'a hill;' Ital. *poggio;* Lat. *podium;* Gr. *podion*) is the name commonly given in the highlands of Auvergne and the Cevennes to the truncated conical peaks of extinct volcanoes. The town of Le Puy stands on the steep slopes of Mount Anis (2050 feet), from the summit of which starts up precipitously the basaltic mass called Mont Corneille, crowned by a colossal figure (53 feet) of the Virgin, made of Russian cannon brought from Sebastopol. The most notable building is the Romanesque cathedral (6th–12th century), with a venerated image of the Virgin and ancient cloisters; it is situated in the highest part of the town. There are other ancient and interesting churches and a museum. Lace and thread work are manufactured. Pop. (1872) 18,961; (1886) 18,912; (1891) 20,308.

Puya, the largest of the Bromeliaceæ (q.v.), found in Chili as far south as 40° S. It equals the Agave (which in its characters it somewhat resembles) in height, and greatly surpasses it in the thickness of its half-woody stem. When the plant is mature it thrusts, forth from its crown of spiny leaves a huge panicle of yellow flowers, which may be from 6 to 9 feet in height. The plant has been grown under cover in England, and will thrive in the open air in the Mediterranean regions of Europe.

Puy-de-Dôme, a central department of France, containing an area of 3070 sq. m. and a pop. (1891) of 564,266. The western side of the department is an elevated volcanic region, studded with numerous extinct cones, and greatly broken by corries, erosion valleys, crater lakes, &c. (see FRANCE). The highest cones are Puy-de-Sancy (6188 feet) and Puy-de-Dôme (4806); on the east side the Forez Mountains (5380) march with the frontier. The principal rivers are the Allier, a tributary of the Loire, and the Dordogne. The soil is, in general, thin and poor; but its volcanic character fosters vegetation, especially in the valley of Limagne. Agriculture and cattle-breeding are the chief occupations. The climate is uncertain, and severe in the mountains. The principal minerals are coal and lead. Hot and cold mineral springs are abundant, among the most frequented being those of Mont Dore (q.v.), Châteauneuf, St Nectaire, Royat, Châteldon, &c. The department is subdivided into the arrondissements of Ambert, Clermont-Ferrand, Issoire, Riom, and Thiers. Capital, Clermont-Ferrand.

Puzzle-monkey. See ARAUCARIA.

Puzzola'na. See CEMENTS.

Pwllheli, a brisk little seaport and popular watering-place, 22 miles by rail S. by W. of Carnarvon in Wales, with lobster and oyster fisheries. It is a municipal borough, uniting with Carnarvon, &c. to return one member. Pop. of parish, 3232.

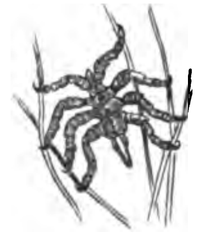
Pyæmia (from the Gr. *pyon*, 'pus,' and *haima*, 'blood'), or purulent infection of the blood, is a disease whose exciting cause is the introduction of decomposing pus or wound discharges, or the products of decomposition of animal fluids, into the circulation, through an ulcer or a wound, or an imperfectly closed vein (see PHLEBITIS and PUERPERAL FEVER). The term *Septicæmia* is applied by some to the same disease, by others only to very grave cases of pyæmia; while by many it is restricted to cases of blood-poisoning by putrid animal matters in general, such as those obtained from decomposing hides or dead bodies, or borne on foul air or septic gases. The two conditions have a general resemblance to each other. The poison is rapidly absorbed and diffused, and the blood undergoes certain changes, the nature of which chemistry has as yet failed to detect; it is certain, however, that the blood contains micro-organisms (micrococci and bacteria; see GERM). Within twenty-four hours, in very acute cases, there are severe shiverings, headache, and giddiness followed by heat, perspiration, and accelerated circulation. In twenty-four hours more the patient may be in a hopeless condition, delirious, and rapidly sinking. In less acute cases the symptoms closely resemble those of typhoid fever, and in this form the disease is a common cause of death after surgical operations; such cases are invariably characterised by the formation of secondary abscesses in the lungs, liver, kidneys, and other internal organs, in the various glands (the parotid gland in President Garfield's case), in the joints, and in the tissues immediately under the skin. The pus of such abscesses always contains bacteria. There is usually more or less delirium. The patient generally dies of exhaustion. Recovery is rare. It is chiefly, however, in the presence of *predisposing causes*, such as previous illness, prostration from organic disease or surgical complaints, or from difficult parturition, unhealthy occupations, &c., that the poison acts so severely; these, with the occurrence of putrefaction in a wound, may convert a comparatively slight local mischief into infection of the whole mass of the blood.

Bearing in mind the manner in which pyæmia originates, it is clear that this disease is one to be prevented rather than cured. Until comparatively recently, when it was acknowledged that pyæmia was the cause of death in 10 per cent. of *all* cases of amputation, and of 43 per cent. of *all fatal* primary amputations, the careful preparation of a patient before operation was, with justice, most strenuously insisted on. 'Patients must be strengthened,' said Mr Callender, 'by tonics, such as quinine and iron; and their secretions must be set right by appropriate alteratives; this treatment must be continued for a considerable period.' Diet should be attended to, and intemperate patients 'should be accustomed to a more healthy mode of life.' After operation, also, patients should be adequately supported with nutritious diet, and with stimulants and opium if necessary. No judicious surgeon will ever neglect such measures. But the really essential matter in the prevention of pyæmia is the prevention of putrefaction in the wound discharges. This has been clearly proved by the brilliant results achieved by Sir Joseph Lister and other surgeons at home and abroad, who have adopted the antiseptic method of treating wounds (see ANTISEPTIC SURGERY). For several years Lister's wards in Glasgow Royal Infirmary, formerly ravaged by pyæmia, remained free of the disease after the adoption of the antiseptic system; after two years' practice of this treatment purulent infection disappeared from the wards of the hospital at Lyons, where it formerly had a permanent home; and similar testimony might be quoted from every quarter and to any extent. The use of antiseptics, adopted early and followed out intelligently, may be said to have abolished the risk of purulent infection in wounds from operation or injury.

Even when the disease has shown itself, the use of antiseptics (perchloride and other salts of mercury, carbolic acid, boracic acid, boroglyceride, iodoform, thymol, eucalyptol, &c.) should be resorted to locally. The bowels, skin, and kidneys may be acted on by suitable purgatives, diaphoretics, and diuretics, with a view to the elimination of the poison; but the patient must be carefully watched for signs of depression, which must be combated with opium and stimulants, both of which should be given in small and frequently repeated doses. Quinine in moderately large doses is very serviceable throughout the whole course of such a case; larger doses may occasionally be given to reduce excessively high temperatures, though antipyretics in general must be used with extreme caution. Various antiseptic drugs have been recommended for internal use, such as salicylic acid and the salicylates, the hyposulphite of sodium, and the hyposulphites generally. This treatment, combined with the most assiduous nursing and generous dieting, and the appropriate surgical management of such secondary abscesses as form, will sometimes prove successful.

Pyat, Felix, a French journalist and communist, born at Vierzon (dept. Cher), on 4th October 1810, studied law and in 1831 was admitted to the bar, but chiefly wrote articles, feuilletons, and plays, often with strong political allusions. He signed Ledru-Rollin's appeal to the masses to arm in 1849, and, the attempt having failed, escaped to Switzerland. After that he found refuge in Belgium and England, and was a member of the 'European revolutionary committee.' Returning to France on amnesty in 1870, he made himself a leader of the Paris communists and took a foremost part in the destruction of the Vendome Column; on the fall of the Commune he escaped to London. He was tried and condemned to death, in absence, in 1873, for his share in the misdeeds of the Communal Government, but was pardoned in 1880. Marseilles chose him one of her deputies in 1888. He died 5th August 1889 at St Gratien.

Pycnogonidæ, a very remarkable group of Arthropod animals, perhaps intermediate between Crustaceans and Arachnids. The body consists of a fused cephalothoracic region, three free thoracic segments, and a rudimentary abdomen. The head usually bears a tubular proboscis, a pair of mandibles, a pair of slender palps, and a pair of egg-carrying legs; but mandibles and palps may be absent, and the egg-carrying legs are sometimes restricted to the males. Besides these there are four pairs of clawed limbs, into which prolongations of the gut extend. There is a dorsal heart; respiration is effected through the skin. The males usually carry the eggs. There is a metamorphosis in development. The pycnogonidæ are sometimes called 'sea-spiders' and also Pantopoda. They are all marine, and some of them live among algæ, or are to be found under stones on the beach, whilst others are dredged from deep water. They seem to feed by sucking other animals. See Hoek, *Challenger* Report (iii. 1880); and Dohrn, *Fauna d. Golfes v. Neapel* (iv. 1881).



Pycnogonum littorale.

Pye, Henry James, poet-laureate, was born in London, 10th July 1745, and educated at Magdalen College, Oxford, in 1772 being made a D.C.L. He held a commission in the Berkshire militia, in 1784 was elected member for that county, in 1790 succeeded Warton as laureate, and in 1792 was appointed a London police magistrate. He died at Pinner, near Harrow, 13th August 1813. The works of 'poetical Pye,' who, as Byron remarked, was 'eminently respectable in everything but his poetry,' are nearly twenty in number, and include *Alfred: an Epic* (1801), with numerous birthday and new-year odes.

Pygmalion, in Greek Mythology, grandson of Agenor, king of Cyprus, fell in love with an ivory statue of a young maiden he himself had made, and prayed to Aphrodite to give it life. His prayer was granted, on which he married the maiden, who bore him Paphus.

Pygmies. See Dwarf; Quatrefages, *Les Pygmées* (1887); and for a description of the two types of pygmies (one handsome and prepossessing, the other degraded and repulsive) whom Stanley saw in the Central African forest in 1887–89, see his *In Darkest Africa* (1890).

Pylades. See Orestes.

Pym, John, was born of a good old Somersetshire stock at Brymore, near Bridgwater, in 1584. He entered Broadgates Hall (now Pembroke College), Oxford, in 1599, as a gentleman-commoner, but left in 1602 without taking a degree, and then probably studied law at one of the Inns of Court. He married in 1614, but in 1620 was left a widower with five young children, and next year was first returned to parliament by Calne. This seat he exchanged in 1625 for Tavistock. He at once attached himself to the Country party, and proceeded to war against monopolies, papistry, the Spanish match, and absolutism with a vigour that brought him three months' durance. He was one of the members who presented a petition to James I. at Newmarket, when 'Chairs!' cried the king, 'chairs! here be twal kynges comin'!' and in 1626, the year after the accession of Charles I., he took a prominent part in the impeachment of the Duke of Buckingham. In the parliament of 1628 he stood second only to Sir John Eliot, whom he ably supported in the debate on the Petition of Right, but whom he opposed in the matter of tonnage and poundage, deeming the privileges of parliament inferior to the liberties of the kingdom. In the Short Parliament (1640), when, in Clarendon's words, 'men gazed on each other, looking who should begin, much the greater part having never sat before,' Pym on 17th April 'brake the ice by a two hours' discourse, in which he summed up shortly and sharply all that most reflected upon the prudence and justice of the government, that they might see how much work they had to do to satisfy their country.' And lastly, in the Long Parliament, having meanwhile joined hands with the Scots, and ridden with Hampden through England, urging the voters to their duty, Pym on 11th November named Strafford, twelve years earlier his friend and ally, as the 'principal author and promoter of all those counsels which had exposed the kingdom to so much ruin.' In the impeachment of Strafford which followed, resulting in his execution under a bill of attainder, Pym took the leading part; and Pym's is the chief credit of this masterstroke of policy, which deprived the king of the one man of resolute temper and powerful genius who supported his cause. In the proceedings against Laud Pym was also conspicuous, as in the carrying of the Grand Remonstrance and in every other crisis of moment up to the time when war became inevitable; he was the one of the 'Five

Members' whom Charles singled out by name. On the breaking out of hostilities he remained at his post in London, and there, in the exercise of the functions of the executive, rendered services to the cause not less valuable and essential than those of a general in the field. While the strife was yet pending he died, through the breaking of an internal abscess, at Derby House on 8th December 1643, having only the month before been appointed to the important post of Lieutenant of the Ordnance. 'King Pym' was buried in Westminster Abbey with great pomp and magnificence, but at the Restoration his remains were cast out into a pit in St Margaret's churchyard.

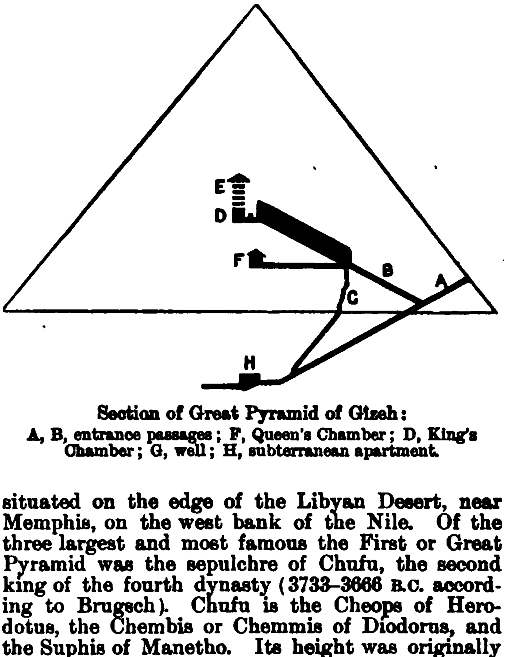
'The most popular man,' says Clarendon, 'and the most able to do hurt that hath lived in any time.' And such Pym was, only emphasis ought to be laid upon the 'able.' He was no demagogue, no revolutionist, as neither was he a narrow precisian. His intellect, on the contrary, was 'intensely conservative,' in Mr Gardiner's phrase; he was a champion of what he believed to be the ancient constitution against those who he thought were striving to subvert it. He was, moreover, an English country gentleman, who liked the good things of this life, and was not so circumspect in his conduct but what scandal made free with his name, asserting, for instance, that 'Master Pym had succeeded the Earl of Strafford in the affections of my lady Carlisle.'

See John Forster's *Eminent British Statesmen* (vol. iii. 1837); Goldwin Smith's *Three English Statesmen* (1867); and other works cited at CHARLES I., ELIOT (SIR JOHN), and STRAFFORD.

Pyracantha. See CRATÆGUS.

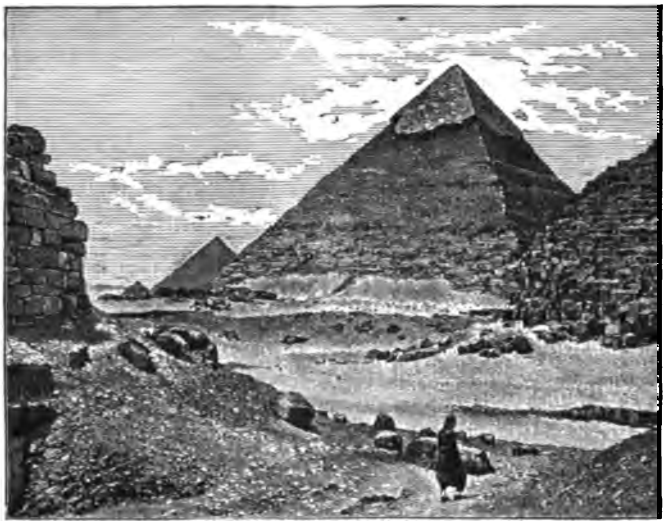
Pyramid, in Geometry, is a solid figure, of which the base is a plane rectilinear figure, and the sides are triangles, converging to a point at the top or 'apex.' Pyramids, like prisms, are named from the form of their bases: thus, a pyramid having a triangle for its base is a triangular pyramid, with a square base, a square pyramid, with any four-sided figure for its base, a quadrangular pyramid; or it may be pentagonal, hexagonal, &c. Pyramids may be either 'right' or 'oblique' (see PRISM). A right pyramid, with an equilateral figure for its base, has all its sloping edges equal; but this is not the case if the pyramid be oblique. The most remarkable property of the pyramid is that its volume is exactly one-third of that of a prism having the same base and vertical height; and it follows from this that all pyramids having the same base and height are equal to one another. The word (Gr. *pyramis*) is of Egyptian origin.

Pyramid, a structure of the shape of the geometric figure so called, erected in different parts of the Old and New World, the most important being the Pyramids of Egypt, which were reckoned among the seven wonders of the world. They are about seventy-five in number, of different sizes, situated chiefly between 29° and 30° N. lat., and are masses of stone (or rarely brick), with square bases and triangular sides. Although various opinions have prevailed as to their use, as that they were erected for astrological, astronomical, and metrological purposes, for resisting the encroachment of the sand of the desert, for granaries, reservoirs, &c., there is no doubt that they were really nothing more than the tombs of monarchs of Egypt who flourished from the first to the twelfth dynasty. With the exception of some very late pyramids in Nubia, none were constructed after the twelfth dynasty; the later kings were buried at Abydos, Thebes, and other places, in tombs of a totally different construction. The pyramids of Egypt may be described as monuments built over the sepulchral chambers of kings. The Egyptian monarch was ever careful to prepare his 'eternal abode.' For this purpose a shaft of the size of the intended sarcophagus was first hollowed in the rock at an incline suitable for lowering the coffin, and at a convenient depth a rectangular chamber was excavated in the solid rock. Over this chamber a cubical mass of masonry of square blocks was then placed, leaving the orifice of the shaft open. Additions continued to be made to this cubical mass both in height and breadth as long as the monarch lived, so that at his death all that remained to be done was to face and smooth the exterior of the step-formed mound by adding courses of long blocks on each layer of the steps, and then cutting the whole to a flat or even surface. This outer masonry or casing has in most instances been stripped off. Provision was made for protecting the vertical joints by placing each stone half-way over another. The masonry is admirably finished; and the mechanical means by which such immense masses of stone were raised to their places must have been powerful and elaborate. The finer stones were quarried at Tura and other places on the opposite bank of the Nile; sometimes, however, granite taken from the quarries of Syene was employed for the casing. The entrances were carefully filled up, and the passage protected by stone portcullises and other contrivances, to prevent ingress to the sepulchral chamber. The sides of the pyramids face the cardinal points, and the entrances face the north. The most remarkable and finest pyramids are those of Gizeh (Giza), situated on the edge of the Libyan Desert, near Memphis, on the west bank of the Nile. Of the three largest and most famous the First or Great Pyramid was the sepulchre of Chufu, the second king of the fourth dynasty (3733–3666 B.C. according to Brugsch). Chufu is the Cheops of Herodotus, the Chembis or Chemmis of Diodorus, and the Suphis of Manetho. Its height was originally 481 feet, and its base 774 feet square; in other words, it was higher than St Paul's Cathedral, on an area about the size of Lincoln's Inn Fields. Its slope or angle was 51° 50′. It has, however, been much despoiled and stripped of its exterior blocks for the building of the mosques and walls of Cairo. The original sepulchral chamber, 46 feet × 27 feet, and 10 feet 6 inches high, was hewn in the solid rock, and was reached by a passage, 320 feet long, which descended to it from the entrance at the foot of the pyramid. The excavations in this direction were subsequently abandoned, and a second chamber, with a triangular



Section of Great Pyramid of Gizeh:
A, B, entrance passages; F, Queen's Chamber; D, King's Chamber; G, well; H, subterranean apartment.

roof, was constructed in the masonry of the pyramid, 17 feet × 19 feet, and 20 feet high. This was reached by a passage rising at an inclination of 26° 18′, terminating in a horizontal passage. It is called the Queen's Chamber, and occupies a position nearly in the centre of the pyramid. The monument—probably owing to the long life attained by the monarch—still progressing, a third chamber, called the King's, was then constructed by prolonging the ascending passage of the Queen's Chamber for 150 feet further into the very centre of the pyramid, and after a short horizontal passage, making a room 17 × 34 feet, and 19 feet high. To diminish the pressure of the superincumbent masonry on the flat roof five small chambers (E in fig.) were made vertically in succession above the roof, the apex of the pointed uppermost chamber (in which the name of Chufu is scrawled) being rather more than 69 feet above the roof of the King's Chamber. The end of the horizontal passage was carefully finished, and cased with slabs of red syenitic granite exquisitely fitted together; and in the King's Chamber is the broken red granite sarcophagus of King Chufu, 7 feet 6½ inches long, 3 feet 3 inches broad, and 3 feet 5 inches high, to contain which the pyramid was built. Piazzi Smyth fancied (for it is nothing more than fancy) that this coffer was not a sarcophagus, but a standard measure of capacity, of which the British quarter is the fourth part. As the heat of this chamber was stifling, two small air-channels, or chimneys, about eight inches square, were made, ascending to the north and south sides of the pyramid, which perfectly ventilate it. After the mummy was deposited in the King's Chamber, the entrance was closed with granite portcullises, and a well made at the junction of the upward-inclined and horizontal passages, by which the workmen descended into the downward-inclined passage. According to Herodotus, this pyramid took a long time in construction—100,000 men being employed on it for thirty years. The facing-stones were said to be inscribed with writing, probably of a religious character. The Great Pyramid was opened by the 'Abbaside Caliph El Mamûn in the 9th century.



The Second Pyramid.

The Second Pyramid is situated on a higher elevation than the first, and was built by Chafra or Chephren (3666–3633 B.C.), third king of the fourth dynasty. It is 450 feet high, on a base of 700 feet, and has two sepulchral chambers, which were opened by Belzoni in 1816. The masonry is inferior to the first, but it was anciently cased below with polished stones, some of which remain, while the top still retains its original casing.

The Third Pyramid, built by Menkaura, or Mycerinus (3633 B.C.), fourth king of the fourth dynasty, is much smaller than the other two, being only 215 feet high by 350 feet at the base. It has three chambers, the lowest of which, granite lined, held a sarcophagus of whinstone and a wooden coffin. The inscription on the coffin reads: 'Osiris, King of the North and South, Men-Kau-Ra, living for ever! The heavens have produced thee, thou was engendered by Nut (the sky), thou art the offspring of Seb (the earth). Thy mother Nut spreads herself over thee in her form as a divine mystery. She has granted thee to be a god. Thou shalt never more have enemies, O King of the North and South, Men-Kau-Ra, living for ever' (Budge, *The Nile*, 141–142). From this we may conclude that the Egyptian religion and the doctrine of immortality were fixed as early as 3600 B.C. Amongst the débris of the coffin and in the chambers were found the legs and part of the trunk of a body with linen wrapper, supposed by some to be that of the monarch, but by others to be that of an Arab. This body and fragments of the coffin were removed to the British Museum; but the stone sarcophagus was unfortunately lost off Carthagena by the sinking of the vessel in which it was being transported to England. The masonry of this pyramid is most excellent, and it was anciently cased half-way up with granite, the remains of which are still visible. It was wantonly damaged by Saladin's nephew, El-Kâmil, in the 12th century, in the insane desire of destroying it. The Third Pyramid is regarded with superstitious dread by the natives, on account of a supposed lady's ghost, and there is a curious legend connecting it with the courtesan Rhodope.

There are six other pyramids of inferior size and interest at Gîzeh; others at Abou Roâsh, six miles to the north-west of the same spot; and four (originally fourteen) at Abusîr (Busiris), with the names of Sahu-ra and Usr-en-ra of the fifth and sixth dynasties. A group of eleven pyramids remains at Sakkara, some of which were explored in 1880–81 by M. Maspero, such as those of Unas (3333 B.C.), Teta (3266), and Pepi (3233), all of the fifth and sixth dynasties. The so-called Step Pyramid at Sakkara is believed to have been built by Uenephes of the first dynasty. Six pyramids still stand at Dahshûr; and that at Meydûm, with a peculiar construction in three stages, is supposed to be the tomb of Seneferu (3766 B.C.), Chufu's predecessor in the fourth dynasty. There are also pyramids in the Fayyûm, and some small ones of brick at Thebes. In Nubia, the ancient Ethiopia, are several pyramids, the tombs of the monarchs of Meroë from 600 to 100 B.C. and of some of the Ethiopian conquerors of Egypt. They are taller in proportion to their base than the Egyptian pyramids, and generally have a sepulchral hall, or propylon, with sculptures, which faces the east.

In Assyria the Birs Nimrûd, or Tower of Belus, was a kind of step-shaped pyramid of seven different-coloured bricks, dedicated to the planets by Nebuchadnezzar. The Mujelliba, another mound, was of pyramidal shape. The pyramid also entered into the architecture of the tomb of Sardanapalus at Tarsus, and of the Mausoleum of Artemisia at Halicarnassus. A small pyramid, the sepulchre of C. Cestius, imitated from the Egyptian in the days of Augustus, still exists within the wall of Aurelian at Rome. Temples and other monuments of pyramidal shape are found in India, China, Cambodia, Java, the Polynesian Islands, and elsewhere. The Toltecs and Aztecs erected temples in Mexico, called *Teocalli* (q.v.), or abodes of gods, of pyramidal shape, with steps or terraces by which to ascend and reach an altar, generally placed on the summit, where human sacrifices and other rites were performed. These, however, are not true pyramids, the pure and simple form of which is restricted to Egypt. The pyramidal form entered extensively into the architecture of the Egyptians, and appears on the tops of obelisks and tombs as a kind of roof. Small models of pyramids, with inscribed adorations to the sun, or having royal names, were also placed in the tombs.

See Lepsius, *Ueber den Bau der Pyramiden* (1843); Wilkinson, *Topogr. of Thebes* 1835); Vyse, *Operations carried on at Gizeh in 1837* (1842); W. Flinders Petrie, *The Great Pyramid* (1888). Ingenious fancies about the supposed metrological and astrological purport of the pyramids are given in Piazzi Smyth's *Our Inheritance in the Great Pyramid* (1864), and R. A. Proctor's *The Great Pyramid* (1882). The astronomical data afforded by the orientation of temples and pyramids were in 1891 subjected to thorough investigation by Mr Norman Lockyer.

Pyramids, a game played on a billiard-table. Fifteen red balls are placed on the table in the form of a pyramid, the apex of the pyramid being on the *winning spot*, with the base nearer to the top of the table. There is also a sixteenth white ball, which is used by both players when striking. The object of the players is to hole the pyramid balls. The first stroke is from hand; the succeeding strokes are played from where the white ball stops, unless the striker runs in, when his adversary plays from hand. Also, when only two balls remain on the table, the white and the red are played with alternately. When a player holes a pyramid ball he scores one, and plays again on any ball he likes. If a player runs in or gives a miss, one is deducted from his score, and a red ball is replaced on the table on the winning spot, or as near in a straight line beyond it as it will go without touching another ball; if the player has made no score, he owes one, and the first red ball he holes is placed on the table. When all the red balls are holed, the lower score is deducted from the higher, and the difference is the number of lives won. The game is generally played for so much a life, with a stake on the pool equal to the value of three lives. The lives are not paid for when taken (as at pool), but the difference in the scores is recorded on a slate marking-board at the conclusion of each game.

The principal varieties of pyramids are *shell out* and *snooker*. Shell out is pyramids played by more than two persons. The only differences are that, if a player runs in or misses, one is deducted from his score, but no ball is replaced on the table, and that the last ball scores two. At snooker, in addition to the pyramid balls, some of the pool balls (beginning with the yellow) are placed on various spots on the table. A red pyramid ball must first be played on, and, if it is holed, the striker must then play on a pool ball. The pool balls score two, three, four, five, and six respectively, according to the order of their colours on the marking-board; running in or missing when playing on a pool ball scores correspondingly against, the amount being added to the opponent's score. When a pool ball is holed, it is replaced on its original spot, and the striker must next play on a pyramid ball. When all the pyramid balls have been holed, the pool balls are played on in the order of their colours, but are not then replaced when holed.

A great point is to avoid being *snookered*—i.e. to play on a pyramid ball so that if holed a pool ball is left open, and *vice versâ*. If a player is snookered, his adversary adds to his score the value of the nearest pool ball. Some rules compel the striker to name the ball played at, when, if he fails to hit it, he is snookered off that. The rules of snooker vary much in different rooms.

Pyramus and Thisbe. The tragical history of these two lovers is told by Ovid in the 4th book of his *Metamorphoses*. They were natives of Babylon, and tenderly attached to each other, but, as their parents would not hear of their marriage, they had to content themselves with clandestine interviews by night. On one occasion they arranged to meet at the tomb of Ninus, where Thisbe, who was first at the trysting-spot, was startled to discover a lioness. She immediately ran off, but in her terror and haste dropped her garment, which the fierce animal, that had just torn an ox in pieces, covered with blood. Soon after Pyramus appeared, and, seeing his mistress's robe, came to the conclusion she had been murdered, whereupon he killed himself. Thisbe now returned, and, beholding her lover lying dead on the ground, put an end to her own life. The story was a favourite one during the middle ages. Bottom pronounces it 'a very good piece of work and a merry' in *A Midsummer Night's Dream*.

Pyrenees, the mountain-chain that divides France from Spain, stretches across from the Mediterranean to the south-east corner of the Bay of Biscay, a distance of 270 miles; the breadth of the system varies between 15 and 70 miles, and the area it covers measures 13,000 sq. m. The Pyrenees form a regular and continuous chain, divisible into three portions, the Western, the Central, and the Eastern Pyrenees. The first-named division extends eastwards from the Bay of Biscay to the Port de Canfranc (or Col de Somport), a carriage-road that crosses the chain at an elevation of 5380 feet, and leads from Oloron to Saragossa. This division is the lowest in the entire chain, its average height being 3300 to 4300 feet. Here two passes give access to Spain, that of St Jean Pied de Port (or Roncesvalles) and that between Bayonne and Elizondo; the railway from Bayonne to San Sebastian passes the end of the chain close to the sea. The Central Pyrenees, extending from the Port de Canfranc to the Col de la Perche, this connecting the valley of the French Tet (dept. Pyrénées-Orientales) with the valley of the Spanish Segre (prov. Lerida), contain the highest peaks and the most imposing mountain-masses of the entire system, as Pic de Néthou (in Maladetta), 11,168 feet; Mont Perdu, 10,998; Vignemale, 10,794; Marboré, 10,673; and Pic du Midi, 9466. The summits of the Eastern Pyrenees, which extend eastwards from the Col de la Perche (5300 feet), the second pass over the lofty chain, range between 6500 and 7500 feet (Puigmal, 9545; Canigou, 9138); and, although the altitude decreases as they approach the Mediterranean, they still reach 2100 feet in the Albères close to the sea. This portion is crossed by the old Roman road from Perpignan to Figueras and pierced by the railway tunnel for the line between the same two towns. The frontier between France and Spain coincides generally with the line of highest summits in the main chain; the principal exception is that at Maladetta the frontier strikes north so as to include within the boundaries of Spain the valley of Aran, which geographically belongs to France. On both north and south the mountains sink down to the plains in a series of terraces, with precipitous faces, the general slope on the Spanish side being somewhat steeper than that on the French side. The valleys cut into the mountain-mass on both sides almost directly at right angles, in the form of deep ravines, and with the regularity of the spines of a fish's backbone. Very many of them terminate in caldron-shaped basins, called *cirques*, or by the native mountaineers *oules* (= pots), the sides of which are precipitous and seamed with waterfalls; the most celebrated is the Cirque of Gavarnie, at the head of Gave de Pau, with a waterfall 1515 feet high. Of the numerous streams that have their origin in the mountains, those on the Spanish side are for the most part feeders of the Ebro, whilst the French streams—generally called *gaves*—feed the Adour, the Garonne, and certain little rivers that reach the Mediterranean. The lower Pyrenean valleys through which these streams flow are in many cases covered with grass or forest, or even vineyards and olive-groves. Snow lies on the highest pinnacles, the snow-line being put at 9200 feet on the south side and at 8300 on the north. A narrow belt of glaciers runs from east to west just below the peaks of the Central Pyrenees, but almost wholly on the French side. Vegetation is most developed in the Western division, where the rainfall is heaviest; but, whilst it is there central European in its characteristics, the vegetation of the Eastern division is subtropical, allied to that of the Mediterranean coasts. The geological nucleus of the range is granite, which comes to the surface in most of the highest peaks. But above the granite lie strata of nearly all subsequent ages, especially Silurian deposits, Cretaceous limestones (hippurite), and limestones (nummulite) of the Eocene period. Minerals are not generally abundant, though iron is worked in the French departments of Basses-Pyrénées and Pyrénées-Orientales; coal exists on the Spanish side and lignite on the French. There are numerous mineral springs (several being hot), those of Eaux-Bonnes, Cauterets, Eaux-Chaudes, Bagnères de Bigorre and de Luchon, and Barèges being the best known. Except the passes already mentioned, the Pyrenees are crossed only by mountain-paths, that none but foot-passengers can use, and they only in the summer; the most remarkable is Roland's Gap (9318 feet), on the west side of Mont Perdu. A great number of caves exist amongst the limestone formations, and in them valuable remains of prehistoric man have been found.

See works by Perret (3 vols. 1881–84) and Prarond (1877); Taine, *Voyage aux Pyrénées* (10th ed. 1885); guidebooks by Gsell-Fels, Joanne (5th ed. 1884), and Murray; and Count Henry Russell, *Pau, Biarritz, and the Pyrenees* (new ed. 1891).

Pyrénées, Basses, a department in the south-west corner of France, between the Landes and Spain, and having the Bay of Biscay on the west. Area, 2946 sq. m.; pop. (1891) 425,027. It is divided into the arrondissements of Pau, Oloron, Orthez, Bayonne, and Mauléon. Chief town, Pau. The department occupies the northern slopes of the Western Pyrenees (3000–9800 feet), offshoots from which divide the department into a number of valleys, traversed by mountain-streams (*gaves*). The chief are the Gave d'Oloron, and Gave de Pau, and other tributaries of the Adour. The Bidassoa, with the Isle of Pheasants, where the treaty of 1659 was signed, forms the dividing line between France and Spain for a short distance. The high valleys and slopes are generally fertile, and well adapted for the growth of the vine, chestnut, and other fruits. Agriculture is the principal industry; large herds of cattle and sheep are fed on the extensive pastures, and many swine in the wide forests. Of the numerous mineral springs the most important are those of Biarritz, Eaux-Bonnes, and Eaux-Chaudes. The western half of the department is the home of the Basques (q.v.).

Pyrénées, Hautes, a department of France, lying east of Basses-Pyrénées, is a part of the old province of Gascony. As its name implies, it contains the loftiest summits of the Pyrenees (q.v.), and is divided into the three arrondissements of Tarbes, Argelès, and Bagnères de Bigorre; chief town, Tarbes. The principal rivers are the Adour and the Gave de Pau. The climate is generally mild in the plains and sheltered valleys. The well-cultivated and artificially watered lowlands yield good crops of cereals, leguminous plants, and fruits of every kind, including the grape. Cattle, sheep, and swine are reared. Marble and slate are quarried. In this department are the springs of St Sauveur, Bagnères de Bigorre, Barèges, and Cauterets. Area, 1749 sq. m.; pop. (1891) 225,861.

Pyrénées-Orientales, a southern department of France, is bounded on the E. by the Mediterranean and on the S. by the Pyrenees. Area, 1591 sq. m.; pop. (1891) 210,125. It is divided into the three arrondissements of Perpignan, Prades, and Céret. The chief town is Perpignan. Like the other Pyrenean departments, this one embraces a series of parallel valleys formed by spurs from the Pyrenees. A plain occupies all the north and east of the department. Agriculture is extensively prosecuted, but wines constitute the wealth of the district, and include the red wines of Roussillon, the white muscatel of Rivesaltes, and others. This department takes the front rank as a producer of iron ore; granite, slate, and limestone are quarried. There are mineral springs at Amélie-des-Bains, and elsewhere.

Pyrethrum, a genus of plants belonging to the natural order Compositæ. The species are by some botanists included in the genus Chrysanthemum. Feverfew (q.v.), a native of Britain, is a notable species. A handsome double-flowered variety is cultivated in gardens for ornament; and Golden Feather, so much employed in bordering, &c. in the bedding-out system of flower-gardening, is a yellow-leaved variety. Several other species are to be met with in flower-gardens; but the most ornamental of all is *P. roseum*, from which has sprung many beautiful varieties with double and single flowers of brilliant colours. From the flowers of the *P. roseum* Insect-powder (q.v.) or Persian powder is prepared; and the flowers are exported in large quantities for this purpose from Dalmatia and from the Caucasus region.

Pyrheliometer, a radiative thermometer (for measuring the direct heating effect of the sun's rays), consisting of a body heated by the sun's rays and a thermometer. See Thermometer.

Pyri'tes, a name employed by mineralogists to designate a large class of minerals, which are compounds of metals with sulphur, or with arsenic, or with both. They are crystalline, hard, generally brittle, and frequently yellow. The name pyrites originally belonged to the disulphide of iron, known as iron-pyrites or simply pyrite, and was given to it in consequence of its striking fire with steel (Gr. *pyr*, 'fire'), so that it was used for kindling powder in the pans of muskets before gun-flints were introduced. Pyrite (iron-pyrites) is commonly of a bright brass-yellow colour; it is often found crystallised in cubes, in which form small crystals of it are abundantly disseminated in some roofing-slates, and very large ones occur in some of the mines of Cornwall; it is also found crystallised in dodecahedrons and other forms, more rarely in oblique four-sided prisms; and it often occurs massive, globular, stalactitic, capillary, or investing other minerals as an incrustation. Beautiful specimens of globular pyrite are found in the chalk of England. It is a very widely diffused and plentiful mineral, occurring in many different kinds of rock. It is too abundant in many coal-seams, the action of water and air changing it into sulphate of iron (vitriol), during which change so much heat is evolved that the coal is frequently kindled by it, mines become unworkable, and the progress of the fire can only be stopped, if at all, by building up portions of them to cut off the access of air, or by the admission of a plentiful supply of water. Sandstones containing pyrite ought not to be employed for building purposes, as it is prone to oxidation. Sometimes it is changed into sulphate of iron, but when other bases are present in the rock the sulphuric acid often unites with these in preference, leaving the iron of the original sulphide free. The iron then becomes oxidised, and appears as dark brown blotches. The presence of pyrite thus leads to corrosion and unsightly staining. The colour of pyrite has often caused it to be mistaken for gold, a mistake which its hardness and comparative lightness should prevent, or its ready solubility in nitric acid, and its burning before the blowpipe on charcoal with bluish flame and smell of sulphur. But it sometimes does contain a small proportion of gold, occasionally even in visible grains. This auriferous pyrite is found in Siberia and in South America. Pyrite is never used as an ore of iron, but it is much employed in the manufacture of sulphuric acid, and sulphur is obtained from it by sublimation. It is also used for the manufacture of alum. A rather unstable variety of iron disulphide of a very pale colour is called *Marcasite;* it crystallises in orthorhombic forms. Another sulphide of iron known as *Pyrrotine* (Fe_7S_8) is magnetic.

Copper Pyrites, also called *Yellow Copper* and *Chalcopyrite*, is the most abundant of all the ores of copper, and yields a large proportion (perhaps a third) of the copper used in the world. It is brass-yellow, the colour varying with the amount of copper which it contains, a rich colour indicating much copper, and a pale colour the presence of a comparatively large amount of iron; for this ore is not a sulphide of copper alone, but of copper and iron. It occurs massive and disseminated in rocks of almost every class, and is often found crystallised in octahedrons and tetrahedrons, but generally in very small crystals. It may at once be distinguished from iron-pyrites by its comparative softness, yielding readily to the knife, and by the green colour of its solution in nitric acid. Before the blowpipe, with borax and soda, it yields a bead of copper.—*Cobaltite*, an arsenio-sulphide of copper, is a principal ore of cobalt. It is generally of a silver-white colour, and occurs massive, disseminated, or crystallised in cubes, octahedrons, dodecahedrons, and polyhedrons, in schistose rocks.—*Nickelite*, used as an ore of nickel, is a compound of nickel and arsenic. It is generally found massive, and is of a copper-red colour; hence it is called by the German miners *Kupfer-nickel*, because they mistook it for an ore of copper.

Pyritz, a manufacturing town of Pomerania, 25 miles SE. of Stettin by rail; pop. 8062.

Pyrmont. See WALDECK-PYRMONT.

Pyrogallic Acid. See GALLIC ACID, PHOTOGRAPHY.

Pyroligneous Acid, or WOOD VINEGAR, a crude commercial form of Acetic Acid (q.v.). It is made by the destructive distillation of wood, and, besides acetic acid, contains tar, creasote, wood-naphtha, and other products, which have to be removed if it is required in a very pure state. The best woods for the distiller are 'hard' woods, although all will yield it. Oak branches stripped of their bark are cut into short billets, which are placed in cast-iron retorts, and a sufficient heat applied to drive off the volatile constituents and carbonise the wood. This acid is of great use in the arts, especially in making the acetates used by dyers and calico-printers; and it is also, when very carefully purified and properly diluted with water, used extensively as a substitute for common vinegar in pickling, and even for table use. It is also used in the preservation of fish, giving them a 'smoked' flavour.

Pyromancy. See DIVINATION, Vol. IV. p. 21.

Pyrometry, the measurement of temperatures beyond the compass of the mercurial Thermometer (q.v.). The leading methods are ocular, calorimetric, and pyrometric. The eye alone is often sufficiently accurate, and can distinguish dull red, 525° C. (say 975° F.); cherry red, 800° C. (say 1450° F.); orange, 1100° C. (2000° F.); white, 1300° C. (2350° F.); dazzling white, 1500° C. (2700° F.). Or we may use cobalt glass as a means of more sharply discriminating the changes of visible colour. Calorimetric: a lump of heated metal is thrown into a known quantity of water; the rise of temperature is measured; the temperature of the heated metal is next calculated from its weight, its specific heat, and the rise of temperature and the quantity of the water. This method admits errors from loss of time and radiation; hence only rough results are attained, comparable with one another, but not numerically reliable. Of pyrometric methods may be named expansion of air, hydrogen or nitrogen (only suited for laboratory purposes, for glass melts, metals become permeable, and porcelain is fragile), or of mercury vapour; dilatation of solids—porcelain, platinum, or iron (Professor J. F. Daniell, 1821)—whose expansions are very small and difficult to measure, as they generally take up a new set or form when alternately heated and cooled; the shrinkage of clay (Wedgwood's pyrometer) giving variable results; the actual fusion of definite metals, alloys, or enamels whose melting-points have been previously ascertained; the temperature acquired by water made to flow uniformly through a tube partially exposed to the heat to be explored; the speeds of outflow of air through an aperture at the atmospheric and at the furnace temperature (Barns, *American Journal of Science*, 1889); Siemens' electric pyrometer, which measures the change in the resistance of platinum wire exposed to the furnace heat; Becquerel's thermo-electric pyrometer, in which a thermo-electric couple (platinum-palladium) is exposed to the heat. When Le Châtelier's thermo-electric couple, consisting of platinum and platinum-plus-ten-per-cent.-of-rhodium, is used, the readings of a thermo-electric pyrometer may be consistent with one another.

The whole subject of pyrometry was carefully discussed by M. Le Châtelier before the French Société Technique de l'Industrie du Gaz at its annual meeting in 1889; and a summary of his address will be found in the *Gas World*, March 15, 1890. See also Poggendorf's *Annalen*, vol. xxix.; and for Ericsson's Solar Pyrometer, see *Nature*, vol. xxx.

Pyrope, a gem, often called *Carbuncle* and *Hyacinth* by lapidaries, which is nearly allied to garnet. Composed of silica, alumina, magnesia, lime, and the protoxides of iron, chrome, and manganese, it is always of a deep red colour, and is transparent, or at least translucent. It generally occurs in roundish grains, but rarely in imperfectly cubical crystals. Pyropes are found chiefly in Saxony and Bohemia, also at Elie in Fife (where they are called *Elie Rubies*).

Pyrophone, also called *Flame-organ*, is a musical instrument invented about 1873 by Eugene Kastner (1852–82) of Paris, in which the musical tones are produced by flames of hydrogen gas burning in tubes of different sizes and lengths, arranged somewhat as in an ordinary organ.

Pyrophorus (from the Gr. *pyr*, 'fire,' and *pherō*, 'I bear') is a term applied to any substances which take fire from the rapidity with which they are oxidised. If iron, cobalt, or nickel be reduced by hydrogen from its oxide at a low red heat, it is obtained in a state of such extreme division as to become incandescent by the oxidising action of the atmosphere; and the tendency to rapid oxidation is much increased by the interposition of some infusible matter, as a little alumina or magnesia, between the particles of the oxide. This is probably due to the cohesion of the minute particles of the reduced metal being thus mechanically prevented, and the access of air to the surface of each particle being thus facilitated. If tartrate of lead be heated in a tube till the organic portion becomes charred, the metallic lead is reduced to a state of extreme subdivision, and usually takes fire when poured into the air. If finely-powdered sulphate of potash be mixed with half its weight of lamp-black, and heated in a covered crucible, the sulphate is reduced to sulphide of potassium, which remains in a finely-divided state, mixed with the excess of carbon, and takes fire spontaneously in the air from the rapid absorption of oxygen. These are amongst the best examples of pyrophori.

Pyrosis. See INDIGESTION.

Pyrosoma, a genus of compound or colonial Tunicates, sometimes called 'fire-flames' on account of their brilliant phosphorescence. The colonies are hollow cylinders, open at one end, and the walls are formed of hundreds of individuals. These have inhalent apertures on the exterior, while their exhalent apertures open into the cavity of the cylinder, thus producing a gentle current, by means of which the colony is slowly propelled through the water with the closed end foremost. Several species occur in the warmer seas, and *P. giganteum* is from 2 to 3 feet long. See ASCIDIANS, PHOSPHORESCENCE.

Pyrotechny, the art of making fireworks, is of unknown antiquity. It was practised amongst the Chinese from very early times, and has attained with them so much perfection that the beauty and ingenuity of their devices have often been admired by Europeans. Fireworks, as the name is now understood, were hardly known in Europe until the nature of gunpowder became known, and for a long time only very simple pyrotechnic contrivances were used.

The compositions employed for most kinds of fireworks are of the nature of gunpowder. That is to say, the mixtures of which they are made contain combustible or oxidisable substances, along with bodies available for their rapid combustion, since these latter contain large quantities of oxygen. The most frequently employed combustible materials are carbon (charcoal) or some compound of carbon, such as sugar or gum, and sulphur or a compound of this element, such as sulphide of antimony. Such bodies as charcoal and sulphur burn slowly in common air, because its oxygen is largely mixed with nitrogen, which does not support combustion; but when they are compounded with nitrates and chlorates the store of oxygen in these salts being given off by heat enables the firework composition to burn at a more or less rapid rate whenever a spark is applied to it. It is not desirable, however, to have too sudden a union of combustible matter with oxygen, hence violent explosives, like nitro-glycerine, are unsuitable for showing coloured or brilliant flames. The two most important oxidising ingredients used in firework compositions are nitrate and chlorate of potash. Iron, in the form of cast-iron or steel, and in a state of fine division, is a frequent ingredient in fireworks, and to some extent the powder or filings of antimony, zinc, magnesium, and copper are also employed. When the particles of these metals are highly heated they produce sparks and scintillations of different colours. A few substances, such as sand and sulphate of potash, are used to modify the rate of combustion.

Variety of colour is much studied in the production of fireworks, as it contributes greatly to their beauty. The colours usually seen are those given by simple metals when burned. Compounds of the metals form part of the mixtures, and these are reduced to the metallic condition in a state of very fine division by contact with the carbon present in the hot mass. A yellow colour is one of the most easily managed, any of the common compounds of sodium producing it. Copper gives a green colour when burned in a hydrogen flame, which changes to blue in the presence of a little free chlorine; so that when this metal is used for green some substance containing hydrogen is added, and when employed for blue, calomel (one of the chlorides of mercury) is put into the mixture. Nitrate of barium is also employed for green. Salts of strontium give fine crimson tints, calcium compounds a red, and lithium carbonate (a costly substance) a purple red. Among the substances used to produce white colours are sulphide of antimony and sulphide of arsenic.

The cases which contain the firework compositions are carefully made of paper or pasteboard, or both, pasted in layers. They are usually cylindrical in shape, and the proportion of length to diameter, and the size of openings for the escape of the burning mixtures, are matters of importance. So also is the proper mechanical construction of the framework of rotatory fireworks. Touch-paper, prepared with a solution of nitrate of potash in alcohol, is used for capping squibs, crackers, and indeed for all kinds of fireworks; quick-match of cotton-wick, which has been saturated with gunpowder, gum, and other ingredients, connects the parts of complicated designs; and portfires, small pencil-like articles filled with saltpetre, sulphur, and gunpowder, are used to fire the touch-paper cappings.

The simpler kinds of fireworks include squibs, crackers, gerbs, Roman candles, stars, sparks, maroons, theatre-fires, Bengal lights, &c. *Squibs* are small stout paper tubes filled with grained powder, to which a little charcoal, sulphur, and steel filings are sometimes added, a sufficient quantity of bursting powder being put in to cause a slight explosion at the end when fired. *Crackers* consist of a tube bent into folds, and containing meal-powder, charcoal, sulphur, saltpetre, and sometimes iron filings in varying proportions. The folds are tied by a cord; and on a cracker being fired a report is given at every turn of the tube. Serpents are tubes, some of which have a choke in the middle. When fired they take a zigzag direction, and give out a hissing noise. *Gerbs* consist of a straight cylindrical case filled with a composition which produces a bright sparkling jet of fire somewhat in the form of a waterspout. They sometimes contain coloured stars. *Roman candles* have a resemblance to gerbs. In filling them stars are placed at intervals along the tube between layers of the composition. *Stars* are of different kinds, such as simple stars, tailed stars, and pointed stars. Simple stars consist of saltpetre, sulphur, and fine gunpowder made into a paste ball with gum and spirits of wine, and dried.

Sometimes they contain iron filings. Many compositions are, however, used for stars, their various colours alone necessitating this. Sparks, or small stars, are also made of different colours. *Maroons* are small boxes, round or square, bound with a cord, and containing a composition which explodes with a loud report. *Bengal lights* consist of compositions varying according to colour, which are burned in small saucers: for example, a red light can be produced by a mixture of chlorate of potash, nitrate of strontia, sulphur, and lampblack; and a green by chlorate of potash, nitrate of baryta, chloride of lead, sulphur, and resin. *Theatre-fires* are produced by slow-burning compositions containing some colouring ingredient. They are burned without cases on a fireproof slab; and all substances obnoxious when burned indoors, such as sulphur, antimony, and arsenic, or their compounds, should be omitted in preparing them. Magnesium powder and the minute spores of one or more species of lycopodium are used to imitate lightning in theatres.

The most complicated kind of fireworks are some of the rotating wheels. These are called wheels because they have a framework of nave and spokes, round the rim of which cases of the nature of rockets are arranged. They revolve on a pin or metal spindle, and the motion is produced, as will be presently explained, by the recoil as the fire escapes from the cases, which are connected with each other by leaders. There are a number of different forms, but they may be classed under three kinds—vertical, horizontal, and spiral wheels. In the case of the last, a rod (nave) rises vertically from the centre of the horizontal wheel, forming the base, and upon this rod cases are arranged so as to form a spiral. *Pin* or *Catherine wheels* and *pastilles* consist each of a long paper case coiled round a rod in the form of a flat spiral, the case being, of course, filled with a burning composition. *Suns* are either fixed or revolving. Fixed suns are of various designs, but a common kind has a number of cases radiating from a centre, from which jets of fire proceed outwards. By a suitable arrangement the fire is communicated at the same time to the mouths of each of the cases. *Revolving suns* are somewhat similar to fire-wheels with spokes. Of ascending fireworks the *rocket* is the most familiar, and it has been known from an early period. It consists of two parts—viz. a long stick to guide it in its course, and a head. The latter, of strong paper and cylindrical in shape, has its lower portion formed into a hollow cone, base downwards, and round this cone is the burning composition. The object of the cavity is to effect a rapid combustion, which fills it with heated gases, and these, issuing downwards through a small hole in the base, force the rocket up through the air. The upper portion of the head is separated from the lower by a perforated plug of plaster of Paris, through which a fuse passes, so that when the lower portion is burned, the upper, which has a conical head, takes fire and sets off its garniture of stars, snakes, and other ornaments. When firearms are discharged there is a recoil, in the case of a heavy gun, of a short distance; in the case of a light cannon, with a larger charge in proportion to its weight, of a much greater distance; and in the case of a rocket which has a bulky charge in a very light barrel the recoil is great enough to send it high in the air. The motion of a fire-wheel is explained in the same way, there being a recoil caused by the backward pressure of the heated gases on the atmosphere as each case on the ring of the wheel takes fire. The *tourbillion* ascends and rotates at the same time. Upward motion is given by the fire escaping from holes on the under side of the cylinder, and rotatory motion by its finding vent from holes at the ends, but on opposite sides.

Aquatic fireworks, in which the devices which come in contact with the water require to be protected with grease or oil, consist of skimmers or water-devils, floating Chinese trees, gerbs, and Roman candles, water-mines, water fire-fountains, &c. Among recent novelties in pyrotechny are firework-pictures of battles, reviews, and other scenes. Of these perhaps the most popular is the enlargement, in lines of fire, of the portrait of an eminent person in whose honour some public gathering has taken place. The displays of fireworks on some occasions of national rejoicings in Great Britain have cost sums approaching or exceeding £30,000. The greatest displays of comparatively recent date have taken place during the visits of foreign sovereigns to the country. See also Life-saving Apparatus, Rocket, Signalling; and T. Kentish, *The Pyrotechnist's Treasury: Art of making Fireworks* (2d ed. 1887).

Pyroxenes, a group of minerals, comprising both monoclinic and rhombic forms. The monoclinic pyroxenes are silicates of lime, magnesia, and iron—alumina being absent or sparingly present in some, while others contain a larger percentage. The more important monoclinic forms are Augite (q.v.) and Diallage (q.v.), both being constituents of igneous rocks. The rhombic pyroxenes are silicates of iron and magnesia. There are three: Enstatite (q.v.), which contains less than 5 per cent. of ferrous oxide; Bronzite (q.v.), in which the percentage is from 5 to 15; and Hypersthene (q.v.), containing 15 per cent. and upwards. All these are important constituents of igneous rocks.

Pyroxylic Spirit, also called Wood-spirit and Wood-naphtha, is a mixture of acetone, methyl-alcohol, acetate of methyl, &c., obtained by the destructive distillation of wood in the manufacture of Pyroligneous Acid (q.v.). Many of its properties are the same as those of common alcohol; and now, notwithstanding a long opposition from the Revenue Board, its manufacture and importation are regularly allowed. It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and other similar substances. It has a peculiar naphtha-like odour, which is inseparable from it, and prevents its use as a potable spirit at present; but it is asserted that some makers produce it almost odourless, and that it sometimes takes the place of common alcohol in the manufacture of cheap perfumes. It is used in making Methylated Spirit (q.v.).

Pyroxylin, a name for Gun-cotton (q.v.).

Pyrrhic Dance, the most famous war-dance of the ancient Greeks, especially the Spartans. The name was said to be derived from Pyrrichos, the inventor of the dance. The *Pyrrhic measure* in prosody consisted of two short syllables. See Dancing.

Pyrrho (Gr. *Pyrrhōn*), the founder of a school of Greek scepticism, named after him, was a native of Elis, born in the third quarter of the 4th century B.C. A pupil of Anaxarchus, he followed him when he went in the train of Alexander to Asia and India. He lived to be ninety years old. Our knowledge of his teaching is derived principally from his pupil, Timon 'the Sillograph' (i.e. writer of *silloi*, 'satiric poems'); he himself left no writings. Pyrrho disbelieved in the possibility of acquiring a scientific knowledge of things, and maintained that the best attitude of mind for a wise man to adopt is a suspense of judgment, the affirmation of nothing dogmatic; but he tenaciously maintained the reality of virtue and the obligations of morality.

Pyrrhus, king of Epirus, born about 318 B.C., a Greek warrior, was the son of Æacides and a distant kinsman of Alexander the Great. After experiencing many vicissitudes of fortune in his youth, he became sole king of Epirus in 295 B.C., and in the following year increased his territories by the addition of the western parts of Macedonia. In 281 B.C. a glorious prospect opened up before the eyes of the restless warrior—the conquest of Rome and the western world, which would confer on him a renown equal to that of his Macedonian kinsman. The Tarentines, a Greek colony in Lower Italy, then at war with the Romans, sent an embassy to Pyrrhus, in the name of all the Greek colonies in Italy, offering him the command of all their troops against their enemies. The king was overjoyed at the proposal, instantly accepted it, and in the beginning of 280 B.C. sailed for Tarentum with 20,000 foot, 3000 horse, 2000 archers, 500 slingers, and a number of elephants. The pleasure-loving Tarentines were far from pleased at the strict measures taken by Pyrrhus to inure them to the hardships of war. The first battle between Pyrrhus and the Romans, who were commanded by the consul, M. Valerius Lævinus, took place at the river Siris in Lucania. The contest was long, obstinate, and bloody; and Pyrrhus only succeeded by bringing forward his elephants, whose strange appearance and gigantic size excited a sudden panic among the Romans. It was a hard-bought victory for Pyrrhus, who said, as he looked upon the field, thick-strewn with his numerous dead, 'Another such victory, and I must return to Epirus alone.' Hence the phrase 'Pyrrhic victory.' Many of the Italian nations now joined Pyrrhus, and he proceeded on his march towards Central Italy. The Roman senate would have accepted the terms proposed by Cineas, the eloquent ambassador of Pyrrhus, but for the stirring speech of old Ap. Claudius Cæcus, which made them resolve to 'fight it out' with the foreigner. Pyrrhus, after penetrating to within 20 miles of Rome, found it impossible to proceed farther with safety, as one Roman army occupied the city and another hung upon his flanks and rear. He therefore withdrew to Campania, and thence to Tarentum, where he wintered. The campaign of 279 was carried on in Apulia, and the principal engagement took place near Asculum. The Romans were again defeated; but Pyrrhus himself lost so heavily that he felt it impossible to follow up his victory, and again withdrew to Tarentum. Here a truce was entered into between the belligerents, and Pyrrhus passed over into Sicily to assist the Sicilian Greeks against the Carthaginians, 278. His first exploits in that island were both brilliant and successful; but the repulse which he sustained in his attack on Lilybæum broke the spell which invested his name. Soon afterwards he became involved in misunderstandings with the Greeks, and in 276 he quitted the island in disgust to renew his war with Rome. While crossing over to the mainland the Carthaginians attacked him and destroyed seventy of his ships. In 274 he fought a great battle with the Romans, under the consul Curius Dentatus, near Beneventum, and was utterly defeated, escaping to Tarentum with only a few personal attendants. He now saw himself forced to abandon Italy and return to Epirus, where he almost immediately engaged in war with Antigonus Gonatas, son of Demetrius, and king of Macedonia. His success was complete, for the Macedonian troops deserted to him *en masse*, and he once more obtained possession of the country; but nothing could satisfy his love of fighting, and in less than a year he was induced to enter on a war with the Spartans. He marched a large force into the Peloponnesus and tried to take their city, but was repulsed in all his attempts. He then proceeded against Argos, where he met his death by means of a tile hurled at him by a woman from the roof of a house, 272 B.C.

Pyrus, a genus of trees and shrubs of the natural order Rosaceæ, sub-order Pomeæ, having a five-celled fruit, with a cartilaginous endocarp and two seeds in each cell. It includes species differing very much in appearance, in foliage, and in almost everything except the characters of the flower and fruit, and formerly constituting the genera Sorbus, Aria, Aronia, &c., or included in Mespilus (see MEDLAR) and Cratægus. Some botanists separate the Apples (Malus) as a distinct genus. Amongst the species of Pyrus are some of the most valuable fruits of temperate climates and some highly ornamental trees and shrubs. See APPLE, PEAR, SERVICE TREE, ROWAN TREE, BEAM-TREE. The so-called *Pyrus japonica* is really a Cydonia; see QUINCE.

Pytchley, a village of Northamptonshire, 3 miles SW. of Kettering, whence the famous Pytchley Hunt takes name. Amongst more than twenty masters of the hunt the most noted have been Lord Althorp (afterwards Earl Spencer; master from 1808 to 1817), 'Squire' Osbaldeston (1827–34), and Mr Payne (1844–48). See FOXHUNTING; and H. O. Nethercote, *The Pytchley Hunt, Past and Present* (1888).

Pythagoras is for us at once the glorified and the actual founder of the Pythagoreans—a philosophical school or sect which exercised a profound and lasting influence on the course of ancient science, philosophy, and theology from pre-Socratic times in Lower Italy, and then, down to the days of the Roman empire, in Greece, in Alexandria, and elsewhere. It cannot be too carefully borne in mind that the earliest written information we have about Pythagoreanism is the fragments not of Pythagoras himself but only of Philolaus, a successor, that the school was at first mainly characterised by its ethico-religious and political tendencies, and that the founder became among later adherents the object of mystical reverence and contemplation; accordingly our knowledge about the doctrines of the Pythagoreans and about the personality of Pythagoras is extremely limited. Aristotle, for example, only speaks of the Pythagoreans in his *résumé* of Greek philosophy, and he with Plato probably only knew of Pythagoras through the oral utterances of Philolaus. Pythagoras was born in Samos about 582 B.C. As regards his education we know only that he was made acquainted with the teachings of the early Ionic philosophers, and, through his travels (which are said to have been not only among the Egyptians, but among the Phœnicians, the Chaldeans, the Persian Magi, the Indians, Jews, Druids, Thracians, &c.), with those of the Egyptian priests. About 530 he settled in Crotona, in Magna Græcia, where he founded the moral and religious school called by his name. Pythagoreanism was first a life and not a philosophy, a life of moral abstinence and purification, reactionary against the popular and the poetic religions, but yet sympathetic towards the old (Doric) aristocratic forms and institutions. All that can be certainly attributed to Pythagoras is the doctrine of transmigration of souls, the institution of certain religious and ethical regulations, and the beginning perhaps of those investigations into numbers and the relations of numbers which made the school famous. The Pythagoreans as an aristocratic party became unpopular after the defeat of the Sybarites by the Crotoniates in 510 (see CROTONA, SYBARIS), and at first were instrumental in putting down the democratic party in Lower Italy; but the tables were afterwards turned upon them, and they had to flee from persecution. How Pythagoras himself died is not exactly known; his death (according to tradition, at Metapontum) may be placed about 500 B.C.

The Pythagoreans adhered at first to certain mysteries—indeed, the Orphic mysteries; an examination as to fitness qualified for admission into their number; obedience and silence, abstinence and simplicity in dress and food and 'external goods,' and the habit of frequent self-examination were prescribed. The enjoined disposal of worldly goods may have helped to foster contemplation and scientific enthusiasm. This at least developed itself in the school. Pythagoras, for example, is said to have practised investigations into harmonies and the properties of numbers. Mathematical investigations were first begun by individuals, and then carried on prominently by the school. Their attention was early turned to the odd and even, to prime numbers, square numbers, &c.; and from this arithmetical standpoint they cultivated geometrical studies, number becoming for them the chief principle in space. The elementary relations of harmonies and the regular rotations of the spheres led the Pythagoreans to think of the cosmic order as a numerical one, and, like the early Greek Realists in philosophy, they took number to have a metaphysical significance—to be, as Aristotle tells us, not only the form, but the very substance of things: 'All is Number' came to be their thesis. As numerical proportions are repeated in different things, they regarded numbers also as archetypes, of which things were in a sense the ectypes. They explained the harmonious arrangement of things as that of bodies in a single all-inclusive sphere of reality, moving according to a numerical scheme, the earth itself and the fixed stars all being in progress round the central fire. (It is interesting to notice this idea so early in science of the movement of the earth.) The scheme of revolution was given them first by the decade, each number of which had a peculiar significance, especially the unit, the duad, the square, &c. The table of contraries they also used in explaining the cosmos; this included such contrasts as the limited and the unlimited, the even and the odd, one and many, right and left, male and female, light and darkness, and so on. In all this room was naturally given to fanciful and arbitrary speculation, developed later among the Neo-Pythagoreans in such tables as 1, the point; 2, the line; 3, the surface; 4, body; 5, quality; 6, soul, and so on. To the virtues numbers were also given, justice being the square number; the soul, too, was in general a harmony chained to the body. As the Pythagoreans thought the heavenly bodies to be separated from each other by intervals corresponding to the harmonic lengths of strings, they held that the movement of the spheres gave rise to a pleasing sound called the 'harmony of the spheres.' Of the so-called 'elements' they had also numerical theories, fire being the tetrad, earth the cube, air the octahed, water the equation.

The great mathematical discovery of Pythagoras is of course the hypothenuse theorem, where the square is equal to the sum of two squares. 'Pythagorean numbers' are such numbers as are related in the way the theorem indicates —e.g. 5, 4, and 3 ($5^2 = 25 = (4^2 + 3^2) = 16 + 9$). Various other theorems are closely connected with this cardinal one; these concern chiefly the squares of the various perpendiculars which may be let fall from the different angles of the right-angled triangle upon the hypothenuse and sides. The speculations in general of the Pythagoreans may be regarded from various sides. Their formal principle of number is often said, and with truth, to mark a transition from the crude Hylozoism of Thales and the Ionic philosophers to a formal or rational or conceptual contemplation of the world, developed, say, by the Eleatics, and culminating in Plato. Their idea of a quantitative combination of elementary units became a commonplace of Greek speculative cosmology, constituting the ground for a deductive ontology. The conception-general of a measure or proportion in things is, of course, a most pronounced trait in the Greek mind. It is easy to trace in the Pythagorean doctrine of the elements and the contraries and of combination and of spheric completeness all the essential features of Greek cosmology. The influence of Pythagoras and geometrical conceptions over the mind of Plato can hardly be exaggerated. The chief interest of the Pythagoreans doubtless lay in the domain of physics, and their astronomical theories may be said to constitute their capital achievement. If we remember, too, that Pythagoras is perhaps the first Greek thinker who conceived of philosophy as first a life, a life in common, we shall see in this the beginning of the legislative and ethical view of the philosopher's function expressed in the fullest way in Plato's *Republic*. The ascetic and mystical aspects of Pythagoreanism linked it closely with Platonism in the mind of Christian idealists in later times. See NEOPLATONISM, NEO-PYTHAGOREANISM.

BIBLIOGRAPHY.—The fragments of Philolaus were published by Böckh in 1819. The brief notices Aristotle gives of the Pythagoreans in the first book of the *Metaphysics* contain almost all that is of philosophical importance in their theory. Zeller's account is quite exhaustive, and notices most that has been written on the subject (*The Pre-Socratic Schools*, Eng. trans. 1882). See also Grote's *Greece*, iv. 525–551; Chaignet, *Pythag. et la Philos. Pythag.* (1873); James Gow, *Short History of Mathematics* (1884).

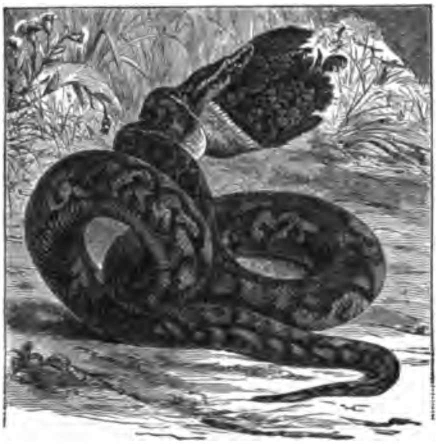
Pytheas of Massilia. See GEOGRAPHY, Vol. V. p. 145.

Pythia. See DELPHI.

Pythian Games, one of the four great national festivals of the Greeks, held in the Crissæan plain, near Delphi (anciently called *Pytho*), are said to have been instituted by Apollo after vanquishing the snaky monster, Python, and were celebrated in his honour every four years. Originally the contests were restricted to singing, with the accompaniment of cithern-playing; but flute-playing, athletic contests, horseracing, contests in poetry and art were afterwards introduced, and long continued a distinguishing feature of these games, which are believed to have lasted down to nearly the end of the 4th century A.D. The prize was a laurel-wreath and the symbolic palm-branch. Several of Pindar's extant odes relate to victors in the Pythian Games.

Pythias. See DAMON.

Python, a name applied to several large serpents, especially of the genus Python, which inhabit tropical Asia, Africa, and Australia, and closely resemble both in structure and habit the Boas of the New World. The body is rarely 20 feet in length, usually indeed nearer 10, though often estimated at 40; it is plump and very muscular; the tail is prehensile; there are beside the anus two rudimentary hind limbs or 'spurs,' which have perhaps a sexual function besides being of use in climbing. The pythons usually lurk near water, among the herbage or on an overhanging tree. They seize small mammals, strangle and crush them in their coils, and swallow them slowly. They do not cover them with saliva before beginning to swallow them, reports to this effect being inferences from the appearance of the occasionally disgorged prey. After a heavy meal the serpents are very lethargic. 'The animals on which the pythons ordinarily feed are seldom larger than a small dog, and though they may seize and overpower animals as large as a goat, to swallow them "horns and all" is absolutely impossible.' We must allow for about fifty per cent. of exaggeration in almost all the popular stories about pythons. It is true, however, that the mother reptile coils herself around her pile of eggs and incubates them for about three months. Among the pythons are the following: the Netted Python (*P. reticulatus*) of the Malay Archipelago, Burma, and Siam; *P. molurus*, the Adjiger of the Hindus; *P. regia*, the Royal Rock-snake of West Africa; *P. natalensis*, the Natal Rock-snake; *P. sebæ*, the 'fetich' snake of tropical Africa; and several Australasian genera—e.g. Morelia, Aspidiotes. See ANACONDA, BOA.



Python (*Python sebæ*).

Pyx (Gr. *pyxis*, 'a box,' properly of boxwood), the sacred vessel used in the Catholic Church to contain the consecrated eucharistic elements which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. It is sometimes called ciborium—a name, however, also given to the Baldachin (q.v.). The form of the pyx has varied very much at different times. Anciently it was sometimes of the form of a dove, which was hung suspended over the altar. More commonly, however, it was, as its name implies, a simple box, generally of the precious metals, or, at least, of metal plated with gold or silver. At present the pyx is commonly cup-shaped, with a close-fitting cover of the same material. The interior is ordered to be of gold, or at least plated with gold. Like all the other sacred utensils connected with the administration of the eucharist, it must be blessed either by a bishop, or by a priest delegated by a bishop.

Pyx, TRIAL OF THE, the annual trial by weight and assay of the gold and silver coins of the United Kingdom issued from the mint during the preceding year. It is so called from the Pyx—i.e. box or chest—in which are deposited specimen coins. Before the coins are weighed into bags at the mint for issue to the public, two pieces are taken out of each 'journey-weight' (180 oz. Troy in the case of gold, and 720 oz. in that of silver coin), one for assay within the mint, the other for the pyx. The latter are sealed up and deposited in the chest or pyx. The trials were formerly held at Westminster at uncertain intervals of several years, the jury being sworn before the Lord Chancellor or an archbishop, and the president once being Prince Rupert, another time Pitt. Now the trial takes place, to use the words of the Coinage Act, 1870, 'at least once in each year in which coins have been issued from the mint,' at Goldsmiths' Hall, and is made by a jury of goldsmiths presided over by the King's or Queen's Remembrancer, who from 1874 to 1886 was Sir Frederick Pollock (cf. his *Remembrances*, vol. ii. pp. 272-4). The pyx chest, having been brought to the Hall in the custody of officers of the mint, is opened in the presence of the jury, who proceed to examine the coins in regard to their number, weight, and fineness, in accordance with the provisions of an order in council dated the 29th June 1871. The standard weights used, as well as the trial-plates, are produced by an officer of the Board of Trade. The weight of the total bulk is ascertained, as well as that of selected specimen pieces, and assays are taken from a bar formed by melting a number of coins as well as from separate coins. The verdict recording the results of these several trials releases the officers of the mint from their responsibility in regard to the coinage, and affords a public guarantee that the standard of the currency is well maintained. See ASSAYING, MINT.

Q

Q is the seventeenth letter of our alphabet. The symbol was derived from the hieroglyphic picture of a knee (see ALPHABET); this was taken over by the Phœnicians as the letter *qoph*, which became *koppa* among the Greeks. Among the Ionian Greeks it was disused as a letter before the middle of the 5th century B.C., keeping its place only as a numeral. It was retained for a while in the Dorian alphabet, lingering longest on the coins of Corinth. On the coins of Syracuse it was replaced by *k* about 480 B.C. In the Italian alphabet, which was obtained from Greece before the letter was disused, the symbol was appropriated for the favourite Latin sound of the velar guttural *kw*. The letter *q* is absent from the Anglo-Saxon alphabet, in which the sound was expressed by *cw*, as in *cwen* for *queen*, and *cwic* for *quick*. It makes its appearance about 1160, and at first was only used for Latin or French words, such as *quarter* or *quarrel*. Before the close of the 13th century it was adopted in genuine English words, such as *qualm*, *quell*, *quick*, and *queen*. In Scotland it replaced *hw*, as in *quhat* for *hwat* (what). In English it is always followed by *u*.

Quack Doctors. Medical quackery is a product of all countries and of all ages; it flourishes among civilised and uncivilised communities alike, and was as rampant before the Christian era as it is in our own day. At all times it has found a numerous public ready and willing to be gulled, and this not only among the illiterate and vulgar, but even specially among the higher and better educated classes. In many cases royalty itself has set the fashion by lending its patronage to notorious charlatans. An exact definition of what constitutes medical quackery is not easy to give. The term 'quacksalver,' in use in the 17th century for quack doctor, seems to be derived from the Dutch *kwakzalver* (Ger. *quacksalber*), meaning a person who praised loudly his own medicines or methods of cure. The first part of the word is derived from the well-known but unmusical note of the duck, and typifies the hoarse blatant tones in which itinerant medicine vendors are accustomed to laud their wares. The equivalent French term is *Charlatan*, derived from the Italian *ciarlare*, 'to chatter' (Lat. *circulari; circulator*, 'a pedlar or mountebank')—a name which also indicates their characteristic and persistent loquacity. In more ancient days the loquacity and persistence were verbal; now they are both verbal and literary, as is shown in the deluge of advertisements with which medical quacks flood the world.

Quackery may be taken to include all devices—whether practised by legally qualified medical practitioners or by those who have had no recognised medical training—which tend to deceive the public by disseminating false ideas of disease, or a belief in imaginary ailments, which vaunt certain medicines or methods of treatment as panaceas or cure-alls, or which attribute to an individual a supernatural or exceptional power of influencing and curing disease. The element of pecuniary gain or of personal vainglory also comes into a definition of quackery, as opposed to the singleness of purpose and devotion to the interests of the patient which are traditionally held to be the guiding principles of the orthodox practitioner of medicine. Perhaps the most amusing description of quacks and their methods has been given by Goldsmith in his *Citizen of the World*, and it is as true and as trenchant to-day as it was then. He says: 'Whatever may be the merits of the English in other sciences, they seem peculiarly excellent in the art of healing. There is scarcely a disorder incident to humanity against which they are not possessed with a most infallible antidote. The professors of other arts confess the inevitable intricacies of things, talk with doubt, and decide with hesitation. But doubting is entirely unknown in medicine; the advertising professors here delight in cases of difficulty; be the disorder ever so desperate or radical, you will find numbers in every street, who, by levelling a pill at the part affected, promise a certain cure without loss of time, knowledge of a bedfellow, or hinderance of business. When I consider the assiduity of this profession their benevolence amazes me. They not only in general give their medicines for half value, but use the most persuasive remonstrances to induce the sick to come and be cured. Sure there must be something strangely obstinate in an English patient who refuses so much health upon such easy terms.'

The Sieur de Courval, writing in 1610, gives a lamentable account of the way in which France, Germany, and Italy were overrun with medical quacks in his day. He describes them as being apostates, vagabonds, disgraced clergy, women of loose character, and rascals of all kinds, and says that they are more dangerous to mankind than vultures, for the latter devour only the dead, while the former prey upon the living. Cadet de Gassicourt, classified quack doctors in a whimsical manner in groups, families, and species, of which the following is an abridgment. *Circulatores:* Insects, very venomous, of the order of suckers; common everywhere, found in all countries and all latitudes. Their external characters are very varied. Some have brilliant elytra, velvety, and studded with gold; others have them more coarsely formed, dull, not entire, and marked with rents. Their intestines have an enormous capacity, the heart is wanting or very small; they attack man exclusively, their stings being always injurious and sometimes mortal. The sting is sometimes very evident, sometimes quite hidden or little apparent. He divides them into two great groups, the *Circulatores Phanerorhynchi*, or peripatetic quacks who practise in public, and the *Circulatores Cryptorhynchi*, or *Charlatans en Chambre*. The latter are described as 'the charlatan of the aristocracy, of the bourgeoisie, and of those who do not wish to be seen consulting him in public. This honest son of toil is imbued with a sense of his own importance, his language is sententious, he speaks with assurance, and is lodged luxuriously. He is often a specialist,' and so on. These two groups are further largely subdivided, and an amusing description given of each species.

The methods of quack doctors have been the same from all time, and consist principally in attracting and impressing public attention by extraordinary surroundings and behaviour, and in loudly and persistently asseverating the virtues of their nostrums. This is essentially advertising; and while the invention of printing has stimulated many industries, there are few which it has benefited to a greater extent than that of the quack doctor, as it at once opened the way to a much wider public. The enormous modern spread of newspaper reading has further been largely turned by the quack to his own advantage, as it opens up a still wider field for the puffing of his wares. When once public attention has been caught, the battle is more than half won; patronage, popularity, and success follow almost as a matter of course. Fortunately these are frequently of a very temporary character; but, as quack doctors are essentially a migratory tribe, this drawback troubles them comparatively little. When they return to their old haunts a new crop of dupes is certain to have come up. The success of quacks must be attributed largely to an imperfect knowledge among the general public of what constitutes disease, added to which there is often an implicit faith in the curative power of drugs. There is little popular conception of what is possible or impossible in the way of healing, and thus the most absurd and extravagant statements are received as facts. Their success, however, has a deeper origin—viz. in the most potent of all human passions—the desire to preserve life. The strong desire for life, health, and the relief of pain clouds the judgment and causes the chance of relief from any source to be eagerly grasped at. The popular love of the marvellous and mysterious has also been of great assistance in pushing the fortunes of many quacks.

Quack medicines, as a rule, form no real additions to our means of treating disease. Almost without exception they are formulæ taken from some old or modern pharmacopœia, or the prescription of some well-known physician, christened with a name calculated to strike the popular fancy, and then puffed and advertised into fame. Such remedies are to be found for every real and imaginary ailment of mankind; but the happy hunting-ground of the quack is more especially in the regions of chronic, but not fatal, disease, such as the multifarious rheumatic affections, chronic skin affections, asthma, hysteria, hypochondriasis, 'nervous disorders,' and a host of others. Persons afflicted with such ailments have naturally alternations of good, bad, and indifferent health, and are often very prone to attribute what is simply natural improvement to the action of the remedy last taken. It is such people who certify so confidently and so gratefully to the curative powers of quack medicines. Cures for cancer, sterility, and consumption, various elixirs of life and youth, and single antidotes efficacious against all poisons must alone have made the fortunes of many thousands of quack doctors. The sad part of the whole matter is that mankind never seems to learn by experience; no new methods of deception are introduced, no real originality or inventive enterprise is ever shown by quacks; they rely upon exactly the same old artifices as their predecessors did, and generation after generation are duped by them just as surely.

Quadragesima ('fortieth') is the Latin name for the whole season of Lent, with its forty days (so also its French derivative, *carême*); but the name is commonly assigned to the first Sunday in Lent, by analogy with the three Sundays which precede Lent—Septuagesima, Sexagesima, and Quinquagesima (q.v.).

Quadrant (Lat. *quadrans*, 'a fourth part'), literally the fourth part of a circle, or 90°; but signifying, in Astronomy, an instrument used for the determination of angular measurements. The quadrant consisted of a limb or arc of a circle equal to the fourth part of the whole circumference, graduated into degrees and parts of degrees. Picart was the first who applied telescopic sights to this instrument. Quadrants were adjusted in the same way as the mural circle. Various innate defects of the quadrant—such as the impossibility of securing exactness of the whole arc, concentricity of the centre of motion with the centre of division, and perfect stability of the centre-work—led to its being superseded by the repeating circle, otherwise called the Mural Circle (q.v.). *Hadley's Quadrant* is more properly an *octant*, as its limb is only the eighth part of a circle, though it measures an arc of 90°. Its principle is that of the Sextant (q.v.).

Quadratic Equations. See EQUATIONS.

Quadrature. The 'quadrature' of a plane curve is effected when a square is found which has the same area as the given curve. Practically it is effected when any rectilinear figure of equal area has been found, for it is easy then to obtain the equivalent square. The quadrature, regarded as an arithmetical process, consists in finding the area of the curve in terms of any square unit.

The great problem in quadrature has been the *Quadrature of the Circle*. The workers in this subject may be divided broadly into two classes: (1) trained mathematicians, who clearly understand the nature of the problem and the difficulties which surround it; (2) those who do not understand the nature of the problem or its difficulties, and who think that they may, by good fortune, succeed where others have failed. The number of the workers of the second class became greatly diminished when the search for 'perpetual motion' became general. And, at the present day, the ranks (now fortunately small) of the perpetual-motionists and the circle-squarers are almost entirely composed of unfortunate individuals whose mental capacities are small, in too many cases the impairment of their faculties having been brought about by a development of their fruitless idea into monomania. Apart from its great historical interest to the mathematician, the subject scarcely merits detailed notice, except in so far as such notice may be useful in preventing further waste of mental energy by some who, were their energies properly directed, might succeed in increasing the sum of useful knowledge.

The nature of the problem may be understood from the following brief account. Let an equiangular n-gon be inscribed in a circle, and let its corners be joined to each other and to the centre. The area of each triangle so formed is $\frac{1}{2}ar\cos\theta$, where a is the base of the triangle, r is the radius of the circle, and θ is one-half of the vertical angle. Hence the area of the polygon is $\frac{1}{2}nar\cos\theta$; and this can be made as nearly equal to the area of the circle as we please by making n sufficiently large. In the limit, when n is infinite, the two areas are equal. But, when n is infinite, θ vanishes and na becomes the circumference, c, of the circle. Hence the area of the circle is $\frac{1}{2}cr$—that is to say, it is equal to the area of a triangle erected on the radius of the circle as base and of height equal to the circumference of the circle.

The arithmetical quadrature of the circle would therefore be effected if we could find the value of the ratio of the circumference to the diameter—that is, the value of π in the equation $c = 2\pi r$. The geometrical quadrature would be effected by finding a geometrical method of drawing a straight line equal in length to the circumference.

It has long been known that the arithmetical solution of the problem is impossible, for it has been proved that the quantity π is *incommensurable.* And proofs have been advanced that the geometrical quadrature is also impossible; but these proofs are by no means simple, and do not always convince those who are able to judge of their accuracy. Still, apart from such proofs, the mere consideration of the fact that (discounting incapable workers) the question has been fruitlessly attacked by the ablest mathematicians of past centuries should be sufficient to deter any reasonable person from engaging in the quest: for it follows that the probability of a solution being possible is excessively small—too small to justify the staking of a man's sanity, or at least the usefulness of his life, upon the result. Any mathematician who now considers the question seeks not for a solution, but for a simple and convincing proof that a solution is impossible. (It must be remembered that a 'geometrical' solution means a solution which involves no more postulates than those of Euclid.)

James Gregory, in 1668, gave a proof of the impossibility of the geometrical quadrature which Huygens, although he at first objected to it, finally admitted in so far as it applied to any *sector* of a circle. Newton also gave a proof of this limited problem, but his proof is not conclusive.

Archimedes was the first to give a practical measurement of the quantity π. By a consideration of the inscribed and escribed 96-gons he proved that it lies between $3\frac{10}{71}$ and $3\frac{1}{7}$. This result is correct only to the second decimal figure. Two Hindu measurements are 3·1416 and 3·1623. Ptolemy gives 3·141552. A great improvement on previous results was made by Peter Metius in the 16th century. His result was correct to the sixth decimal place inclusive; but its correctness was accidental, for he gave two fractions between which the result lay and took the arithmetical means of the numerators and the denominators in order to obtain his final numerator and denominator—a totally unwarranted method. Vieta gave the result correct to the ninth decimal place inclusive; Adrianus Romanus gave it correct to the fifteenth; and Van Ceulen gave it to the thirty-sixth. Snell introduced considerable improvements in the method, and gave 55 decimal figures. Abraham Sharp gave 75, Machin 100, De Lagny 128, Vega 140. The latter result is only correct to 136 places. Montucla cites an Oxford manuscript in which the result (given to 154 places) is correct to 152 places. In 1846 Dase gave a result with 200 decimals, and, in the following year, Clausen gave 250. In 1851 Shanks gave 315, which were extended by Rutherford to 350; and, shortly afterwards, Shanks gave 527, which he extended to 607. An interesting experimental method was adopted by R. A. Smith. He tossed a thin rod upon a uniformly planked floor, the length of the rod being three-fifths of the breadth of a plank. If l be the length of the rod, while b is the breadth of a plank, the probability of the rod intersecting a seam is $2l/\pi b$. From the result of 3204 tosses, he found $\pi = 3{\cdot}1412$. The true value to 20 places is 3·14159265358979323846.

Any one who is desirous of a more detailed historical account may consult De Morgan's article on the subject in his *Budget of Paradoxes* (1872).

Quadratures, METHOD OF. This name is applied to any arithmetical method of determining the area of a curve. When the exact area is known a square whose area is equal to it can be found—hence the term 'quadratures.'

It has been shown, under the heading CALCULUS, that the area of a curve whose equation is $y = f(x)$ is $\int y dx$, and can therefore be found when the integral can be evaluated. Hence the approximate determination of the value of a definite integral is obtainable by the method of quadratures.

Let it be required to find the area bounded by a portion of a curve, the ordinates at its extremities, and the axis. The usual method of procedure is to divide the portion of the axis which is included between the two ordinates into a number of equal parts, and to erect ordinates at the points so obtained. The area is approximately equal to the product of one of the given equal parts into half of the sum of the two extreme ordinates together with the sum of all the intermediate ordinates. To obtain a very accurate result by this process the number of equidistant ordinates must be so great that the portions of the curve which are intercepted by successive ordinates are very nearly straight.

A better method, due to Simpson, consists in drawing, through the first, second, and third points obtained as above on the curve, a parabola whose axis is parallel to the ordinates, and repeating this process with the third, fourth, and fifth points, and so on—the points being chosen so that the total number of points is even. The area of the given curve will be approximately equal to the sum of the areas of the various portions of the parabolas included between successive ordinates when these ordinates are sufficiently close together. It is therefore approximately equal to one-third of the product of one of the given equal portions of the axis into the sum of the extreme ordinates together with twice the sum of all the odd intermediate ordinates and four times the sum of all the even intermediate ordinates.

When the successive equidistant ordinates are very close together, the area is approximately equal to the product of the common intercept on the axis between successive ordinates into the sum of all the ordinates. The labour involved in the estimation of an area by this process would be fatal to its employment unless the number of ordinates was small. But, if the ordinates were few in number, considerable error would in general result unless a correction could be applied. This method is adopted in that process which is known as *the* method of quadratures par excellence, and which is as follows: Let $y_0, y_1, \ldots y_n$ be the several equidistant ordinates, and let a be the intercept on the axis between y_0 and y_n. Also let s be the sum above referred to; and let $\Delta y_0 = y_1 - y_0$, $\Delta y_1 = y_2 - y_1$, &c.; $\Delta^2 y_0 = \Delta y_1 - \Delta y_0$, $\Delta^2 y_1 = \Delta y_2 - \Delta y_1$, &c.; and so on. The value of the whole area is (not s, but)

$$\begin{aligned} s &- \tfrac{1}{2}\tfrac{a}{n}(y_n + y_0) - \tfrac{1}{12}\tfrac{a}{n}(\Delta y_{n-1} - \Delta y_0) \\ &- \tfrac{1}{24}\tfrac{a}{n}(\Delta^2 y_{n-2} + \Delta^2 y_0) - \tfrac{19}{720}\tfrac{a}{n}(\Delta^3 y_{n-3} - \Delta^3 y_0) \\ &- \tfrac{3}{160}\tfrac{a}{n}(\Delta^4 y_{n-4} + \Delta^4 y_0) - \tfrac{863}{60480}\tfrac{a}{n}(\Delta^5 y_{n-5} - \Delta^5 y_0), \text{ \&c.} \end{aligned}$$

It will not in general be necessary to proceed beyond the fifth difference. As an example we shall find the area of the curve $y = x^3$ between the limits $x = 10$ and $x = 15$. In this case all differences beyond the third vanish, and $a/n = 0{\cdot}5$ if we make eleven ordinates in all. The following table represents the results:

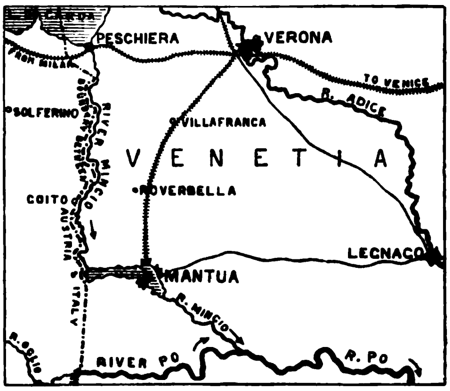
	x	y	Δy	$\Delta^2 y$	$\Delta^3 y$
0	10	1000	157·625	15·75	0·75
1	10·5	1157·625	173·375	16·5	0·75
2	11	1331	189·875	17·25	0·75
3	11·5	1520·875	207·125	18	0·75
4	12	1728	225·125	18·75	0·75
5	12·5	1953·125	243·875	19·5	0·75
6	13	2197	263·375	20·25	0·75
7	13·5	2460·375	283·625	21	0·75
8	14	2744	304·625	21·75	
9	14·5	3048·625	326·375		
10	15	3375			

Hence we have $s = 22515{\cdot}625 \times 0{\cdot}5 = 11257{\cdot}8125$; $\frac{1}{2} \times 0{\cdot}5 \times (y_{10} + y_0) = 1093{\cdot}75$; $\frac{1}{12} \times 0{\cdot}5 \times (\Delta y_9 - \Delta y_0) = 6{\cdot}61458$; $\frac{1}{24} \times 0{\cdot}5 \times (\Delta^2 y_8 + \Delta^2 y_0) = 0{\cdot}78125$. We therefore get by this method, approximately, for the value of the area the quantity 10156·67. The correct value is 10156·25, and so the error is less than one in twenty thousand.

This method is of extreme utility in the evaluation of definite integrals when rigorous processes are not attainable.

Quadriga. See CHARIOT.

Quadrilateral, the name given in history to the four fortresses of North Italy—Mantua, Verona, Peschiera, and Legnago—which form a sort of outwork to the bastion of the mountains of Tyrol, and divide the north plain of the Po into two sections by a most powerful barrier. They have figured in all the later wars that have been fought in North Italy, especially in the wars between Austria and the different Italian states.—Russia has a similar combination of four fortresses in Poland, called the Polish Quadrilateral. See NOVOGEORGIEVSK.



The Quadrilateral.

Quadrille, a dance of French origin, introduced about 1808 into England. It consists of consecutive dance movements, generally five in number, danced by *four* or more couples, opposite to, or at right angles to, each other. See DANCING.

Quadrille, a game at cards, very fashionable about two centuries ago. It is very similar to the Spanish game of Ombre (q.v.), with the necessary alterations to fit it for a four-handed game. When whist came into fashion after 1740, quadrille began to lose favour.

Quadrivium. See EDUCATION, Vol. IV. p. 205.

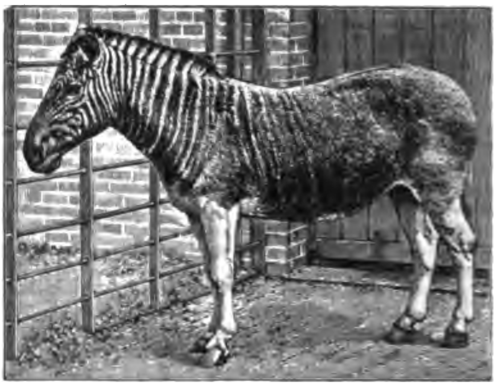
Quadroon, the offspring of a mulatto and a white person; the name indicates a man or woman who is 'quarter-blooded.'

Quadru'mana (Lat., 'four-handed'), in the zoological system of Cuvier an order of Mammalia, which he placed next Bimana, and which contained the animals most nearly resembling man in their form and anatomical character—viz. the monkey and lemur families. See ANTHROPOID APES, MAMMALS, MONKEY.

Quadruple Alliance, a league formed August 1718 between England, France, Austria, and Holland to counteract the ambitious schemes of Alberoni. It was made upon the basis of the Triple Alliance which was formed in the January of 1717 between England, Holland, and France, and by which the clauses in the treaty of Utrecht having reference to the accession of the House of Hanover in England, the renunciation by the Spanish king of his claims on the French throne, and the accession of the House of Orleans to the French throne should the young king, Louis XV., die without issue, were guaranteed. The Spanish fleet was destroyed by Byng off Cape Passaro, while the French crossed the Pyrenees and inflicted several defeats upon the Spaniards; and at length Philip was compelled to dismiss his ambitious minister, and accept the terms of the Quadruple Alliance, January 19, 1720.

Quæstor was anciently the title of a class of Roman magistrates, reaching as far back, according to all accounts, as the period of the kings. The oldest quæstors were the *quæstores parricidii* ('investigators of murder,' ultimately public accusers), who were two in number. Their office was to conduct the prosecution of persons accused of murder, and to execute the sentence that might be pronounced. They ceased to exist as early as 366 B.C., when their functions were transferred to the *Triumviri Capitales*. But a far more important though later magistracy was the *quæstores classici*, to whom was entrusted the charge of the public treasury. They appear to have derived the epithet of *classici* from their having been originally elected by the centuries. At first they were only two in number, but in 421 B.C. two more were added. Shortly after the breaking out of the first Punic war the number was increased to eight; and as province after province was added to the Roman Republic they amounted in the time of Sulla to twenty, and in the time of Cæsar to forty. On its first institution the quæstorship (*quæstura*) was open only to patricians; but after 421 B.C. plebeians also became eligible.

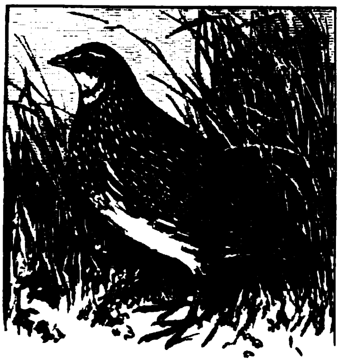
Quagga (*Equus*—or *Asinus*—*quagga*), one of the three species of striped wild horses, or more properly wild asses, peculiar to Africa, of which the zebra is the type. Formerly found in profusion south of the Vaal River, beyond which its range seldom extended, it is believed to be now quite extinct. The illustration represents the last animal of its species owned by the Zoological Society; it was sent from the Cape by Sir George Grey in 1858. The quagga was a handsome animal, more strongly built than the mountain zebra and Burchell's zebra. The upper parts of the body were dark rufous brown, becoming gradually more fulvous, and fading to white at the rump and ventral surface, the dorsal line dark and broad, widening over the crupper. The head, neck, mane, and shoulders were striped with dark brown, gradually waxing fainter till lost behind the shoulder. It was usually



Asinus Quagga.
(From a Photograph by Messrs York & Son, London.)

found in herds of from ten to a hundred, but often seen in troops of many hundreds on the plains of the Orange Free State and Cape Colony, and often associated with the white-tailed gnu, not seldom with ostriches. The quagga was swift and enduring, but could be run down by a first-rate horse. Its extinction was mainly wrought by the Orange Free State and Transvaal Boers, who slew thousands annually for their skins. In the old days it was tamed with success, was more tractable than the zebra, and even bred in captivity. The term Quagga is a corruption of the old Hottentot name *Quacha*, bestowed in imitation of the peculiar barking neigh of this quadruped. The quagga is not to be confounded with Burchell's zebra, which is often erroneously called quagga by hunters of the South African interior.

Quail (*Coturnix*), an Old-World genus of the Partridge family (Perdicidæ), ranging over the temperate Palæarctic, Ethiopian, and Oriental regions, and in the Australian region to New Zealand. The quails are the smallest of the partridge family. Six species are described in this restricted genus. The best known is the Common Quail (*Coturnix communis*). In size it is about 7½ inches long; the general colour above is brown, varied with buff, and on the under parts buff. The male is somewhat smaller in size, is brighter, and has a reddish throat and two dark-brown bands descending from the ear-coverts and ending at the throat in a blackish patch acquired at the second year. Quails fly rapidly, and take long and fatiguing journeys. Immense flocks visit the countries bordering the Mediterranean, especially during the spring emigration; and they are caught for food in large numbers—17,000 have been brought to Rome in one day, and in the small island of Capri, in the Bay of Naples, over 160,000 have been netted in a single season. Many remain to breed, but the majority pass northwards. In England quails are spring visitors; they are becoming scarcer, but at times there is a great influx. Northwards the numbers are fewer, but nests have been found in the northernmost mainland of Scotland, and in the Orkneys, Shetlands, and Outer Hebrides, and in summer they reach the Faroe Islands. A few remain on the south-west coast of England and in Ireland during winter, but the majority leave in October; many pass the winter in the south of Europe and in North Africa; and the species is resident in the Canaries, Madeira, and the Azores. It is also found at the Cape, in Madagascar and Mauritius, and in Egypt, while in Palestine, as of old (Exod. xvi. 13), quails come up at night and cover the land. It ranges to India and China, and passes the cold season in those countries. Its flesh is considered a delicacy, and in the countries they commonly visit the arrival of the quails is eagerly expected. Quails feed chiefly on insects and slugs, but also on grain and seeds, and they seek their food in the evening. In habit they are unsociable, unamiable, and pugnacious with their own species. They are partly polygamous, partly monogamous. The female is, however, an excellent and careful mother. She builds her nest of bits of plants, and lays from seven to fourteen eggs, pear-shaped, light brown in colour, with dark shading. The young are full grown in six weeks, and two bevies may be reared during the season. The call-note of the male is three-syllabled, and from it the quail is known as 'wet-my-lips,' or 'wet-my-feet,' and the species has also for the same reason been named *C. dactylisonans*. The other species of this genus are *C. delegorguii* (named after the discoverer Delegorgue) and *C. coromandelica*, found in South Africa and India respectively in addition to the common quail; *C. pectoralis*, found in Australia and Tasmania; *C. caineana*, found in China; and *C. novæzelandiæ*, formerly abundant in New Zealand, but now almost extirpated by the bush fires. The Button-quails, a different group, including twenty species or more ranged under the genus Turnix or Hemipodus, are distributed in Barbary and in the Ethiopian, Indian, and Australian regions. Australia possesses a genus, Synoicus, peculiar to itself, which includes four species. The American Quails, of which there are about fifty or sixty species, are included in the family or sub-family Odontophoridæ, and differ in habit from all the Old-World forms in perching upon trees. The Virginian Quail (*Ortyx virginianus*), known as the Partridge and the Bob-White, from its calling-note, and the Californian Quail (*Lophortyx californica*) have been introduced into England as game-birds, but they have not yet become resident there.



Common Quail (*Coturnix vulgaris*).

Quain, a family of eminent medical men. (1) JONES QUAIN, born in November 1796, at Mallow in Ireland, studied medicine at Dublin and Paris, and in 1829 was appointed lecturer on Anatomy and Physiology in the Aldersgate School of Medicine, London. Two years later he was made professor of Anatomy and Physiology at London University, and held that post until 1836. He died in London on 27th January 1865. That well-known students' text-book, Quain's *Elements of Anatomy*, was originally written by him; the first edition appeared in 1828, the tenth in 1890. Jones Quain published also a series of elaborate *Anatomical Plates* (1858) and a translation of Martinet's *Pathology* (1835).—(2) RICHARD QUAIN, brother of the above, was born at Fermoy, Ireland, in July 1800, studied at London, and was appointed professor of Anatomy and Clinical Surgery in University College, London, in 1837. He was likewise appointed surgeon-extraordinary to the Queen, and was elected president of the Royal College of Surgeons in 1868. He died in London on 15th September 1887. Amongst his works the principal are *Anatomy of Arteries*, with folio plates (1845), *Diseases of the Rectum* (1854), *Observations on Medical Education* (1865), *Some Defects of Medical Education* (1870), and articles on *Dislocations of the Hip* and *the Knee*; he edited along with others the fifth edition of (Jones) *Quain's Anatomy*. By his will he left nearly £75,000 to University College, London, for the 'education in modern languages (especially English) and in natural science.'—(3) SIR RICHARD QUAIN, Bart., first cousin to both the above, was born at Mallow on 30th October 1816. He was Lumleian lecturer at the Royal College of Physicians (*Diseases of the Muscular Walls of the Heart*) in 1872, and Harveian Orator (*The Healing Art in its Historic and Prophetic Aspects*) in 1885, and was made physician-extraordinary to the Queen. He edited the *Dictionary of Medicine* (1882; 2d edition, 1894), and contributed to the *Trans. of the Med. and Chirurg. Soc.*, the *Lond. Jour. of Medicine*, &c. Dr Quain was made LL.D. of Edinburgh in 1889, president of the General Medical Council in 1891, and was created a baronet in 1891.—(4) Another member of the family, Sir John Richard Quain, born at Mallow in 1817, the half-brother of Jones and Richard Quain, was made a judge of the Court of Queen's Bench in 1872, and justice of the High Court of Judicature in 1875. He died 12th September 1876. Along with H. Holroyd he published *The New System of Common Law Procedure* (1852).

Quakers. See Friends.

Quantification of the Predicate, a phrase belonging to Logic, and introduced by Sir W. Hamilton. According to the Aristotelian Logic, propositions are divided, according to their *quality*, into affirmative and negative, and, according to their *Quantity*, into universal and particular ('*All* men are mortal,' '*Some* men live eighty years'). If we combine the two divisions we obtain four kinds of propositions. Sir W. Hamilton affirmed that the statement of the *Quantity* of these various propositions is left incomplete; only the *subject* of each has its quantity expressed (*all* men, *some* men, *no* men); while there is implied or understood in every case a certain quantity of the *predicate*. Thus, 'All men are mortal,' is not fully stated; the meaning is, that all men are a *part* of mortal things, there being (possibly and probably) other mortal things besides men. Let this meaning be expressed, and we have a complete proposition to this effect: '*All* men are *some* (or part of) mortals,' where quantity is assigned, not only to the subject, but also to the predicate. The first result of stating the quantity of the predicate is to give eight kinds of propositions instead of four; the next result is to modify the process called the Conversion of Propositions. *Limitation* (All A is B, *some* B is A) is resolved into simple conversion, or mere transposition of premises without further change. 'All A is *some* B;' 'Some B is all A.'

The multiplication of varieties of propositions is attended with the further consequence of greatly increasing the number of *syllogisms*, or forms of deductive reasoning (see Syllogism). In the scholastic logic, as usually expounded, there are nineteen such forms, distributed under four figures (four in the first, four in the second, six in the third, five in the fourth). By ringing the changes on eight sorts of propositions, instead of the old number, four, *thirty-six* valid syllogisms can be formed in the first figure. Whether the increase serves any practical object is another question. Sir W. Hamilton also considered that the new system led to a simplification of the fundamental laws of the syllogism.

Professor De Morgan also invented and carried out into great detail a plan of expressing the quantity of the predicate. It should be noted that in the *Contemporary Review* of 1873 Professor Jevons, following Mr Herbert Spencer, recognised the fact that the discovery of the quantification of the predicate, regarded by him as the most fruitful discovery in abstract logical science since the time of Aristotle, was fully contained in George Bentham's *Outlines of a New System of Logic.* This work was published in 1827, and reviewed by Sir W. Hamilton in the *Edinburgh Review*, long ere he himself published anything on the doctrine of quantification. Boole's system of logic was based on his doctrine of quantification of the predicate. See Jevons's *Logic;* Bowen's *Treatise on Logic* (Cambridge, U.S., 1866).

Quantocks. See Somersetshire.

Quarantine (from the Fr. *quarantaine*, 'a period of forty days') is a forced abstinence from communication with the shore which ships are compelled to undergo when they are last from some port or country where certain diseases held to be infectious, as yellow fever, plague, or cholera, are or have been raging. Where a quarantine is established it is a punishable offence for any person in the suspected ship to come on shore, or for any one to disembark any merchandise or goods from her, except at lazarettos, which are establishments provided for the reception of goods or passengers or crew, and where such purifying processes as the sanitary science of the time prescribes are applied. Prolonged quarantine in bad quarters is apt to produce new diseases in typhus, &c. Until a ship is discharged from quarantine she exhibits a yellow flag at the mainmasthead if she has a clean bill of health, and a yellow flag with a black spot if not clean; at night a white light is exhibited at the same place. The permit to hold intercourse after performing quarantine is called Pratique. Quarantine is not of necessity limited to a sea-frontier; and it is enforced at the frontiers between contiguous states. History declares quarantine regulations for maritime intercourse to have been first established by the Venetians in 1127 A.D.; but the practice must have been greatly older on land-frontiers; and the precautions of the Jews against leprosy indicate that a species of quarantine was enforced by them. The law for regulating quarantine in Britain is 6 Geo. IV. chap. 78, amended by 29, 30 Vict. chap. 90; power to proclaim any place subject to quarantine and prescribe regulations being vested in the Privy-council. See Bill of Health.

Quarles, Francis, a minor religious poet, belonged to a good Essex family, and was born at the manor-house of Stewards near Romford in 1592, being baptised on 8th May. He studied at Christ's College, Cambridge, and at Lincoln's Inn, and was successively cup-bearer to the Princess Elizabeth, secretary to the famous Archbishop Ussher, and, like Middleton and Ben Jonson, Chronologer to the city of London (1639). He married in 1618 a wife who bore him eighteen children, and penned shortly after his death a touching short memoir, prefixed to *Solomon's Recantation* (1645). Quarles was a bigoted royalist and churchman, suffered losses and calumny in the cause, and died 8th September 1644. He wrote abundantly both in prose and verse, and his books were extraordinarily popular in their day. Nor are his *Divine Emblems* and *Enchiridion* entirely unworthy of their reputation. Pope's lines in the *Dunciad* are familiar to every one:

> Or where the pictures for the page atone,
> And Quarles is saved for beauties not his own.

But the clever gibe is not entirely justifiable, for the *Emblems*, in spite of verbose and dull if edifying moralising, helpless bad taste, not infrequent bathos, and ever present monotony, shows wealth of fancy, excellent good sense, felicity of expression, and occasionally a bright though intermittent flash of the true poetic fire. And the *Enchiridion*, a collection of short essays and meditations, affords many an example of compact and aphoristic prose, while its antithesis and word-play are often effective and sometimes fine.

His poetical works include *A Feast for Wormes* (1620); *Hadassa, or the History of Queene Ester* (1621); *Argalus and Parthenia*, his only long poem not directly religious (written apparently about 1622; first extant ed. 1629); *Sions Elegies wept by Jeremie the Prophet* (1624); *Iob Militant* (1624); *Sions Sonets sung by Solomon the King* (1625); *Divine Poems*, a collection containing many poems printed before (1630); *The Historie of Samson* (1631); various *Elegiacal Poems* (between 1630 and 1640); *Divine Fancies: Digested into Epigrammes, Meditations, and Observations* (1632); the famous *Emblemes* (1635), to which were added in 1638 *Hieroglyphikes of the Life of Man; Solomon's Recantation* (1645); and *The Shepheards*

Oracles delivered in Certain Eglogues (1646). The prose includes the *Enchyridion* (1640); *Observations concerning Princes and States upon Peace and Warre* (1642); *Judgement and Mercy for Afflicted Souls* (1646); *The Profest Royalist* (1645); and *The Virgin Widow*, a worthless comedy (1649). The only complete edition is that by the Rev. A. B. Grosart in the 'Chertsey Worthies Library' (3 vols. 1880–81).

Quarry. See BUILDING STONE, BLASTING.

Quart, the fourth part of a Gallon (q.v.). The ordinary *quart-bottle* is a deception, containing only the sixth part of a gallon, and often less.

Quartan Fever. See AGUE.

Quarter, a measure of weight, equal to the fourth part of a hundredweight—i.e. to 28 lb. avoirdupois. As a measure of capacity, for measuring grain, &c., a quarter contains 8 bushels.

Quarter-day. See TERM.

Quarter-deck, that part of the upper deck which extends from the mainmast or gangway amidships to the poop, or where there is no poop, to the stern; in modern turret and barbette war-ships it generally extends from the after-turret or barbette to the stern. It is the place of honour, and is considered the 'King's or Queen's Parade;' and every officer and man stepping upon it salutes it, as a mark of respect to the majesty of the throne. 'H.M. quarter-deck' is used as a promenade by officers only, at sea the weather side, and in harbour the starboard side being reserved for senior officers. Persons of distinction and officers are received on the quarter-deck; and when the captain addresses the men, or confers rewards or honours on any individual, it is on the quarter-deck that the officers and men fall in for the purpose.

Quartering. See HERALDRY; also EXECUTION, TREASON.

Quarterly Review. John Murray, conscious of the growing power and influence of the *Edinburgh Review*, and strongly disapproving of its Whig opinions, set about the organisation of a work which should counteract what he believed to be its dangerous tendencies. Accordingly, in September 1807, he wrote to Canning with a view of securing his interest in 'a work of the greatest talent and importance.' Though Canning does not seem to have replied directly, his cousin, Mr Stratford Canning, introduced Gifford (q.v.) to Murray in January 1808, and arrangements were afterwards made whereby he became its first editor. Murray sagaciously concluded on reading a review on *Marmion* in the *Edinburgh* (1808) that Scott's feelings as a gentleman and a Tory must be wounded, and that he would break his alliance with the whole Whig clique. He judged truly, and in a conference with him at Ashiesteel, in October 1808, he secured his assistance and co-operation. Scott not only wrote to his brother Thomas, C. K. Sharpe, Morritt, and Southey, on behalf of the first number, but sent a letter of advice to Gifford, and became himself a considerable contributor. The first number, rather more literary than political in tone, appeared at the end of February 1809. An edition of 4000 was sold at once, of which 850 went to Ballantyne in Edinburgh. The publisher bravely persevered, though up to the fifth number not one had paid its expenses, and though £5000 of capital was embarked in the undertaking. By 1817 it was an assured success, 14,000 being printed, and Southey, who was its 'sheet anchor,' wrote that 'Murray is a happy fellow living in the light of his own glory.' Great drawbacks were Gifford's unpunctuality, and occasional ill-health. Only two numbers appeared in 1824—No. 60, due in January, in August; and No. 61, due in April, in December. Gifford, resigning the editorship in 1824, was succeeded by John T. Coleridge, who edited only four numbers; his successor was John Gibson Lockhart (q.v.). Murray's original offer to Gifford as editor was 160 guineas a number for contributions, and £200 a year as editor; when he invited Lockhart to London his offer was £1000 a year, which could be made £1500 by contributions, and a share for three years, the profits of which would not be worth less than £1500 per annum. Besides Scott and Southey, George Ellis, Heber, Barrow, Croker, and Captain Head were considerable contributors. Croker had 99 articles in the first 100 numbers. A frequent rate of payment to Scott and Southey was £100 per article. The fashion of the times, and the lighter monthlies, have told against the *Quarterly*, which still commands, however, the best ability and scholarship in England. See Smiles, *A Publisher and his Friends* (2 vols. 1891), and articles BOOK-TRADE, MURRAY (JOHN), and PERIODICALS.

Quartermaster. In the British army the *quartermaster-general* is a staff-officer of high rank (major-general or colonel) who deals with all questions of supply, transport, marches, quarters, fuel, clothing, &c. He ranks next after the adjutant-general or senior staff-officer to the commander-in-chief at the War Office, and has under him two assistants and three deputy-assistants. The army in India has a similar staff for these duties, and so has every division; but since 1889 the title of assistant adjutant-general (B) has been substituted for that of assistant quartermaster-general on the staff at home. In a brigade the duties fall upon the brigade-major. A *quartermaster* is an officer on the staff of a depôt, a cavalry regiment, or an infantry battalion, charged with the care of stores, issues of clothing, food, forage, and fuel, allotment of barracks, tents, &c. In the native army of India he is a combatant officer of the staff-corps, but in other cases he is commissioned from the ranks as honorary lieutenant, and promoted after ten years' service, or for distinguished conduct, to the honorary rank of captain or major. In the Royal Artillery there are 44 quartermasters, in the Army Service Corps 49, and in the Royal Engineers 120, not counting those in the militia and volunteers. Several are employed, at the War Office and elsewhere, on duties different from those mentioned above; the War Office librarian, for instance, in 1891 being a quartermaster of the Royal Engineers. The daily pay of a quartermaster is 9s. for infantry; 9s. 6d. for garrison artillery and engineers, with 2s. 6d. engineer pay in addition in the latter corps; and 10s. 6d. for mounted troops, rising every five years by increments of 1s. 6d. to 15s., 15s. 6d., and 16s. 6d. respectively. After twenty years' commissioned service, or when fifty-five years of age, a quartermaster is compulsorily retired on a pension of £200 a year, or somewhat less if his total service as a soldier does not amount to thirty years. A *quartermaster-sergeant* assists the quartermaster in a regiment or battalion.

In the navy the *quartermasters* are first-class petty officers; at sea they are stationed at the bow, their duty being to take care that the helmsmen keep the ship on her proper course, and also to see that all orders from the officer of the watch affecting the movements of the helm are promptly and correctly carried out; they also assist in heaving the log and in taking soundings when necessary. In harbour they keep regular watch at the gangways, looking out for boats arriving and leaving, and conveying the necessary orders for the carrying out of the work of the ship. Their pay depends upon their gunnery or torpedo qualifications, number of good-conduct badges, &c., and will be found under the heading PETTY OFFICERS.

Quartern is a term employed in some parts of Great Britain to designate the fourth part of a peck; in liquid measure it is the fourth part of a pint, and so synonymous with the imperial gill. A quartern loaf generally weighs 4 lb.

Quarter Sessions, a court of Justices of the Peace (q.v.) established in 1350-51, and meeting once a quarter. Most of their administrative duties were in 1888 transferred to the County Councils (see COUNTY).

Quarter-staff, once a favourite weapon with the English for hand-to-hand encounters, and still sometimes used in athletic exercises, is a stout pole of heavy wood, about 6½ feet long, often bound with iron at both ends. It is grasped in the middle by one hand, the other holding half-way between the middle and end (hence apparently the name 'quarter-staff'); and the attack is made by giving it a rapid circular motion, which brings the loaded ends on the adversary at unexpected points. See *Broadsword and Singlestick*, by Allanson-Winn and Phillipps-Wolley (1890).

Quartett, a piece of music arranged for four solo voices or instruments, in which all the parts are *obligato*—i.e. no one can be omitted without injuring the proper effect of the composition. A mere interchange of melody, by which the parts become in turn principal and subordinate, without any interweaving of them, does not constitute a quartett. Quartetts for stringed instruments are generally arranged for two violins, viola, and violoncello, and are in sonata form. They originated with Haydn, and were further developed by Mozart, and notably by Beethoven, who perfected the art of part-writing. Subsequent writers are Schubert, Spohr, Mendelssohn, Schumann, and Brahms. Vocal quartetts are a frequent feature in oratorios and operas, up to the time of Wagner.

Quartodeciman Heresy. See EASTER.

Quartz, a mineral composed of silica, SiO_2. It is met with chemically pure, but not infrequently contains variable proportions of ferric oxide, manganese oxides, alumina, magnesia, lime, organic matter, &c. Very often it shows inclusions, microscopic or macroscopic as the case may be, of various minerals and fluid cavities. It occurs both in crystals and massive, the more common crystals being hexagonal prisms terminated by hexagonal pyramids. Double hexagonal pyramids are also not uncommon. It scratches glass easily, and becomes positively electrical by friction—two pieces rubbed together giving light in the dark. Quartz when pure is colourless, but, owing to the presence of foreign substances, many coloured varieties are known. Three types of quartz are recognised: (1) *Rock-crystal*, (2) *Common Quartz*, and (3) *Compact Quartz*.

Rock-crystal.—Under this head are included the varieties which are more or less transparent and assume well-marked crystalline forms. The water-clear crystals are known as *Rock-crystal*. The crystals are sometimes slender, crossing and penetrating each other in exquisite groups. They frequently enclose other substances, which are beautifully seen through the transparent rock-crystal, as slender hair-like or needle-like crystals of hornblende, asbestos, oxide of iron, rutile or oxide of titanium, oxide of manganese, &c., and such specimens are known by various fanciful names, as *Thetis' Hair-stone*, *Venus' Hair-stone*, *Venus' Pencils*, *Cupid's Net*, *Cupid's Arrows*, &c.; and sometimes the enclosed substances are small spangles of iron-glance, or crystals of iron pyrites, or native silver in fern-like leaves, or spangles of gold. Fluid inclusions are also not uncommon, as in the quartz of Poretta. Very large crystals of perfectly pure rock-crystal are sometimes found. One from the Alps, which was among the treasures carried from Italy by the French in 1797, is 3 feet in length, about 1½ feet in diameter, and weighs 7 cwt. Similar giant crystals are obtained in Madagascar. Rock-crystal was prized by the ancients, and was used by them, as it still is, for vases, cups, seals, &c. An important modern use of it is for lenses of spectacles, &c., its hardness rendering it much less liable to be scratched than glass. Lenses of rock-crystal are often called *Pebble* lenses. Rock-crystal is best developed in the crevices and cavities of crystalline schistose and granitoid rocks, such as those of Tyrol and the Alps, where it is associated with felspar, titanite, rutile, mica, chlorite, and other crystallised minerals. *Smoky Quartz*, smoky-brown; *Cairngorm*, smoky-yellow; and *Morion*, black, are varieties the colours of which have been variously attributed to the presence of small quantities of oxide of iron or manganese, or titanic acid or organic substance. Yellow and pellucid varieties of rock-crystal are known as *False Topaz*. *Amethyst* (q.v.) or *Amethystine Quartz* is purple or violet; the darker shades are often highly prized; sometimes speckled varieties of this beautiful mineral occur. When subjected to heat amethyst loses its violet colour and becomes yellow. The *Gold Topaz* and *Citrin* of jewellers are in most cases amethysts which have been treated in this way.

Common Quartz includes non-transparent varieties, some of which, however, are more or less translucent. They are either white, colourless, or coloured, the tints being generally pale, but many show intense shades of red, green, yellow, brown, &c. Sometimes they assume crystalline forms, at other times they have a granular or massive structure. The following are varieties: *Milk-quartz*, milk-white and slightly opalescent (Greenland, &c.); *Greasy Quartz*, like milk-quartz, but with a greasy lustre; *Rose-quartz*, rose-red, sometimes crimson, the colour fading on exposure (Bodenmais); *Siderite* or *Sapphire-quartz*, indigo or blue in colour, from the presence of asbestos-like fibres of blue crocidolite (Golling in Salzburg); *Ferruginous Quartz*, coloured red with ferric oxide or brown with hydrous ferric oxide; *Prase*, leek and other shades of green, which are due to needles of actinolite (Saxony, &c.); *Star-quartz*, containing within the crystal whitish or coloured eccentric radiations (Bohemia); *Fibrous Quartz*, brown, with a silky lustre, pseudomorphous after crocidolite (Cape of Good Hope); *Quartz-pisolite* is an oolitic aggregate of quartz granules (Sicily, Egypt); *Floatstone*, porous, cavernous, which floats in water until the air in its numerous cavities becomes displaced (Cornwall, &c.); *Cat's-eye*, yellow or greenish, exhibits opalescence, but without prismatic colours, an effect due to fibres of asbestos or minute tubes arranged in parallel directions (Ceylon, Harz, Fichtelgebirge, &c.).

Compact Quartz embraces compact and also finely granular aggregates, which are only translucent on their edges. Varieties are *Hornstone*, gray, brown, yellow, or red, common in many countries; *Chrysoprase*, a hornstone coloured green with nickel (Silesia); *Aventurine* (q.v.), a somewhat granular hornstone, spangled with scales of mica or goethite (Altai Mountains); *Jasper* (q.v.), brown, yellow, red, very impure, with a considerable percentage of iron.

Another group of minerals which are included in the quartz family are the chalcedonies. These are mixtures of crystalline and amorphous silica. *Chalcedony* (q.v.) itself is colourless or pale gray, or pale bluish or yellowish, translucent to semi-opaque, and occurs either in irregular layers or in mammillary, botryoidal, or stalactitic forms. The following are coloured chalcedonies: *Carnelian*, clear red and sometimes yellowish; *Plasma*, green; *Heliotrope* or Bloodstone (q.v.), green with red spots. *Cacholong* is a dull milk-white and sometimes porous chalcedony, but is regarded by some mineralogists as a variety of opal. *Mocha-stone* or *Moss-agate* is a colourless chalcedony, containing brown moss-like dendritic inclusions. *Agate* (q.v.) consists of alternate layers of chalcedony and other varieties of crystalline and amorphous silica. *Onyx* is composed of even layers of black or brown and white chalcedony; while in *Sardonyx*, which has a similar structure, the alternate layers are red and white. For amorphous forms of silica which contain variable quantities of water, see OPAL.

Quartz is the most abundant and widely diffused of all rock-forming minerals. It is an important and characteristic ingredient of acid igneous rocks, such as granite, quartz-porphyry, &c., and forms one of the principal constituents of gneiss. In many other igneous and schistose rocks it is met with as a more or less prominent constituent. It occurs also abundantly as a secondary mineral or alteration-product in igneous and schistose rocks generally—sometimes irregularly diffused, at other times occupying cracks, crevices, cavities, &c. Many rocks, especially Archæan and Palæozoic rocks, are traversed by veins of quartz, which vary in breadth from mere lines up to many feet. In some places such veins are more or less impregnated with gold—indeed quartz-veins may be looked upon as the chief repositories of the precious metal (see GOLD).

Quartz, in crystals, is also one of the most common minerals met with lining the walls of metalliferous lodes. Amongst derivative rocks it plays an important part—conglomerates and sandstones being composed as a rule chiefly of siliceous materials. Chalcedony as a rock-constituent is a product of alteration, and is met with commonly in the vesicles and pores of many igneous rocks, or as irregular aggregates diffused through their ground-mass. It is also a common vein-mineral—the coloured chalcedonies especially occurring in this form. Agates occur in veins, and especially in the amygdaloidal cavities of igneous rocks.

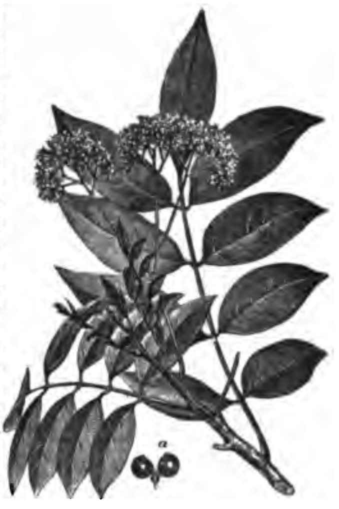
Quartz-porphyry, an igneous rock, consisting of crystals of quartz and felspar scattered porphyritically through a compact or very finely crystalline ground-mass of the same minerals. It occurs both as an intrusive rock and in the form of lavas which have flowed out at the surface. Some of the quartz-porphyries which have a very compact or microfelsitic ground-mass appear to have been originally volcanic vitreous rocks—the glass having subsequently become devitrified. The non-porphyritic varieties which have a flinty or hornstone-like aspect are called *Felsite* (q.v.). 'Quartzlers-porphyry' is a name for Orthoclase-porphyry (q.v.).

Quartz-rock, or QUARTZITE, is a commonly occurring rock, composed of an aggregate of quartz-grains welded together. It is usually white, gray, or rusty yellow or reddish in colour, and has a splintery fracture. Under the microscope the grains show a rounded and often semi-fused appearance, as if they had been mutually agglutinated while in a softened condition. The siliceous paste in which the granules are frequently set has usually a crystalline texture, and now and again crystals of quartz are developed in it. The rock not infrequently shows false-bedding, and occurs in strata of variable thickness, often forming mountain-masses. Sometimes it assumes a foliated structure (*Quartz-schist*), and contains scales of mica which occasionally form layers or laminæ. The rock is obviously of sedimentary origin, and has subsequently been subjected to metamorphic action.

Quartz-trachyte. See LIPARITE.

Quasimodo Sunday. See LOW SUNDAY.

Quassia, a genus of trees and shrubs of the natural order Simarubaceæ (q.v.); having hermaphrodite flowers, with five petals combined into a tube, and much longer than the small calyx, ten stamens, five germens, and only one style; the fruit composed of five drupes. *Quassia amara* is a native of the tropical parts of America and of some of the West India Islands. It is a shrub 10 to 15 feet high, with racemes of bright-red flowers, and large pinnate leaves, the stalks of which are remarkably winged and jointed. The wood, and particularly that of the root, has a strong, purely bitter taste, and was at one time much used in medicine under the names of *Quassia-wood*, *Bitter-wood*, &c. The flowers were valued in Surinam for their stomachic properties as early as the beginning of the 18th century; the wood of the root began to be known in Europe before the middle of that century, and was more fully brought into notice about 1756, by Rolander, a Swede, who had visited Surinam, and had learned its value from a negro, called Quassi, Quasha, or Quacy. This negro had discovered it about 1730, and had employed it with great success as a remedy for fevers, so that though, as Rolander says, a very simple man, he had acquired a great reputation by his use of it. Linnæus published a dissertation on it in 1761, and it was he who gave to the genus the name Quassia, from the name of the slave by whom its medicinal qualities had been made known. The true quassia is now, however, little used; its name having been transferred to the Bitterwood (q.v.) of the West Indies, *Picræna* (or *Quassia*) *excelsa*, a lofty tree, the wood of which possesses the same properties, although in an inferior degree; but this inferiority is compensated by the greater facility with which any requisite supply is obtained. It is the wood of this tree which is now sold as *Quassia-wood*, or *Quassia-chips*, in the shops. It is used to a considerable extent instead of hops for making beer, although the use of it is illegal in Britain, and beer made with it is said to become muddy and flat, and not to keep. Quassia-wood is very feebly narcotic, and a decoction of it is used for killing flies. Cabinet-work made of it is safe from all attacks of insects. In medicine it is a valuable stomachic tonic; but in fevers it is not to be compared in efficacy with cinchona and its alkaloids. Its properties depend on a bitter principle called quassiin, $C_{10}H_{12}O_3$, which is present in minute amount in the wood.



Quassia: Bitterwood (*Picræna excelsa*), branch with bisexual flowers: *a*, fruit.
(Bentley and Trimen.)

Quaternary, or POST-TERTIARY, the fourth great division of the fossiliferous strata, which embraces the Pleistocene or Glacial (q.v.) and Post-glacial and Recent (q.v.) systems.

Quaternions (or 'sets of four'), the name of a calculus of peculiar power and generality invented by Sir William Rowan Hamilton (q.v.) of Dublin. As a geometry, it primarily concerns itself with the operations by which one directed quantity or Vector (q.v.) is changed into another. Such an operation is called a quaternion, for reasons which will appear hereafter. From this point of view alone we shall discuss it here. We assume the law of vector addition, which asserts that the vector or directed line AC (see fig. 1) is equal to the sum of the vectors AB and BC—or any other directed lines parallel and equal to them. For example, the resultant of two velocities or coterminal forces is a vector equal to the vector sum of the components (see COMPOSITION). Quantities which do not involve the idea of direction or directedness are called *Scalars*; such are the quantities used in arithmetic and ordinary algebra. Parallel vectors can all be represented as scalar multiples of one another, or (better) of the parallel vector whose length is unity. By the latter representation, the scalar multiple gives the length or *tensor* of the vector. Thus any vector α may be factorised into its tensor and directed unit part. This is symbolised by the equation $\alpha = \mathrm{T}\alpha\mathrm{U}\alpha$, where T and U appear as selective symbols of operation, separating out the length and direction respectively.

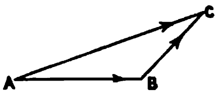


Fig. 1.

The operation which simply rotates a vector into a new direction without changing its length is a particular kind of quaternion called a *Versor*. A second application of this versor produces an extra equal rotation in the same plane—i.e. about the same axis. With every versor, therefore, are associated an axis having a definite direction and an angle through which any vector perpendicular to this axis is rotated by the versor operating on it. A very important case is the quadrantal or right versor, which turns a perpendicular vector through a right angle. Let i represent the right versor whose axis is perpendicular to the plane of the paper. Then (fig. 2) if β is any vector in the plane of the paper, the quantity $i\beta = \gamma$ gives a vector perpendicular to β and to the axis of i. A second operation gives

$$ii\beta = i^2\beta = i\gamma = -\beta,$$

or symbolically $i^2 = -1$. Thus the square of any right versor is negative unity. It is easy to show that ni, where n is a scalar, is an operator which still turns any appropriate vector through a right angle, but at the same time increases its tensor n times. Such an operator is a quadrantal quaternion, whose tensor is n and versor i. A quaternion can always be factorised into its tensor and versor parts.

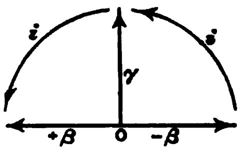


Fig. 2.

Now let Oi, OI (fig. 3) be the axes of two right versors i and I, making angle θ with each other. Describe the sphere of unit radius with O as centre, and draw the vector OA or α perpendicular to i and in the plane OiI. Draw OB or β perpendicular to i and α—i.e. upward from the plane of the paper; and finally draw OC or γ perpendicular to I and β. Then first $i\alpha = \beta$ and secondly $\mathrm{I}i\alpha = \mathrm{I}\beta = \gamma$; so that $\mathrm{I}i$ $(= \gamma/\alpha)$ is the versor which rotates α into the position γ. This versor has its axis parallel to OB, and its angle equal to the complement of θ. Thus any versor can be represented by the product of two right versors perpendicular to it and making with each other the appropriate angle. If the two right versors are themselves at right angles, their product becomes the right versor perpendicular to both. We thus arrive at what is historically the basis of quaternions—viz. Hamilton's remarkable system of mutually perpendicular right versors, ijk. As *operators* (see fig. 4) they are connected by the equations

$$\begin{aligned} ij &= k = -ji \\ jk &= i = -kj \\ ki &= j = -ik \\ ijk &= -1 = i^2 = j^2 = k^2. \end{aligned}$$

The special point to notice is the non-commutative character of the process of multiplication, ij *not* being the same as ji. The discovery of the equation $ij = -ji$ on October 16, 1843, was quickly followed by the development of the whole calculus of quaternions. Now, if j and k were *vectors* instead of right versors, the equation $ij = k$ would still be true as an equation of *operations*. In fact, as is capable of easy proof, right versors obey the law of vector addition; and in the identification of unit vectors and right versors, or more generally of vectors and right quaternions, lies one of the great simplifications of the calculus. Thus the operator $(i + j)$ is a right quaternion whose axis (see fig. 4) is along the diagonal of the square of which i and j are the sides, and whose tensor is equal to the length of this diagonal.

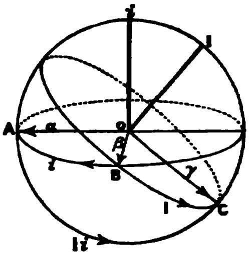


Fig. 3.

The following conclusions are readily come to. The square of every unit vector is negative unity; the product of two parallel vectors is *minus* the product of their tensors; the product of two perpendicular vectors is a third vector perpendicular to both and having its tensor equal to the product of the tensors of its factors; the product of any two unit vectors is in general a versor; the product of any two vectors is a quaternion whose tensor is the product of the tensors, and whose versor is as mentioned in the preceding sentence. The quaternion $\alpha\beta$ transforms β^{-1} into the vector α; and β^{-1}, being itself that quaternion which undoes the effect of the right quaternion β, must also be a right quaternion—i.e. a vector. In fact, β^{-1} is always equal to a scalar multiple of $-\beta$. Hence the quaternion $\alpha\beta$ is the operator which changes the vector β^{-1} into the vector α. This operation involves *four* numbers: first, the change of length; second, the angle through which the one vector must be rotated so as to bring it into parallelism with the other; and third and fourth, the two numbers necessary to fix the *aspect* of the plane in which the rotation takes place, or the direction of the axis about which rotation takes place. Thus a quaternion, in general, depends on *four* numbers, whence the name. A vector or quadrantal quaternion is a degenerate quaternion,

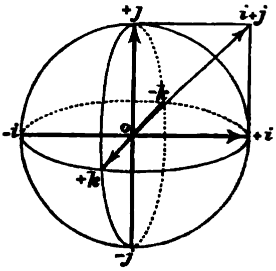


Fig. 4.

involving only *three* numbers; while a scalar, which might be defined as the quaternion which changes one vector into a parallel one, is still more degenerate, involving only *one* number—viz. itself.

There is still one very important representation of a quaternion to consider. This is done most simply as follows: Let $\alpha\beta$ be the two vectors OA, OB (fig. 5). Resolving β along and perpendicular to α we get $\beta =$ OM + ON; and hence $\alpha\beta =$ OA.OM + OA.ON. But OA.OM, being the product of two parallel vectors, is *minus* the product of the lengths or tensors. On the other hand, the product OA.ON, being the product of two perpendicular vectors, is a vector perpendicular to the plane of the paper with tensor equal to twice the area of the triangle OAB. Thus the quaternion $\alpha\beta$ is equal to the sum of a scalar and a vector; and generally for any quaternion (q) we have the relation

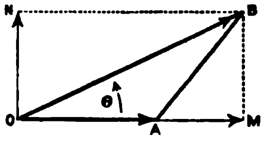


Fig 5.

$$q = \mathrm{S}.q + \mathrm{V}.q,$$

where S selects the scalar part and V the vector part. The geometrical meanings of S and V operating on $\alpha\beta$ are easily seen to be these—

$$\mathrm{S}.\alpha\beta = -\,\mathrm{T}\alpha\mathrm{T}\beta\cos\theta, \qquad \mathrm{V}.\alpha\beta = \iota\mathrm{T}\alpha\mathrm{T}\beta\sin\theta,$$

where ι is the unit vector perpendicular to α and β.

We end with a few illustrations. Thus, if α is a constant vector, and ρ a variable vector, the equation $\mathrm{S}.\alpha\rho = c$, a constant, means that the resolved part of ρ along the direction of α is constant, and that therefore the extremity of ρ traces out a plane perpendicular to α. The versor that turns any line through an angle θ in a given plane has the form $\cos\theta + \iota\sin\theta$, where ι is the right versor perpendicular to that plane. Demoivre's theorem (see DEMOIVRE) at once follows if we write $\iota = \sqrt{-1}$. Finally, if β represents a force acting at the extremity of α, $\mathrm{V}.\alpha\beta$ is the vector moment of the force about the origin; and in the almost self-evident equation

$$\mathrm{V}.\alpha\,(\beta + \beta^1) = \mathrm{V}.\alpha\beta + \mathrm{V}.\alpha\beta^1$$

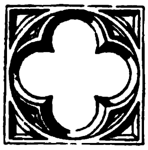
we have a completely general demonstration of Varignon's theorem of moments. See MOMENT.

Hamilton's *Lectures on Quaternions* (1853) and his *Elements of Quaternions* (1866) are still the classical works on the subject. Tait's *Elements of Quaternions* (3d ed. 1890) is probably better fitted as a text-book for the student to work through, and contains some original applications of high physical interest. Kelland and Tait's *Introduction to Quaternions* (1874) may be recommended to the beginner Tait's treatise has been translated into French and German.

Quatre-Bras, a village of Belgium, about 10 miles SSE. of Waterloo, situated at the intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name ('four arms'). On 16th June 1815, two days before the battle of Waterloo (q.v.), Quatre-Bras was the scene of a desperate battle between the English under Wellington and the French under Ney. The honours of the field remained with the former; but the severe defeat of Blücher the same day at Ligny compelled Wellington to retreat. The loss on the English side was 5200, on the French 4140, amongst the Allies being the Duke of Brunswick, the gallant chief of the Black Brunswickers. A monument to his memory, a bronze lion 10½ feet high, was erected in 1890.

Quatrefages, JEAN LOUIS ARMAND DE, a naturalist, was born at Berthezenne (Gard) on 10th February 1810, studied medicine at Strasburg, and in 1838 was appointed professor of Zoology at Toulouse. But this post he soon resigned and went to Paris, to study further for himself. In 1850 he was elected professor of Natural History in the *Lycée Napoléon*, and in 1855 of Anatomy and Ethnology at the Natural History Museum in Paris. He devoted his attention principally to anthropology and the lower animals, especially annelids. His chief works are *L'Espèce Humaine* (1877; 8th ed. 1886; Eng. trans. 1879); *Souvenirs d'un Naturaliste* (1854; Eng. trans. 1857); *Unité de l'Espèce Humaine* (1861); *Crania Ethnica* (1875–82); *La Race Prussienne* (1879; Eng. trans. 1872); *Les Pygmées* (1887); and *Histoire Naturelle des Annelés* (2 vols. 1866). In 1889 he was elected president of the French Geographical Society. Died January 12, 1892. For his position as an anthropologist, see ANTHROPOLOGY.

Quatrefoil, an opening in tracery, a panel, &c., divided by cusps or featherings into four leaves. This form is much used as an ornament in Gothic architecture.



Quatrefoil.

Quatremère, ÉTIENNE MARC, a French orientalist, was born in Paris, 12th July 1782, and from his earliest childhood to his latest years was immersed in study; he lived more after the fashion of a mediæval recluse than a modern scholar. Employed in 1807 in the manuscript department of the Imperial Library, he was promoted in 1809 to the Greek chair in the College of Rouen, and in 1819 to the chair of Ancient Oriental Languages in the Collége de France, and in 1827 he became professor of Persian in the School for Modern Oriental Languages. He died 18th September 1857. Although a man of vast and accurate knowledge, he had little critical insight or originality. His principal works are *Recherches sur la Langue et la Littérature de l'Égypte* (1808), proving that the language of ancient Egypt is to be sought for in modern Coptic; *Mémoires Géographiques et Historiques sur l'Égypte* (1810); *Mémoire sur les Nabatéens* (1835); *Histoire des Sultans Mameloucks* (1837), from the Arabic of Makrizi; *Histoire des Mongols de la Perse* (1836), from the Persian of Rashid ed-Din; an edition of the Arabic text of the Prolegomena of Ibn-Khaldun; and a multitude of articles scattered through the pages of the *Journal Asiatique* and the *Journal des Savants.* Besides this, he gathered materials for Arabic, Coptic, Syriac, Turkish, Persian, and Armenian dictionaries.

Quattro Cento (Ital., 'four hundred,' a contraction for one thousand four hundred; cf. CINQUE CENTO), in Italian a term for the 15th century, its literature and art; the early Renaissance. Outstanding *Quattrocentisti* in art are Donatello, Della Robbia, Brunellesco, Masaccio, Ghirlandajo, Lippo Lippi, and Mantegna.

Quebec, a province of the Dominion of Canada, lies to the east of Ontario, and between that province and New Brunswick. Deducting the surface of its inland waters, including the River and Gulf of St Lawrence, the area of Quebec amounts to 228,900 sq. m., or 146,496,000 acres. The surface of the country is varied and grand, consisting of extensive rivers and lakes, large stretches of agricultural land, and immense forests. Two ranges of mountains run through the province from southwest to north-east, that on the south side of the St Lawrence being called the Notre Dame or Green Mountains, stretching from Quebec to Gaspé, while on the north side of the river is the Laurentian Range (see CANADA). The chief river in the province is of course the St Lawrence (q.v.), which has many tributaries of great length, the principal being the Ottawa, the St Maurice, and the Saguenay. The influence of the tide in the St Lawrence is felt as far up as the town of Three Rivers, which is nearly 900 miles from the Straits of Belle Isle. Several of the rivers are navigable for the greater part of their course, while others are used in floating timber, and besides supply manufacturing industries with almost unlimited water-power. There are numerous lakes in the province, of which the best known are Temiscamingue, Metapedia, Temiscouata, Memphremagog, and St John. The province has a coast-line of 825 miles on the Atlantic.

The climate of Quebec is very much like that of the other parts of eastern Canada, excepting perhaps that the winter is slightly colder; but, as in Ontario and in the maritime provinces, the air is generally dry and brilliant, the cold is not felt to be unpleasant, and it is no disadvantage to either the agricultural or other industries; in fact, the climate is exceedingly healthy. The soil of the province is rich and loamy, well adapted for the growth of products of all kinds. Cereals, hay, and root-crops grow everywhere in abundance. Indian corn, hemp, flax, and tobacco are also raised in many parts of the province. Fruit in considerable quantities is grown, especially apples and plums, which are exported largely. Small fruits are very abundant, and grapes ripen in the open air in many districts. Tomatoes are also a field-crop. Cattle-breeding on a large scale is carried on, and many thousands of animals are exported to Great Britain yearly. For pasturage the land of Quebec is of special excellence, particularly in the eastern townships and north of the St Lawrence.

The fisheries in the River and Gulf of St Lawrence are very prolific, and all the smaller rivers teem with fish. Along the St Lawrence especially this industry is an important one. The value of the fisheries in 1889 was $1,876,194. The province is notably rich in minerals. Alluvial gold is found in various places, copper is found in the eastern townships, while iron is very generally distributed. Other minerals, such as lead, silver, platinum, and zinc, are also found, while the asbestos deposits, and those of apatite, or phosphate of lime, have achieved a reputation far beyond the limits of the province. Agriculture and dairy-farming form the chief occupations of the people at present, but manufactures, the fisheries, and commerce employ a considerable part of its inhabitants, as do also lumbering, mining, and shipbuilding. The principal articles manufactured are cloth, linen, furniture, leather, sawn timber, flax, iron and hardware, paper, chemicals, sugar, soap, india-rubber goods, boots and shoes, cotton and woollen goods, cheese (there were 672 cheese-factories and creameries in 1891), and all kinds of agricultural implements. Good wagon-roads abound, and in 1890 Quebec had 2688 miles of railway in operation, besides important canals, such as the Lachine, Beauharnois, and Chambly. The imports of the province in 1889–90 were valued at $45,485,026, of which $19,329,560 came from Great Britain, and $15,873,968 from the United States. The exports, for the same period were valued at $34,640,633, of which $28,020,311 went to Great Britain, and only $4,372,529 to the United States. Of the exports the most important were the products of the forest, $11,672,758, animals and their products, $16,178,404, and agricultural products, $3,406,749. The revenue of the province for the year 1889 was $5,997,565, the expenditure being $5,124,136. The revenue is derived from the subsidy from the Federal treasury, receipts from land sales, timber limits, mines, licenses, and certain other direct taxes. The affairs of the province, which is divided into 63 counties, are administered by a lieutenant-governor, who is appointed by the governor-general, an executive council consisting of 24 members appointed for life, and a legislative assembly of 73 persons elected every four years. The province is represented in the Dominion Senate by 24 members, and in the House of Commons by 65 members. The population consists largely of French-Canadians, descendants of the French settlers living in the country when it was transferred to Great Britain in 1763. The population in 1881 was 1,359,027, of whom 1,073,820, or 79 per cent. of the total, were French, 123,749 Irish, 81,515 English, and 50,923 Scotch. In 1891 the total population was 1,488,586. In 1763, at the time of the cession, the French population did not exceed 70,000, so that the progress in less than 130 years has been very remarkable, and in strange contrast to the state of things in old France. Families of twelve and fourteen are quite common amongst French-Canadians. The English population does not increase in the same way. Farms are subdivided amongst all the children as in France. In religion the Roman Catholics naturally prevail, but the Protestant churches flourish in the different cities, and the rights of the minority, both in religious and educational matters, are protected by statute. Education is under the supervision of a council, which is divided into two committees for the government of Roman Catholic and Protestant schools respectively. The two Protestant universities are M'Gill at Montreal and Bishop's College at Lennoxville; Laval, the Catholic university, is at Quebec. The principal city in the province is Montreal, which now claims a population of 210,000, and is the commercial metropolis of the Dominion. The next is Quebec, the most historic city in Canada, and the seat of the provincial government.

From a historical point of view the province of Quebec is probably the most interesting part of the continent, and has already been described up to the 'Quebec Act' of 1774 in the article Canada (q.v.). The French language is still used in the province, and is sanctioned by law; the same remark applies to the French law. It is generally supposed that these privileges were conferred upon the French-Canadians by statute, but this is not the case. By the proclamation of 1763 French law was abolished in the province, and the English law substituted for it. The civil law of France was established again in 1791, and the use of the French language was officially recognised for the first time in that year; but by the Act of 1840 the French language was again set aside, and it was only legalised again in 1848. The principal historical occurrences in the 19th century have been the rebellion of 1837–38, which led to the union of Upper and Lower Canada in 1840, and the subsequent difficulties which ended in the confederation, of 1867, with the other provinces of Canada.

See *Quebec Past and Present*, by J. M. Lemoine (Montreal, 1876); *Picturesque Quebec* (1881); *Mineral Resources of Quebec* (Geol. Sur. of Canada, 1888); Sketch of the Province, by the Hon. Honoré Mercier (1890); Garneau's *History of Canada*; *Histoire des Canadiens Français*, by Sulte; Cassell's *Picturesque Canada*; and handbooks issued by the Canadian government.

Quebec, capital of the province of that name, is situated on a steep promontory on the north-west bank of the St Lawrence at its junction with St Charles River, 300 miles from the Gulf of St Lawrence and 180 miles below Montreal (172 by rail). The highest part of the headland is Cape Diamond, 333 feet above the level of the river. Quebec is the most important military position in Canada. The citadel occupies an area of 40 acres, and commands a magnificent view. The harbour is spacious, and the docks and tidal basin are perfect specimens of engineering skill. On the Levis side of the river is the extensive graving-dock. The city is divided into an Upper and Lower Town. In the latter are situated the banks, warehouses, and wholesale and retail stores. In the Upper Town are the principal residences, public buildings, churches, gardens, and retail shops. Towards the west are the thriving suburbs of St John, St Louis, and St Roch's. The last named has become a place of commercial importance, with its immense warehouses and stores. To the south-west of St John are the Plains of Abraham, the historic battlefield, where a column 40 feet high has been erected to the memory of General Wolfe. Another monument, 65 feet high, dedicated to Wolfe and Montcalm, is situated in the Governor's Garden, and immediately overlooks the St Lawrence. On the Ste Foye Road is an iron pillar crowned by a bronze statue, commemorating the deeds of the British and French under Murray and Levis in 1760. There is a shaft also to the memory of Jacques Cartier and the Jesuit Brébeuf. Four martello towers occupy elevated positions. In the Upper Town is Dufferin Terrace, 1400 feet long and 200 feet above the water level, commanding a noble view. The Grand Battery is also picturesquely situated. Three handsome modern gates have replaced the old gates. The principal edifices are the parliamentary and departmental buildings, court-house, post-office, custom-house, city hall, masonic hall, basilica, the archiepiscopal palace, the Anglican Cathedral, Church Hall, and Young Men's Christian Association building. Laval University, named after the first Roman Catholic bishop of Quebec, who in 1663 founded the seminary, is an important institution, holding two charters, one from Queen Victoria (1852) and the other from Pope Pius IX. The building is spacious, well equipped, and contains a library of 90,000 volumes, a museum and art gallery, laboratory, &c. The faculties are theology, law, medicine, and arts. At the Grand Seminary theology is taught; the minor seminary is devoted to literature and philosophy. Other Roman Catholic halls of instruction are Laval Normal and Model School, the Ursuline Convent, the Convent of the Good Shepherd, and several nunneries. Morrin College, Presbyterian, is affiliated with M'Gill University. The principal benevolent institutions are the Marine Hospital, the Jeffrey Hale Hospital, the Hôtel Dieu, the Finlay Asylum, Church of England Female Orphan Asylum, Ladies' Protestant Home, St Bridget's Asylum, the Grey Nunnery, and the lunatic asylum at Beauport. Eight daily newspapers are published, five in the French language. The supply of water is continuous and good, and comes from Lake St Charles. The city is lighted with gas and electricity, the power for the latter being afforded by the Falls of Montmorency, 9 miles distant.

Quebec is connected with all the cities in America by various lines of railway, and is at the head of ocean steamship navigation to Europe. Shipbuilding has fallen off considerably of late years. The principal manufactures are worsted goods, iron-castings, machinery, cartridges, cutlery, nails, leather, musical instruments, boots and shoes, paper, tobacco, steel, &c. The chief exports are timber and lumber. In 1889 the exports amounted to $5,757,835, the imports to $3,815,151. The real estate is valued at $26,000,000. The city elects three members to the Canadian House of Commons and three members to the Quebec House of Assembly. Quebec is the seat of the Roman Catholic cardinal-archbishop and the see of the Anglican bishop. It was originally called Stadacona, and was visited by Cartier in 1535. In July 1608 Champlain founded the town and gave it its present name. It continued to be the centre of French trade and civilisation, as well as of the Roman Catholic missions in North America, till 1759, when it fell into the hands of the British (see WOLFE). In 1763 it was ceded to Great Britain by the treaty of Paris. Pop. (1852) 42,052; (1881) 62,446; (1891) 63,090; in 1889 to the city proper was annexed the suburb of St Sauveur, with its population of 15,000.

Quebracho is the bark of *Aspidosperma quebracho* (natural order Apocynaceæ), which grows in the Argentine Republic. It has a slightly bitter taste, and contains a number of active principles, of which the most important is aspidospermine. Both the bark and aspidospermine act like quinine in lowering the temperature in some cases of fever. They promote secretion from the kidneys, intestinal and salivary glands, and relieve dyspnœa or asthma of functional origin. The bark is taken in doses of five to eight grains, aspidospermine in doses of one grain, per day.

Quedah, or KEDAH, a state on the west side of the Malay Peninsula, with an area of 3600 sq. m. and a pop. of 30,000, nominally subject to Siam. The capital, from which the state takes its name, has about 8000 inhabitants.

Quedlinburg, a town of Prussia, at the northern base of the Harz Mountains, 56 miles by rail SE. of Brunswick. Founded by Henry the Fowler in 924, it is still in part surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, which prior to the Reformation was the residence of the abbesses of Quedlinburg, who were independent princesses of the empire, and had a vote in the diet, and other privileges. The castle chapel contains monumental tombs of Henry I., his wife Matilda, and the Countess of Königsmark. Here Klopstock and Karl Ritter were born. The town has manufactures of sugar, wire goods, and farinaceous foods, and gardening is prosecuted on an extensive scale. Pop. (1890) 20,761.

Queen (A.S. *cwén*, 'a woman,' cognate with Dutch *kween*, Ice. *kván*, Gr. *gynē*, Sansk. *jani*), in its primary signification, the king's consort, who has in all countries been invested with privileges not belonging to other married women. The English queen, unlike other wives, can make a grant to her husband, and receive one from him. She can sue and be sued alone, and purchase land without the king's concurrence. The Statute of Treasons makes it treason to compass her death, or to violate her chastity, even with her consent, and the queen consenting is herself guilty of treason. If accused of treason, the queen is tried by the peers of the realm. The queen-consort is exempt from paying toll, and from amercements in any court. She has a Household (q.v.) of her own. It has been the usual practice to crown the queen-consort with solemnities similar to those used in the coronation of the king. In the case of Queen Caroline, consort of George IV., who was living apart from her husband, this was not done. Certain rents or revenues were anciently appropriated to the income of the queen, but no separate revenues seem ever to have been settled on any queen-consort by parliament. Her personal expenses are defrayed from the king's privy purse.

The queen-dowager is the widow of the deceased king. She retains most of the privileges which she enjoyed as queen-consort, nor does she lose her dignity by re-marriage; but it has been held that no one can marry the queen-dowager without permission from the king, on pain of forfeiture of lands and goods. On the marriage of a king, or accession of an unmarried prince, parliament makes provision for the queen's maintenance, in case of her survivance.

The queen-regnant is a sovereign princess who has succeeded to the kingly power. In modern times, in those countries where the Salic law does not prevail, on failure of males a female succeeds to the throne. By an act of Queen Mary, the first queen-regnant in England, it was declared 'that the regall power of this realme is in the quene's majestie as fully and absolutely as ever it was in any of her most noble progenitours kinges of this realme;' and it has since been held that the powers, prerogatives, and dignities of the queen-regnant differ in no respect from those of the king. The husband of the queen-regnant is her subject; but in the matter of conjugal infidelity he is not subjected to the same penal restrictions as the queen-consort. He is not endowed by the constitution with any political rights or privileges, and his honours and precedence must be derived from the queen. The Prince Consort was naturalised by 3 and 4 Vict., words being used which enabled him to be a privy-councillor, and sit in parliament; but it was provided that His Royal Highness was not, by virtue of his marriage, to acquire any interest in the property of Her Majesty. By a decree of the Queen, Prince Albert enjoyed place, pre-eminence, and precedence next to Her Majesty.

Queen Anne Style. See RENAISSANCE.

Queen Anne's Bounty, the name given to a fund appropriated to increase the incomes of the poorer clergy of England, created out of the first-fruits and tenths, which before the Reformation formed part of the papal exactions from the clergy. The first-fruits are the first whole year's profit of all spiritual preferments, and the tenths are one-tenth of their annual profits, both chargeable according to the ancient declared value of the benefice; but the poorer livings are now exempted from the tax. Henry VIII., on abolishing the papal authority, annexed both first-fruits and tenths to the crown; and, by an act passed in 1703, these revenues were set aside, with the consent of Queen Anne, to form a perpetual fund for the augmentation of poor livings. The Archbishops, Bishops, Deans, Speaker of the House of Commons, Master of the Rolls, Privy-councillors, Lieutenants and *custodes rotulorum* of the counties, the Judges, Queen's Serjeants-at-law, Attorney- and Solicitor-general, Advocate-general, Chancellors and Vice-chancellors of the two Universities, Lord Mayor and Aldermen of London, and mayors of the several cities, and by supplemental charter the officers of the Board of Green Cloth, the Queen's Council, and the four Clerks of the Privy-council were made a corporation by the name of 'The Governors of the Bounty of Queen Anne, for the augmentation of the Maintenance of the Poor Clergy;' and to this corporation was granted the revenue of first-fruits and tenths. The governors' grants consist of capital sums of £200 to meet benefactions of money, land, tithes, rent-charges, stipends, &c., of equal value, offered on behalf of benefices not exceeding £200 in net annual income. A benefaction may be offered and a grant sought either for the augmentation of the endowment of a benefice, or towards the cost of providing or improving a parsonage-house, &c. The application of the funds at the disposal of the governors is now made subject to a long series of statutory provisions. The annual revenue in 1890 was £176,896. See Cripps, *Laws of the Church and Clergy*.

Queen Anne's Farthings. See FARTHING.

Queenborough, a village on the Isle of Sheppey, Kent, 2 miles S. of Sheerness, was founded by Edward III. (1369), and named after Queen Philippa. A line of steamers sail daily between Queenborough and Flushing in Holland. Pop. 982.

Queen Charlotte's Islands, a group to the north of Vancouver Island, off the coast of British Columbia. Area, 5100 sq. m. The two principal islands, Graham and Moresby, have a length of 160 and a greatest breadth of nearly 70 miles. The climate is healthy, but very rainy. Anthracite coal, copper and iron ore, and gold-bearing quartz have been found, and forests abound. The inhabitants are about 2000 Indians, who engage in fishing. —*Queen Charlotte's Sound* is a strait separating Vancouver Island, on the north, from the mainland.

Queen of the Meadow. See SPIRÆA.

Queen's Bench. See COMMON LAW.

Queensberry, WILLIAM DOUGLAS, DUKE OF, 'Old Q,' was born in 1724, and succeeded his father as Earl of March, his mother as Earl of Ruglen, and his cousin in 1778 as fourth Duke of Queensberry. He was famous for years as a patron of the turf, and infamous always for his shameless debaucheries. He is said to have 'displayed great taste in a song,' but to-day lives solely through Wordsworth's indignant sonnet, composed at Neidpath, whose venerable trees 'degenerate Douglas' had felled, to spite his heir or to dower one who he flattered himself was his daughter. After long fear of death he died unmarried, worth over a million sterling, on 23d December 1810, and was buried beneath the communion-table of St James's Church, Piccadilly.

Queensberry Plot. See LOVAT.

Queen's College, for women (43 to 45 Harley Street, London), was established in 1848, and incorporated by royal charter in 1853. It owed its existence partly to the Governesses' Benevolent Institution and partly to a movement originated by the Rev. C. G. Nicolay, and supported by the Rev. F. D. Maurice and other King's College professors. Its Committee of Education as at first constituted included the names of Maurice, Trench, and Kingsley; of Sterndale Bennett and Hullah; of Ansted and Edward Forbes; of Mulready and Richmond. Its aim is to provide for the higher education of women, in the first place by a liberal school training, and subsequently by a six years' course of college education. The college curriculum includes the school for pupils under fourteen years of age, the preparatory class for pupils too old to be admitted to the school but too backward for the first year's classes in college, and the college course of three years for the training for the grade of 'associate,' or six years or more for that of 'fellow.' This college is self-supporting, and is at present without any endowment. The students number about 360, and are chiefly day scholars, but boarders are received by authority of the council at two adjoining houses in Harley Street. See the *Queen's College Calendar* for 1890–91 and *Queen's College; its Objects and Method*, by Professor Maurice (1848).

Queen's Colleges. See IRELAND, Vol. VI. p. 202.

Queen's Counsel. See KING'S COUNSEL.

Queen's County, an inland county of Leinster, Ireland, is bounded N. by King's County, S. by Kilkenny, and W. by Tipperary, and measures 33 miles by 37 in its extreme dimensions. Area, 424,854 acres. Pop. (1841) 153,988; (1861) 90,650; (1881) 73,124; (1891) 64,639, of whom 56,743 were Catholics. The number of acres under crop in

1890 was 131,680, and of these 45,312 were under grain-crops (chiefly oats and barley), 36,538 were permanent grass, 30,650 under green-crops (mostly potatoes and turnips), and 19,180 were meadows. Nearly 14¼ per cent. of the total area is barren. Queen's County is, for the most part, within the basin of the Barrow, and is flat and, except where bogs prevail, fertile. It is also drained by the Nore and crossed by the Grand Canal. On the north-western border lie the Slieve Bloom Mountains, reaching 1734 feet. Coal occurs in the south-east. Agriculture is the principal occupation; there is much dairy-farming, and a little woollen and cotton weaving. This district was made a shire in honour of Queen Mary, from whom also the chief town, Maryborough (pop. 2872), was called. The antiquities include a round tower and some ecclesiastical and feudal remains, the most important being a castle on the picturesque rock of Dunamase. The county embraces two parliamentary districts, each returning one member.

Queen's Evidence. See APPROVER.

Queensferry, a town of Linlithgowshire, 9 miles WNW. of Edinburgh, on the south shore of the Firth of Forth, which here is crossed by the great Forth Bridge (1882–90; see BRIDGE, Vol. II. p. 443). Named after St Margaret (q.v.), it has been a burgh of royalty since 1363, a royal burgh since about 1639, and a police-burgh since 1882; with Stirling, &c. it returns one member. Remains of a Carmelite friary were converted in 1890 into an Episcopal church; and one of its hotels is the Hawes Inn of Scott's *Antiquary*. In the neighbourhood are the seats of the Earls of Rosebery and Hopetoun. Pop. (1841) 1233; (1881) 1966; (1891) 1529.

Queensland. This, the youngest and second largest of the Australasian colonies, comprises an area of 668,497 sq. m., representing a country five and a half times the dimensions of the United Kingdom. It was little known until December 1823, when Surveyor-general Oxley, acting on information imparted by two castaway convicts, discovered the river which he named the Brisbane, in honour of the governor of the mother-colony of New South Wales. Queensland was proclaimed by imperial command a separate colony in 1859 under Sir George Ferguson Bowen as first governor. The coast-line is 2250 miles in extent. The southern boundary, beginning at Point Danger, generally follows the twenty-ninth parallel of south latitude. The northernmost point of the mainland is Cape York; but, since the annexation of the Torres Straits Islands, the limit may be reckoned from the parallel of 10°. Queensland is 1300 miles in length from north to south, and 800 miles at the greatest breadth. The width gradually lessens until, with Cape York peninsula, it assumes a pyramidal outline. Its western boundary for the most part is a straight line, marked by the 138th degree of longitude. Running more or less parallel with the eastern coast is a backbone of mountains, averaging a distance of 50 miles from the sea. Upon its intervening belt settlement has principally taken place. The Main Dividing Range is a continuation of the bolder Australian Alps of Victoria and the famous Blue Mountains of New South Wales. The highest peaks are Bellenden-Ker (5500 feet) and Mount Dalrymple (4250). The mean altitude of the range is 2000 feet. The east side is ridgy and thickly timbered with the eucalypti peculiar to the Antipodes. The country west of the mountains is to a large extent open downs and plains, often of the richest black soil, covered with the finest fattening herbage in the world.

Queensland is a fairly watered land. The largest rivers on the east coast are the Brisbane, Mary, Burnett, Fitzroy, Burdekin, and Johnston. There is also a western watershed, including the rivers Mulligan, Herbert, and Diamantina. The head-waters of the Thomson and Barcoo flow southward through the boundless prairie-country. The rivers Flinders, Leichhardt, Gilbert, Mitchell, and Gregory flow northward to the Gulf of Carpentaria. The eastern rivers, affording communication from the interior, have assisted in the creation of important industries and thriving ports along the island-studded coast. Rockhampton is on the Fitzroy, Maryborough on the Mary, and Mackay on the Pioneer. The principal harbour in Queensland is Moreton Bay, and between it and Thursday Island there are numerous ports of growing importance. The alluvial coast-lands are devoted to ordinary and semi-tropical agriculture and timber produce. The basaltic plains and tablelands beyond the Main Range, extending to what is still known as the 'Never Never country,' are occupied by pioneer pastoralists with their herds of sheep and cattle.

In such a colony, two-thirds of which lies within the tropics, there is a wide variety of climate and natural capabilities. The summer heat is undoubtedly great; but there is immunity from the hot winds which prevail in the other portions of Australia. The heat being dry, although the maximum register is 108° (the winter minimum being 34°), the exhilarating quality of the atmosphere is such that the hottest weather is not unbearable. For seven months of the year the climate is most enjoyable, and not inaptly compared with that of Madeira. At midsummer (Christmas time) the rainy season commences in the tropical portion, and extends more or less until March. The colony enjoys a high repute for health, gives a low death and a high birth rate, and is free from the scourges of pulmonary and contagious diseases. Invalids sent from the old country in what appear to be the last stages of consumption often regain health in Queensland, and live to become old inhabitants. The enumerated population in 1891 was 393,718, consisting of 223,779 males and 169,939 females. Free and assisted emigration is one of the features of government policy; and some idea of the rapid growth of Queensland may be formed from the fact that Brisbane, which in 1881 had a population of 30,955, ten years later numbered 93,657 within its five-mile radius. There are some 22,000 aborigines, mostly in the unsettled country. The revenue to June 1895 was £3,413,172; expenditure, £3,308,434; and in each of the preceding four years the revenue exceeded the expenditure. In 1894 the public debt amounted to £30,639,534—nearly £70 a head. A table of the population, revenue, comparative crops, exports, &c. of Queensland and the other Australian colonies will be found in the article AUSTRALIA.

Much of the marked prosperity of Queensland is due to the development of ocean and intercolonial steam communication. The British India Steam Navigation Company has a direct line between London and Brisbane, carrying monthly mails and despatching intermediate boats; and there is a regular coastal service to the other colonies. The dangerous Barrier Reef making it imperative for the government, from its earliest establishment, to construct harbours and improve the rivers, the coast of Queensland is now one of the best lighted in Australia. The navigable streams have been dredged at enormous cost, and the largest ocean steamships can now ascend the Brisbane River to discharge cargo at the city wharves. The postal system is worked by 996 post-offices, with a twopenny postage on inland letters and a penny for the towns. The railway system has been rapidly extended since 1880; up to 1895, 2379 miles have been opened for traffic, and other lines are projected or in course of construction. The total expenditure on railways to December 31, 1894, was over 18 millions sterling. The government maintains a well-equipped series of workshops at Ipswich, one of the oldest towns, on the Bremer River, 25 miles from Brisbane. The railway system of Queensland is now directly connected with that of New South Wales. The telegraphic service, like the railways and the post-office, is under state control; the length of telegraph line (1894) is 9986 miles, and, since the opening of the South Australian Overland Line, Queensland is in telegraphic communication with the whole civilised world.

Queensland possesses a wealth of gold and other mineral resources; and machinery has reduced gold-mining to a settled and scientific industry. After the disastrous gold 'rushes' of the early days the miners profited by experience. But the real era of payable gold-mining in Queensland did not begin until 1868. Since that date to 1895 its mines have produced 9,926,923 ounces of gold, with a value of £34,744,230. In 1889 the yield was 739,103 ounces; in 1894 only 679,511. In central Queensland is to be found the remarkable Mount Morgan (q.v.) mine. It is supposed that this unique formation, 1225 feet above the sea-level, was once a hot-spring, the water of which held in solution gold which was precipitated and consolidated with other mineral matter into the curious ferruginous stone which, contrary to the previous theories of geologist and miner, has proved the most wonderful gold-bearing material in the world. Its fine and pure gold is worth four guineas an ounce, and the gross annual output has been estimated at 1¼ million pounds sterling. The principal gold-fields in northern Queensland are Charters Towers, Ravenswood, Etheridge, Gilberton, and Palmer. A recently discovered gold-field is the Croydon, on the edge of the alluvial flat extending to the Gulf of Carpentaria. The Palmer is the most extensive alluvial field in the colony. Copper, tin, silver and lead, quicksilver, manganese, and iron are found in Queensland; and there are valuable coal-mines. Opals of great brilliancy and variety of colour have been found in a few localities, and specimens of the diamond, ruby, sapphire, and topaz near Stanthorpe. Agates exist in quantity.

The wool of Queensland, clipped from the merino and coarse-woolled sheep, still maintains its high character. The number of sheep in the colony in 1894 was 19,587,691; cattle, 7,012,997; and horses, 444,109. The annual exports of wool, hides, skins, and tallow represent a total value of 4½ millions. The manufactories of Queensland comprise metal-foundries, sugar-mills, tanneries, flour-mills, distilleries, saw-mills. Tweed-factories are worked in the neighbourhood of Ipswich. Of late years the bêche-de-mer and pearl fisheries of Torres Straits have been highly productive; and preserved meats have also become an established industry.

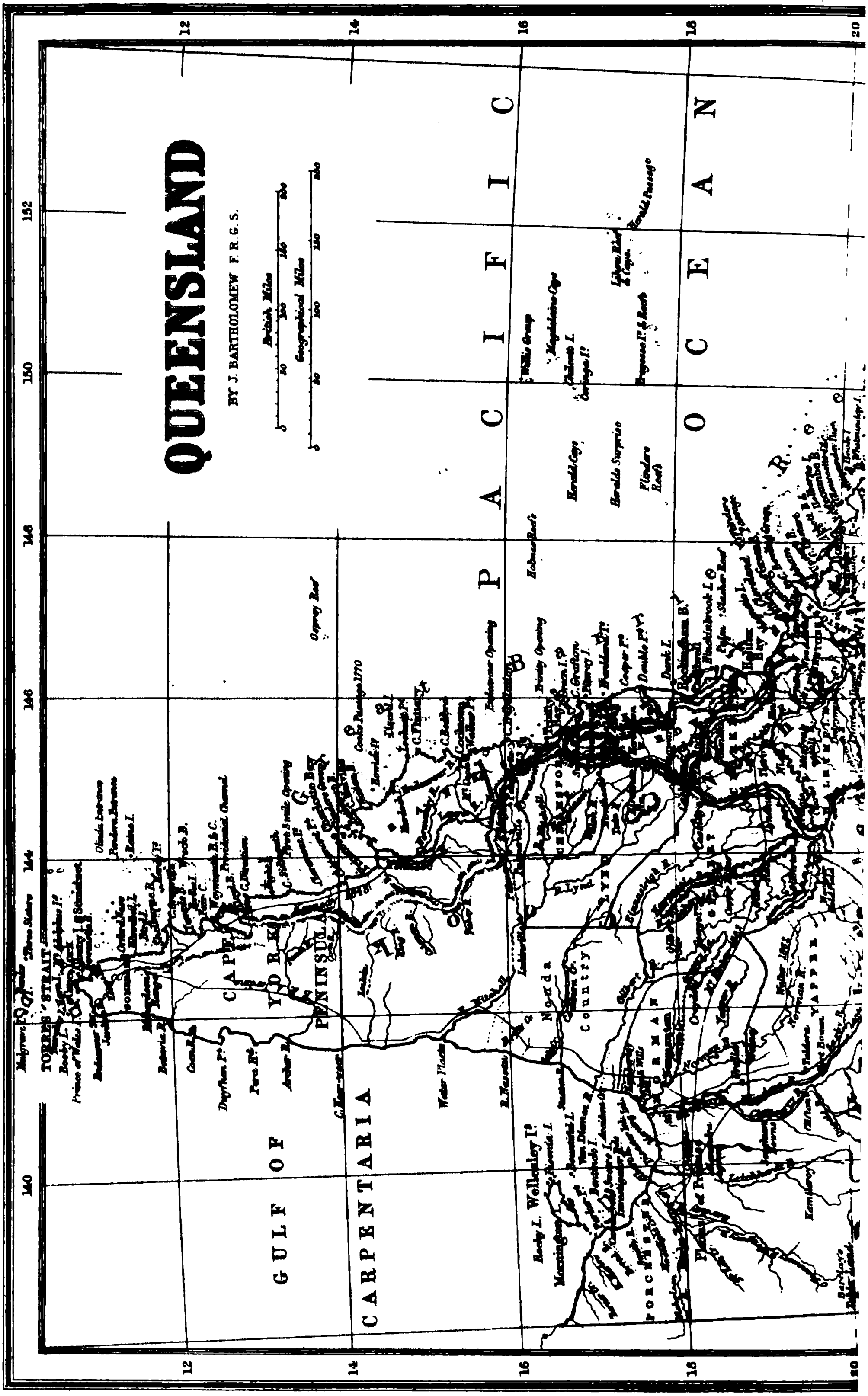
The seat of government is Brisbane, and the principal provincial towns are Rockhampton, Ipswich, Townsville, Cooktown, Maryborough, Gympie, Gladstone, Toowoomba (capital of the Darling Downs), Dalby, Roma, and Bowen. The government is vested in a governor appointed by the crown, an executive council, and two houses of parliament. The upper house or Legislative Council consists of thirty-nine life members, named by the governor, and sitting under a president elected by themselves; and the Legislative Assembly numbers seventy-two members, elected on a franchise that is virtually manhood suffrage. State aid to religion was abolished by one of the first acts of parliament. The educational system is free, secular, and compulsory, and the annual expenditure is—primary state schools, £208,747; grammar and university education, £1241; technical education, £3816. The defence of the colony was provided by act of parliament in 1884. A small permanent force, a defence contingent (whose members are paid for each day's drill), and volunteers make up an enrolment nearly 5000 strong; but every male between eighteen and sixty years old is liable for military service in an emergency. The entrance to the Brisbane River (twelve miles from the capital) is defended by a battery and torpedo works, and there are two gunboats, torpedo and packet boats, and a naval reserve.

About 418¼ million acres of land still belong to the crown, the greater part leased to squatters as sheep and cattle runs. The object of the recent governments of Queensland being to foster agricultural settlement and closer pastoral occupation, the tendency now is to leasing rather than selling and to prevent the aggregation of large estates.

Market-gardening in Queensland, even in the large towns, is principally done by Chinamen, who have the special gift of patience for the work. On the Darling Downs, which is the garden of Queensland, wheat may be grown; and oats, barley, and rye are cultivated for fodder. Maize and lucerne are the crops most commonly grown by farmers. European vegetables and fruits, turnips, mangolds, and potatoes are raised on the Darling Downs, but the vegetables which are the staple of the bush garden elsewhere are sweet potatoes, yams, and pumpkins. The growth and propagation of arrowroot is a most profitable industry. Tobacco thrives well. Cotton, rice, coffee, and even tea have been proved to be suitable for Queensland. Grapes, peaches, pine-apples, bananas, oranges, lemons, limes, citrons, mangoes, passion-fruit, and guavas bear profusely, and north of Capricorn all the fruit trees and spices of tropical value might be cultivated with profit but for the scarcity of labour. Ginger, pepper, and nutmeg are indigenous. The beautiful collection of timbers shown at the Colonial and Indian Exhibition in London emphasised the value of the forests of Queensland. Amongst the hardwoods are the ironbarks, stringy-barks, gums, and bloodwoods. There are several varieties of turpentines, and the easily-worked softwoods include four excellent pine-trees, while the red cedar, yellow-wood, silky oak, tulip-wood, and beech are prized for cabinet and ornamental purposes.

The wild animals of Queensland are neither numerous nor dangerous, always excepting the worst varieties of the snake. Alligators are numerous and destructive in the rivers of tropical Queensland. The fauna includes the usual Australian marsupials—the platypus, dingo, flying-fox, &c. Many of the birds are of gorgeous plumage. The emu roams the plains, and the cassowary is a rare appearance in the north. The rabbit has, so far, been fenced out from the southern borders with tolerable success; but this imported pest is an object of dread in Queensland, which suffered so severely, before the legislature assisted in their suppression, from the plague of kangaroos. The sea-fishing is unsurpassed, and the Moreton Bay oysters are exported in quantities to the sister colonies. From the Dugong (q.v.), besides the oil, is obtained a hide invaluable for thick machinery belting.

Queensland, in common with other Australian colonies, suffers occasionally from floods and droughts; but the necessity for artificial irrigation is now generally recognised as an essential protection for development in the future. The sugar industry of late has somewhat declined in value; but the export in 1890 amounted to £443,668. Owing to the rigorous laws passed to discourage


QUEENSLAND
BY J. BARTHOLOMEW F.R.G.S.
British Miles
Geographical Miles
PACIFIC OCEAN
GULF OF CARPENTARIA
CAPE YORK PENINSULA
TORRES STRAIT
Prince of Wales I.
Three Sisters
Osprey Reef
Holmes Reef
Willis Group
Magdalaine Cays
Herald's Cays
Heralds Surprise
Flinders Reefs
Trinity Opening
Rockingham B.
Halifax Bay
Wellesley I.s
Water Ponds
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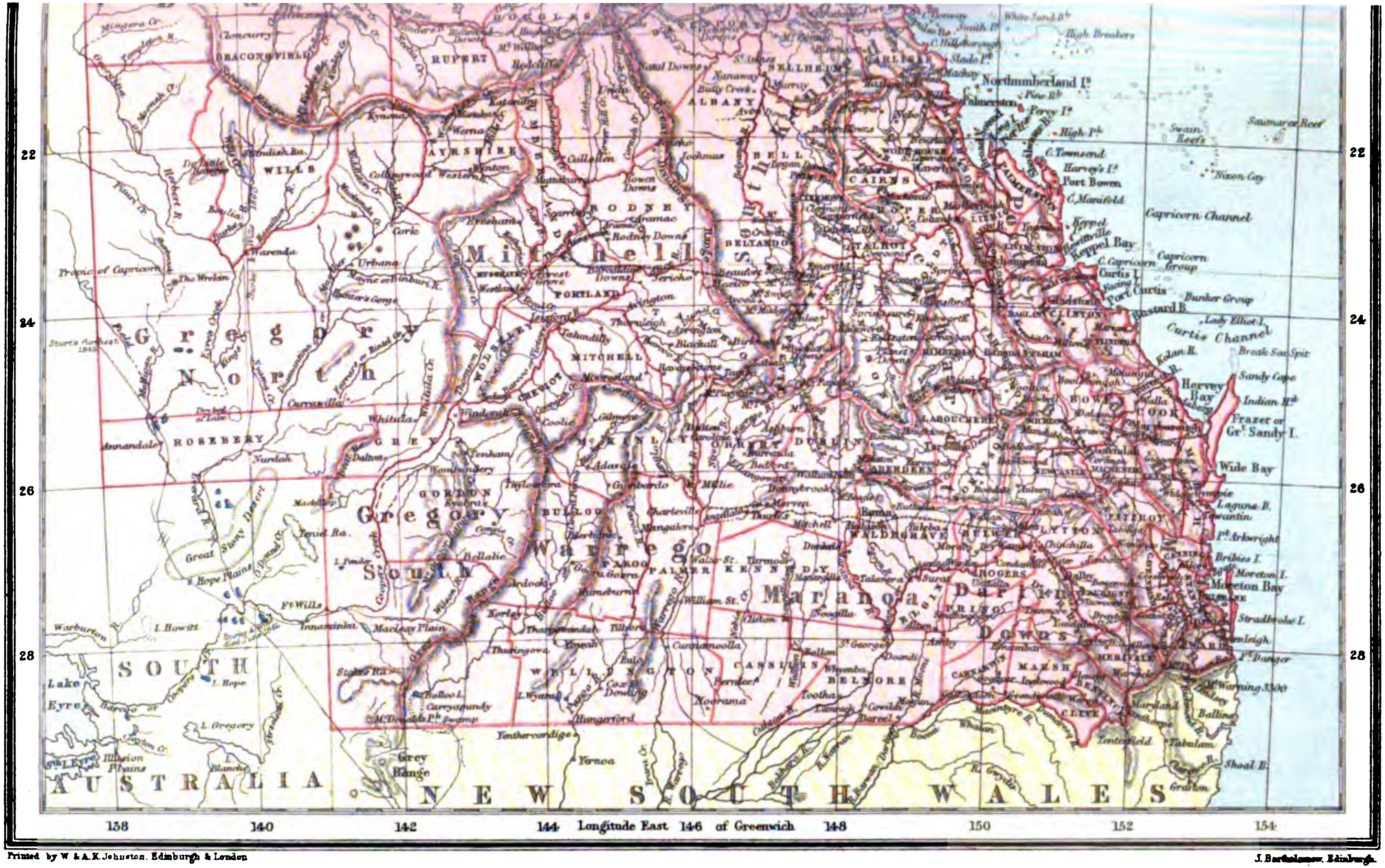
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Longitude East
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of Greenwich
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Gregory North
Gregory South
Mitchell
Warrego
Maranoa
Darling Downs
Burnett
Wide Bay
Port Curtis
Leichhardt
Kennedy
Burke
ROSEBERY
WILLS
AYRSHIRE
RODNEY
MITCHELL
BELYANDO
PORTLAND
GORDON
GREY
BULLOO
PAROO
PALMER
KENNEDY
CASSILLIS
WELLINGTON
BELMORE
CAIRNS
CLINTON
BOWEN
COOK
CHEVIOT
ALBANY
BELL
RUPERT
BEACONSFIELD
Northumberland Is.
Capricorn Channel
Capricorn Group
Bunker Group
Curtis Channel
Keppel Bay
Hervey Bay
Frazer or Gt. Sandy I.
Moreton Bay
Moreton I.
Stradbroke I.
Swain Reefs
Saumarez Reef
High Breakers
Breaksea Spit
Sandy Cape
Indian Hd.
Wide Bay
Laguna B.
Pt. Danger
Mt. Warning 3300
Shoal B.
Tropic of Capricorn
Sturt's Farthest 1845
Lake Eyre
L. Hope
L. Gregory
L. Blanche
Great Stony Desert
Grey Range
Innamincka
Macleay Plain
Yantharcordige
Yernoa
AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
Warburton R.
Cooper's Cr.
Thomson R.
Barcoo
Warrego R.
Maranoa R.
Dawson R.
Burdekin R.
Fitzroy R.
Burnett R.
Mary R.
Brisbane
Toowoomba
Ipswich
Rockhampton
Gladstone
Maryborough
Bundaberg
Roma
Charleville
St. George
Goondiwindi
Warwick
Stanthorpe
Dalby
Gayndah
Springsure
Clermont
Emerald
Mackay
Palmerston
Port Bowen
Aramac
Tambo
Blackall
Isisford
Adavale
Thargomindah
Cunnamulla
Windorah
Tenterfield
Grafton

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the influx of South Sea Island or Chinese labour (see COOLIES), the cost of cultivation has been largely increased. Proposals have been advanced for the formation of separate northern and central colonies; but these movements have been met by a government scheme, whereby, roughly speaking, Queensland would become a dominion with three provinces somewhat on the lines of Canada.

See H. S. Russell, *The Genesis of Queensland* (1888); A. C. Grant, *Bush Life in Queensland* (1881); J. Bonwick, *The Resources of Queensland* (1880); Arthur Nicholls, *Wild Life and Adventure in the Bush; Handbook for Emigrants to Queensland*, published by authority of the Agent General; *Queensland, its Institutions and Resources*, prepared for the Colonial Exhibition (1886); and for the aborigines, Lumholtz, *Among Cannibals* (1889).

Queen's Metal, a kind of Britannia Metal (q.v.).

Queen's Tobacco-pipe, the facetious designation of a peculiarly shaped kiln which used to be situated at the corner of the Tobacco Warehouses belonging to the London Docks. The kiln consisted of a circular brick stalk, bulging out at the bottom to a width of five feet inside. In the interior were piled up damaged tobacco and cigars, and contraband goods, such as tobacco, cigars, tea, silk, &c., which had been smuggled, books which were attempted evasions of the Copyright Act, &c., till a sufficient quantity had accumulated, when the whole was set fire to and consumed. The total value of the goods thus destroyed was enormous; and, though this wanton destruction was often censured, government continued till recent years periodically to fill and light the 'Queen's Pipe.' Seized goods are now sold at the periodical 'customs sales,' where unclaimed goods, samples, &c. are also disposed of.

Queenstown, a seaport of Ireland, on the south side of Great Island, in the harbour of Cork, by rail 12 miles SE. of the city of Cork and 177 SW. of Dublin. Its original name was Cove of Cork; the present name commemorates the visit of Queen Victoria in 1849. The town is built in parallel streets on the slopes of a hill shaped like an amphitheatre. It enjoys a high reputation for its mild and salubrious climate. The splendid Roman Catholic cathedral for Cloyne diocese is the principal building. Queenstown is an important port of call, the mails from the United States being landed here and sent overland by rail to Dublin; while the British mails are in part taken on board here. Pop. (1871) 10,334; (1881) 9755; (1891) 9123. See an article in *Harper's Magazine*, September 1884.

Queen's Town stands on an arm of the Klaas Smits River in the east of Cape Colony, 154 miles by rail N. by W. of East London and 205 miles NE. of Port Elizabeth. Pop. 500.

Quelpart, an island 60 miles off the south coast of Corea, about 40 miles long by 17 broad. It is rock-bound and mountainous, the volcanic Mount Auckland being 6500 feet high. It has fertile soil and good timber, and is populous.

Quercitron, the name both of a dyestuff and of the species of oak of which it is the bark. This oak (*Quercus coccinea*, var. *tinctoria*), also called Dyer's Oak and Yellow-barked Oak, is a native of North America—one of the noblest forest trees of the United States, found in New England, and as far south as Georgia, although there only at a considerable elevation. For the dyestuff, see DYEING, Vol. IV. p. 139.

Querétaro, an important town of Mexico, capital of Querétaro state (see MEXICO), is charmingly situated on a hilly plateau, 6273 feet above sea-level, 153 miles by rail NW. of Mexico city. It contains a government palace, a cathedral, an aqueduct supported in part upon arches 90 feet high, and two large cotton-spinning mills, employing 2300 hands. Here the Emperor Maximilian was shot by order of a court-martial, 19th June 1867. Pop. 36,000.

Quern, a primitive mill for grinding corn, the stone of which was turned by the hand. It is a contrivance of great antiquity, and so well adapted for the wants of a primitive people, that we find it perpetuated to the present day in remote districts of Ireland and some parts of the Hebrides and Shetlands. The remains of querns have been dug up in Britain, Ireland, and continental Europe wherever the traces of ancient population are found. They occur in the Scottish Earth-houses (q.v.), or cyclopean underground dwellings; in the lake-dwellings of Ireland, Scotland, and Switzerland; and abundantly among the remains of the Roman period in Britain and northern Europe. The most usual form of quern consists of two circular flat stones, the upper one pierced in the centre with a narrow funnel, and revolving on a wooden or metal pin inserted in the lower. The upper stone is occasionally ornamented with various devices; in the Roman period it is sometimes funnel-shaped, with grooves radiating from the centre. In using the quern, the grain was dropped with one hand into the central opening, while with the other the upper stone was revolved by means of a stick, inserted in a small opening near the edge. As early as 1284 an effort was made by the Scottish legislature to supersede the quern by the water-mill, which did not, however, prevent hand-mills from being largely used in Scotland down to the beginning of the 19th century. Probably the oldest British type of quern is that which was fashioned from a section of oak. A less simple variety of the hand-quern, known as the Pot Quern, and also of great antiquity, consists of a circular stone basin, with a hole through which the meal or flour escapes, and a smaller circular stone fitting into it, perforated with an opening through which the grain was thrown into the mill.

See Sir Daniel Wilson's *Archæology and Prehistoric Annals of Scotland* (1863), and Sir Arthur Mitchell's *The Past in the Present* (1880).

Quesnay, FRANÇOIS, a great French economist, was born at Mérey, near Montfort-l'Amaury, June 4, 1694, studied medicine and surgery at Paris, and in 1718 commenced practice at Mantes. He acquired a high reputation in his profession, and at his death on 14th December 1774 was first physician to the king. But the fame of the 'European Confucius,' as he was called by his followers, depends upon his speculations in political economy, in the pages of the famous *Encyclopédie* (articles 'Fermiers' and 'Grains') and various serials. Around him and his friend, M. de Gournay, gathered the famous group of the *Économistes*, also called the Physiocratic School (q.v.; and see POLITICAL ECONOMY, p. 288). Quesnay's views were systematically set forth in a little treatise, entitled *Tableaux Économiques*. Only a few copies of this work were printed about the end of the year 1758, and these have now all disappeared; yet the principles maintained by Quesnay are well known, both from the sources above mentioned, and from other treatises that have met with a better fate—his *Maximes Générales du Gouvernement Économique d'un Royaume Agricole*, the *notes* to which occupy more space than the text; *Le Droit Naturel*, included in the *Physiocratie* of Dupont de Nemours; *Analyse du Tableau Économique; Problèmes Économiques*; and *Dialogues sur le Commerce et sur les Travaux des Artisans*—collected in Oncken's edition of his *Œuvres Économiques et philosophiques* (Frankfort, 1888).

Quesnel, PASQUIER, a French theologian, was born at Paris, July 14, 1634, and, after a distinguished course in the Sorbonne, entered the Congregation of the Oratory in 1657. So great was his reputation for learning and piety that at the age of twenty-eight he was appointed director of the Paris house of his Congregation. It was for the use of the young men under his care that he commenced the celebrated series *Réflexions Morales sur le Nouveau Testament*. In 1675 he published an edition of the works of Leo the Great, which in the notes was held to maintain Gallicanism (see GALLICAN CHURCH), and was accordingly placed on the *Index*. Having refused to subscribe the formulary condemnatory of Jansenism required by a decree of 1684 from all members of the Oratory, Quesnel saw himself compelled to flee to the Low Countries, where he attached himself to Arnauld. He continued at Brussels his *Réflexions*, which were published in a complete form, with the approval of the Cardinal de Noailles, Bishop of Châlons, and ultimately Archbishop of Paris (1693-94). The Jesuits were unceasing in their malignant hostility, and Quesnel was denounced and flung into prison, but escaped to Holland. His book was finally condemned in 101 several propositions by the celebrated bull *Unigenitus* (1713). Quesnel spent his last years in Amsterdam, where he died December 2, 1719. A complete list of his many books will be found in Moréri's *Dict. Hist.* His Letters were edited by Le Courayer (1721-23). For the later history of Jansenism, see Séché, *Les Derniers Jansénistes* (1891).

Quételet, LAMBERT ADOLPHE JACQUES, a celebrated Belgian statistician and astronomer, was born at Ghent, 22d February 1796, and studied at the lyceum of his native city. Here at eighteen he began to teach mathematics, and five years later was appointed to this chair at the Brussels Athenæum. He superintended the building of the Royal Observatory, and became its director in 1828, while in 1836 he accepted the chair of Astronomy and Geodesy at the Brussels Military School. From 1834 he was perpetual secretary of the Belgian Royal Academy. He died 17th February 1874. His scientific work lay mostly in the regions of meteorology and statistics relating to anthropology. His greatest book is *Sur l'Homme et le Développement de ses Facultés* (1835), in which he sums up his researches on the physical and intellectual qualities of man. Both in this and in later work in the *Bulletin de la Commission Centrale de Statistique*, in *l'Anthropométrie*, ou *Mesure des différentes Facultés de l'Homme* (1871), and in other books and papers he shows the use that may be made of the theory of probabilities, as applied to the 'average man'—at times carrying out that method so as to arrive at a mechanical precision not justified by facts, and rejected by later writers on 'mind statistics.' Quételet's contributions to meteorology, astronomy, terrestrial magnetism, &c., in the *Mémoires* and *Bulletins* of the Belgian Royal Academy, were numerous and important. See Mailly's *Essai sur la Vie et les Travaux de Quételet* (1875), and Wolowski's *Éloge* (1875).

Quetta, known locally as Shalkot, a town near the north frontier of Beluchistan, strategically important as commanding the Bolan Pass and the Pishin Valley. Since 1887 it has been connected with the Indian railway system, and since 1877 Quetta and its district have been administered by British officers; it is now the headquarters of the British agent in Beluchistan, and of a considerable military force, and is strongly fortified. The valley is fertile, well watered, and populous. Coal and petroleum were discovered in 1890.

Quetzal. See TROGONS.

Quetzalcoatl. See MEXICO, Vol. VII. p. 169.

Quetzaltenango, the second city of Guatemala, the capital of a department of the same name, is on the Siguila, 95 miles W. by N. of Guatemala city. It contains an ornate church, the handsomest government buildings in the republic, a national college, and a conservatoire. The streets are lit with the electric light; the houses are built of a light-brown lava from the Cerro Quemado ('Burned Mountain'), which overhangs the city. Quetzaltenango is the centre of the trade in native cloths. Its port is Champerico, on the Pacific, from whence a railway extends inland to Retalhulen (27 miles). Pop. 20,000, mostly Indians.

Quevedo Villegas, FRANCISCO GOMEZ DE, was born at Madrid in 1580. His father was secretary to the queen and his mother one of her ladies in waiting. The Quevedos were one of the old families of the Montaña, the mountain-region between Burgos and Santander. The name was no doubt derived from a place on the Besaya River, but the punning motto of the scutcheon on their house in the adjacent Toranzo valley, 'I am he who stopped—*el que vedó*—the advance of the Moors,' expressed the family tradition, and, like Cervantes, Lope de Vega, Calderon, and others of the race, Quevedo was not a little proud of an ancestry that claimed a share in stemming the tide of Moslem conquest. Villegas was the name of his grandmother's family, another of the same mountain stock. He was left an orphan at an early age, and sent by his guardian to the university of Alcalá, from which he came away with such a name for varied scholarship that he may be said to have entered upon life with a reputation ready made. Apparently a quiet, studious, meditative life would have been his own choice, but chance ordered it otherwise for him. The fatal issue of a duel, brought about by his chivalrous championship of a woman who had been insulted in his presence, drove him in 1611 to the court of his friend the Duke of Ossuna, the new viceroy of Sicily; and he, perceiving in Quevedo, poet, scholar, and bookworm as he was, the capacities of an able administrator and diplomatist, made him his right-hand man, and kept him constantly employed in confidential missions to Rome, Milan, Genoa, and Venice, and when promoted to the vice-royalty of Naples, chose him as his minister of finance, an office in which Quevedo's success was only equalled by his integrity.

He was involved in the fall of Ossuna in 1619, and kept in prison for a time, but there was in fact nothing to tax him with except fidelity, and he was permitted to retire to La Torre de Juan Abad, a small estate of his in the Sierra Morena; he was allowed, however, to return to Madrid in 1623, and became a *persona grata* at the court of Philip IV. In 1626 he published his most important work, the *Politica de Dios*, sketched probably in Italy, but put into shape during his banishment. He had been for ten years behind the scenes, and had watched the working of one-man-rule in its worst form under the autocracy of the Duke of Lerma, and in the *Politica* he made an earnest and eloquent appeal to the king to be a king, not in name only, but in fact. 'The heart of the king,' he said, 'must be in no hand but God's.' Possibly it would never have seen the light had Philip IV. been true to the promise of his youth; but he soon grew weary of governing, and left it to Olivares, and so long as Olivares remained in power Quevedo's book continued to be a popular one. In 1628 he followed up his attack on government by favourites in an apologue entitled *Hell Reformed*. He remained, however, on friendly terms with Olivares; and if honours and high place could have tempted him he might have had anything in the minister's gift. He would have been a valuable buttress to an unstable regime, and it was desirable to silence a man who had an awkward knack of telling the truth in a way that brought it home to the public. But Quevedo had no mind to be a favourite's favourite, and all that he could be got to accept was the purely honorary title of secretary to the king. In the winter of 1639 another way of effecting his purpose presented itself to Olivares. A memorial in verse to the king, imploring him in respectful and loyal language to look with his own eyes to the miserable condition of his kingdom, was one day placed in his napkin on the royal table. Quevedo was denounced as the author (and no doubt he was, though his biographer, Dr de Tarsia, strives to disprove it), and was arrested at night and carried off to the convent of San Marcos at Leon, where, heavily ironed, he was lodged in a cell below the level of the river that washes the convent wall. He was soon struck down by an illness, brought on by cold and damp, from which he never recovered. He appealed to Olivares, but Olivares represented the king as implacable. In 1643, however, the count-duke fell from power, the ruthlessness of the king disappeared, and Quevedo was free to return to Madrid, broken in health and fortune; all his property within reach had been seized with his books and papers. He remained a year in Madrid, and then went home to La Torre to die; but the next year his sufferings became so acute that he had to move to Villanueva de los Infantes for medical aid, and there death released him in September 1645.

Quevedo was one of the most prolific Spanish poets, and was ranked by his contemporaries with Juan de Mena, Garcilaso, Lope, and Gongora; but he wrote no poetry for the world. His verses were all written for his friends or for himself, and, except those in the *Flores* of Espinosa (1605), the few pieces published in his life-time were printed without his consent. Poetry was with him a recreation and a solace, and, according to his nephew, some of his gayest and brightest verses were written in his cell at San Marcos. His poetry therefore is for the most part of an occasional character, and to a great extent made up of what would now be called *vers de société;* sonnets, serious and satirical, form a large portion of it, and light humorous ballads and songs a still larger. His more ambitious work is at times disfigured by conceits, but that it is the work of a true poet no one will dispute. All through life he was at war with the poets of the 'Culto' school, Gongora and his followers ('the scourge of silly poets' Cervantes called him), and this perhaps may have made him chary of appearing in public as a poet; but if he took no pains to place himself upon the roll of Spanish poets, he added to it the name of Francisco de la Torre, whose poems he discovered and published in 1631. It was for a long time maintained that the discovery was a pretended one; but it is now admitted that he could not have been the author. His place as a dramatist is not so well defined. About a dozen of his interludes are extant, but of his comedies, except two of which he was joint-author with Antonio de Mendoza, nothing is known. His prose is even more multifarious than his verse. His first book was a life of St Thomas de Villanueva in 1620 and his last, in 1644, a life of St Paul; and the greater part of his prose is of the same character, as is indicated by the titles: *The Patience and Constancy of Job, The Cradle and the Grave, Virtue Militant, The Martyrdom of Marcelo Mastrillo, Instruction how to Die, The Introduction to Devout Life,* from St Francis de Sales, and others of the same kind. Of his political works the *Politica de Dios* is the chief; but he also wrote a *Life of Marcus Brutus,* to which he was adding a second part when struck down by his last illness, a *Letter to Louis XIII.,* on the war of 1635, and several shorter tracts. In 1626, at Saragossa, his brilliant picaresque novel, the *Vida del Buscon Pablos,* or, as it was called after his death, the *Gran Tacaño,* was printed, apparently, like most of his books, without his permission, and at once took its place beside *Guzman de Alfarache;* and in 1627 his five *Visions,* four of which had been written between 1607 and 1610, and the fifth in 1621, were printed in the same way at Barcelona. His friend, Vander Hammen, immediately printed three of them at Saragossa from his own copies, and added the *Casa de los locos de Amor* ('The Madhouse of Lovers'), which has ever since been wrongly attributed to Quevedo. He himself disowned it; it bears no trace of his hand, and it is not printed as his by Vander Hammen, who, moreover, afterwards confessed himself the author. Chiefly for the sake of the vision or apologue of *Hell Reformed,* a sort of offshoot or sequel to the *Politica de Dios,* he wished the *Visions* to appear in an authorised edition at Madrid; but unluckily they were submitted for examination to the Padre Niseno, a friend of Montalvan, the dramatist, who had a grudge against Quevedo, and to obtain a license he had to consent to barbarous mutilations of his work which in some places make utter nonsense of it; and it is in this mangled shape the *Visions* have been printed ever since 1631. He added some short humorous pieces, on the affectations of the Culto school, the use of vulgar slang phrases, silly popular beliefs, and the like; and, the better to mask the design of the others, he called the volume *Juguetes de la Niñez* ('Playthings'), and apologised for the whole as the work of his youth, though the principal piece was written only three years back. The vision or apologue was Quevedo's favourite form of expression; his peculiar humour and satire are nowhere better seen than in *Fortuna con Seso* ('Fortune Right'), written in 1635, but not printed till 1650, in which Fortune demonstrates by experiment that if strict logic and justice took her place mankind would have a great deal more to complain of.

The edition of Quevedo's works in the *Biblioteca de Autores Españoles* (vols. xxiii. and xlviii., prose, edited by Aureliano Fernandez-Guerra; vol. lxix., verse, edited by Florencio Janer) is the only one that can be said to approach completeness. Many of the pieces in it are printed for the first time. The prose is edited with commendable thoroughness and industry; but Señor Fernandez-Guerra has unfortunately preferred the expurgated text of the *Visions* to that which came direct from the hand of Quevedo; he gives, however, the most important of the variations in his notes. The volume of verse is less satisfactory, and follows the stupid pedantic arrangement of the 17th-century editors. After Quevedo's death editions followed in quick succession, but most of them are slovenly in the extreme as regards editing, paper, and print. A handsome edition in 3 vols. 4to was issued by Foppens (Brussels, 1660–71), and well printed, if not critical ones by Ibarra (6 vols. 8vo, Madrid, 1772), by Sancha (11 vols. 8vo, Madrid, 1791–94), and by Castellanos (5 vols. 8vo, illustrated, Madrid, 1841–45); and an admirable selection (which in Quevedo's case is not only a defensible but a desirable form) was published by Villalpando (6 vols. 12mo, Madrid, 1798).

The earliest translations from Quevedo were into French by the Sieur de la Geneste, who translated the *Visions* in 1633, the *Hell Reformed* in 1634, and the *Vida del Buscon,* according to Barbier in 1633, or 1641 according to Brunet. His versions are by no means faithful or accurate, but they have the advantage of being based upon Quevedo's original text. From them most of the English versions have been made e.g. *Visions; or Hel's Kingdome,* by R. Croshawe (1640); *Hell Reformed,* by E. M. (1641); *Buscon, the Witty Spaniard*, by J. Davies (1657); and the well-known lively version of the *Visions* by Sir R. L'Estrange (1667). Captain John Stevens in 1697 produced a good translation from the original of *Fortuna con Seso;* and of the *Vida del Buscon* and some shorter pieces in 1707; and his translations, together with L'Estrange's *Visions*, were published in 3 vols. at Edinburgh in 1798 as *Quevedo's Works.* The best French translation of the *Vida del Buscon* is one by D'Hermilly under the title of the *Fin Matois* (1776), edited and by no means improved by Restif de la Bretonne. That by M. Germond de Lavigne is unfaithful. Led away by an absurd theory that Quevedo wrote the story when he was only fifteen, he has tampered with the text to make it suit his preposterous chronology. Under the title of *Voyages récréatifs de Quevedo* four of the Visions were very freely rendered by the Abbé Beraud in 1756. In 1648 Hans Moscherosch gave a still more free German version under the title of *Wunderliche Gesichte Philander's von Sittewald;* and in 1841 Dr Guttenstein treated the *Buscon* in much the same fashion in *Der Glücksritter.* An Italian translation of the novel by G. P. Franco appeared in 1634.

Quiberon, a small fishing-town of France (dept. Morbihan), at the extremity of a long narrow peninsula, 21 miles SW. of Vannes. Pop. 1036. It was here that a body of French emigrant royalists landed from an English fleet in 1795, and endeavoured to rouse the people of Brittany and La Vendée against the Convention, but were defeated and driven into the sea by General Hoche. Nearly all the prisoners taken were shot by order of the Convention. On 20th November 1759 Hawke completely defeated a French fleet under Admiral Conflans in Quiberon Bay.

Quichua, the language of the Indians of Peru (q.v.).

Quick, Robert Hebert, was born in 1832, had his education at private schools and at Harrow, whence he passed to Trinity College, Cambridge. He took orders, held curacies in Whitechapel and Marylebone, and was appointed by his college to the vicarage of Sedbergh in 1883, but four years later resigned the living. He had an intense love of children, and the great interest of his life was education. To the discussion of its theories he brought wide study, independent thought, and ripe wisdom; witness his bright and delightful *Essays on Educational Reformers* (1868; 2d ed. 1890). His practical knowledge of the work of teaching he had gained by service at Cranleigh, Harrow, and elsewhere. He died at Cambridge, 9th March 1891.

Quickens. See Couch-grass.

Quicksand (*quick*—i.e. 'living' or 'moving,' and *sand*), in its usual significance, a tract of sand which, without differing much in appearance from the shore of which it forms part, remains permanently saturated with water to such an extent that it cannot support any weight. Quicksands are most often found near the mouths of large rivers. They appear only to be formed on flat shores, the substratum of which is an irregular expanse of stiff clay or other impervious formation. Pools of water are retained in the hollows, and become partially filled with sand or mud, which remains like the soft sediment in a cup of cocoa on account of the absence of drainage. The sand on a uniform shelving shore consolidates at low tide because the water which permeates it drains back freely to the sea. In narrow channels through which the configuration of the adjoining shore causes strong tidal currents to run the sand may be kept so constantly stirred up by the moving water that a quicksand results. Thus, while the summit of a sandbank rising from a gentle slope is usually firm, the hollow margin of the bank where it meets the shore is frequently a quicksand. Quicksands are not commonly of great extent, and their danger has probably been exaggerated in the popular mind by sensational descriptions in works of fiction—e.g. in the *Bride of Lammermoor* and Wilkie Collins's *Moonstone.* Persons sink in a quicksand exactly as in water, only more slowly; and it is probable that if the victim did not struggle he would not sink over the head, as experiments show that water containing a quantity of solid matter in suspension has its floating power increased. It is a common belief amongst sailors that if a vessel is stranded on a quicksand it is inevitably sucked down. This cannot be the case unless the vessel springs a leak, or heels over sufficiently to let the semi-liquid sand enter. The idea may have taken rise from the popular association of quicksands with whirlpools, or from the fate of small vessels stranded at low tide on a stiff bank of clay which held them fast and allowed the rising tide to submerge them.

The name quicksand is sometimes applied, especially by old writers, to the drifting sands which are carried by wind over cultivated land bordering the seashore or a desert. See Downs, Drift, Dunes.

Quicksilver. See Mercury.

Quietism, a name given to a tendency shown at various periods in the history of the church by many classes of mystical religious enthusiasts, of widely different beliefs, to make perfection on earth consist in a condition of uninterrupted contemplation. In this state of quiet the soul ceases to reason, to reflect either on itself or God, or to form any of the ordinary acts of faith, its sole function being passively to receive the infused heavenly light which accompanies this state of inactive contemplation. The first of modern Quietists was the Spanish priest Molinos; its most famous devotee, Madame Guyon, whose gentle but powerful influence led into the same mode of thought the saintly Fénelon. Quietism has been called the Spanish analogue of Quakerism in England, of Jansenism in France, of Pietism in Germany; but these several systems, though they had common tendencies, were also sharply distinguished. It may be said that Quietism involves but little of practical consequence, whether for good or for evil. This may and does hold true in the case of noble and lofty souls like Fénelon; but what moved Bossuet and the church generally to strong opposition was the belief that, carried to its logical conclusion, Quietism led to Antinomianism, and would inevitably prove pernicious in its effects upon the vulgar crowd of followers. From the belief of the lofty and perfect nature of the purely passive state of contemplation there is, it was held, but a single step to the fatal principle in morals, that in this sublime state of contemplation all external things become indifferent to the soul, which is thus absorbed in God; that good works, the sacraments, prayer, are not necessary, and hardly even compatible with the repose of the soul; that so complete is the self-absorption, so independent is the soul of corporeal sense, that even criminal representations and movements of the sensitive part of the soul, and even the external actions of the body, fail to affect the contemplating soul, or to impress it with their debasing influence. See Bossuet, Fénelon, Guyon, Molinos; also Heppe, *Geschichte der Quietistischen Mystik in der Kathol. Kirche* (1875).

Quigrich. See Fillan (St).

Quilimane, a seaport of East Africa, in the Portuguese territory of Mozambique, stands about 15 miles from the mouth of the river of the same name, the northern arm of the Zambesi delta. The town occupies an unhealthy site, but imports cottons, beads, hardware, arms, coal, spirits, and food-stuffs to the annual value of £80,000, and exports ivory, ground-nuts, india-rubber, wax, copal, and oil-seeds to a value that ranges between

£90,000 and £160,000 a year. Fifteen per cent. of the total trade is for and from Nyassaland. See NYASSA. Pop. 6000, including 116 Europeans and 327 Asiatics.

Quillo'ta, a town of Chili, in the fertile valley of the Aconcagua, 13 miles from its mouth, and 25 miles by rail NE. of Valparaiso. Pop 9000.

Quills are the large feathers of the wings of birds, certain kinds of which have for centuries been used to make into writing-pens. From the swan, goose, and turkey the kinds are obtained that are regularly prepared for writing purposes, crow quills being used for drawing. A quill, like horn or hair, is formed of epidermic tissue, and the barrel or tube (the quill proper) has an external membrane and an internal pith. In order to get rid of these, and to bring the naturally soft state of the barrel into a condition ready for making into a pen, it requires to be dressed. The quill-dresser sits beside a fire enclosed with brick sides and with an iron face-plate in front, containing a hole somewhat larger than a crown piece. He first heats the quill by placing it for one or two seconds in this hole, which enables him to scrape off the outer membrane with a thick strong knife, the quill being pressed nearly flat in the operation. This done, he again holds it for a brief time in the furnace, by which the quill acquires the proper strength and brittleness to admit of its being made—by a knife or machine—into a pen with a clean slit. Quills were formerly prepared for writing by another process, which is still used for such as are made into toothpicks. This consists in steeping them for a night in water and then manipulating them in hot sand. Although the manufacture of quill-pens is a declining industry, they are still made in considerable numbers. The Controller of the Government Stationery Office, thinking the matter of some public interest, published between 1865 and 1873 a yearly statement showing the numbers of steel pens and quills supplied for the public service. These reports show that as late as the year 1868 there was still a large number of quills used. The figures for that year were: Quills, nearly 6000 gross, value £1816; steel pens, 14,942 gross, value £1900. These figures did not materially differ for the four previous years, but in 1873 the annual number of quills supplied had diminished by nearly one-half. In 1890 the quantities issued from the Stationery Office were: Quills, 4000 gross; steel pens, 38,000 gross.

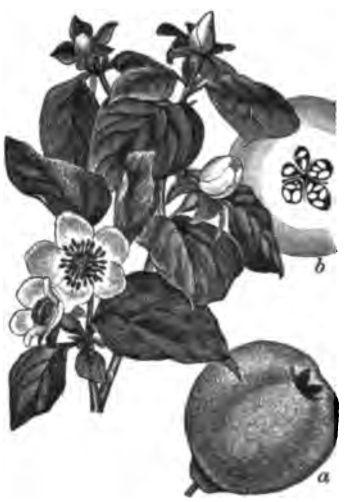
Quiloa, or KILWA, a seaport of East Africa, in German territory, 190 miles S. of Zanzibar, and an outlet for the trade with Nyassaland, exports ivory, gum copal, rice, and manioc. Pop. 6000, including a number of Banyans.

Quilon, a town of Southern India, in the state Travancore, is situated on the west coast, 85 miles NW. of Cape Comorin. A settlement of the ancient Syrian Church and subsequently of the St Thomas Christians, it was, under the names Coilon and Columbum, a famous mart for the trade in timber, ginger, pepper, &c. The Portuguese built a fort there in 1503, which the Dutch took in 1653. From 1803 to 1830 it was garrisoned by the British. Pop. 13,588.

Quimper, a town of France (dept. Finistère), is prettily situated on the Odet, 11 miles from its mouth, and 63 miles by rail SE. of Brest. Its cathedral (1239-1515), a stately and richly-carved and ornamented edifice, is the principal building; there are also a college, a museum, and an agricultural school. Potteries are in operation, as well as tanyards, sailworks, &c.; and fishing is carried on. Pop. (1872) 13,159; (1891) 14,901.

Quin, JAMES, a celebrated actor, was born in London, of Irish descent, 24th February 1693, and made his first appearance on the stage in 1714 at Dublin. Shortly after he proceeded to London, where he was engaged at Drury Lane, but for quite inferior parts. In 1716, however, the sudden illness of a leading actor led to Quin's being called on to sustain the character of Bajazet in the once famous play of *Tamerlane*. His success was marked. Next year he exchanged Drury Lane for Rich's theatre at Lincoln's Inn Fields, where he remained as a principal actor for seventeen years. Not long after leaving the former place he had the misfortune to kill a brother-actor in a duel—a circumstance which clouded his reputation for a while. The only really fine parts which he seems to have played were Captain Macheath in the *Beggars' Opera* and Falstaff in the *Merry Wives of Windsor*. In 1734-35 he returned to Drury Lane Theatre, 'on such terms,' says Cibber, 'as no hired actor had before received;' and from this date until the appearance of Garrick in 1741 he was by universal consent the first actor in England. In 1746 Quin and Garrick acted together in the *Fair Penitent*, as a contest for pre-eminence. The novelty of seeing the two rival actors in the same tragedy, and the admirable acting of Mrs Cibber as the Fair Penitent, contributed greatly to the extraordinary success of this play. The superiority of Garrick was acknowledged by the best judges; and Quin, by no means pleased at his rising fame, sarcastically declared that 'Garrick was a new religion, and that Whitefield was followed for a time, but they would all come to church again.' In 1751 he withdrew from the stage, and fixed his residence at Bath, where he died, January 21, 1766. In society Quin was also popular, his conversation being full of wit and his stories amusing though coarse. He had a most benevolent heart, and among his many kind actions he was able on one occasion to do a great service to Thomson by delivering him from arrest, and afterwards lived 'in fond intimacy' with the poet, as Johnson tells us in his *Lives of the Poets*. An anonymous *Life of Quin*, dedicated to Garrick in 1766, was reprinted in 1887, with a supplement of corrections and additional information.

Quince (*Cydonia*), a genus of trees and shrubs of the natural order Rosaceæ, sub-order Pomeæ, nearly allied to Pyrus, with which many botanists have united it under the name *P. Cydonia*, but distinguished by having many instead of two seeds in each cell, and by their very mucilaginous nature. The Common Quince (*C. vulgaris*), a native of the south of Europe and temperate parts of Asia, is a low tree, with generally tortuous branches, ovate, entire, deciduous leaves, and rather large whitish flowers, which are solitary at the extremity of young branches. The fruit is in some varieties globose, in others pear-shaped, of a rich yellow or orange colour, with a strong smell. It is hard and austere, but when stewed with sugar becomes extremely pleasant, and is much used in this way either by itself or to impart a flavour to apple-pies. It is also much used for making a preserve called *Quince Marmalade*. A delicious beverage somewhat resembling cider is made from it. The seeds, which readily give out their mucilage to water, so that they turn forty or fifty times their amount of water into a substance as thick as syrup, have long been used in medicine. Quince mucilage or quince gum, *Cydonin*, is allied to Bassorin, but differs from it in being readily soluble in water (see GUM). The quince was cultivated by the ancient Greeks and Romans, and is at the present day cultivated in the south of Europe, in England, and generally in temperate climates. Its principal use in Britain in a commercial sense is as a stock on which to bud or graft the pear. Many choice kinds of pear succeed better when united to it than when they are grafted on the true pear-stock. In Scotland the fruit seldom ripens except on a wall. The Japanese Quince (*C. japonica*, better known by its older name, *Pyrus japonica*), a low bush, a native of Japan, but perfectly hardy in Britain, is often to be seen trained against walls, being very ornamental from the profusion of its beautiful flowers, usually a rich red in colour. See Meech's *Quince Culture* (New York, 1888).



Flowering Branch of Quince (*Cydonia vulgaris*): *a*, ripe fruit; *b*, section of do. (Bentley and Trimen.)

Quincey, De. See De Quincey.

Quincy, (1) the third city of Illinois, and capital of Adams county, is on the Mississippi River, 160 miles above St Louis and 262 by rail SW. of Chicago. It is handsomely built on a high bluff, has a large trade by the river and extensive railway connections, an important railway bridge crossing the river at this point. The public buildings include a fine court-house, a medical college, several hospitals and asylums, an Episcopal cathedral, and some forty other churches. The city has many large flour-mills, machine-shops, foundries, saw- and planing-mills, breweries, and manufactories producing stoves, furniture, carriages, tobacco, &c. Pop. (1880) 27,268; (1890) 31,494.—(2) A town of Massachusetts, near the sea, and 8 miles S. of Boston by rail. The township produces the famous Quincy granite, and was the birthplace of John Hancock, John Adams, and his son, John Quincy Adams. Pop. (1880) 10,570; (1890) 16,723.

Quincy, Josiah, an American orator and man of letters, and son of Josiah Quincy (1744–75), an eloquent advocate of the rights of the colonists, was born at Boston, February 4, 1772, graduated at Harvard in 1790, and was called to the bar in 1793. He took an active interest in politics as a leading member of the Federal party in New England, and was elected in 1804 to congress, where he became distinguished as a ready, earnest, and fervent orator. He was one of the earliest to denounce slavery, but his most remarkable speech was one in which, spurred on by the jealousy with which the old New England colonies regarded the new western states, he declared that the admission of Louisiana would be a sufficient cause for the dissolution of the union, and that, 'as it would be the right of all, so it would be the duty of some, to prepare definitely for a separation—peaceably if they could, violently if they must.' Disgusted with the triumph of the Democratic party and the war of 1812, he declined a re-election to congress, and devoted his attention for a while to agriculture. He was, however, a member of the Massachusetts legislature during most of the next ten years, served as mayor of Boston from 1823 to 1828, and in 1829 accepted the post of president of Harvard, which he held until 1845. His remaining years were spent in quiet literary work, and he died at Quincy, July 1, 1864. Among his published works are Memoirs of his father (1825) and of J. Q. Adams (1858), and histories of Harvard University (1840), of the Boston Athenæum (1851), and of Boston (1852). His *Speeches* were edited (1874) by his son, Edmund Quincy (1808–77), who was secretary of the American Anti-slavery Society, and contributed largely to the Abolitionist press.

Quinet, Edgar, a great French writer, was born of an old Catholic family at Bourg in the department of Ain, February 17, 1803. His mother, whose dreamy and emotional nature he inherited, was a Protestant. In 1806 the child was carried by his mother to join his father, then Commissioner of the Army of the Rhine, and he spent great part of his boyhood in the remote and dreary solitudes of Certines near Bourg. His parents were both ardent republicans, hating the very name of Napoleon. Accordingly the boy early made him a hero in his heart; but as he grew up a passion for liberty superseded his first love. He was educated at the colleges of Bourg and Lyons (1817–20), and next went to Paris; but refusing to take the course for a soldier at the École Polytechnique, he published in justification of his choice of a profession *Les Tablettes du Juif Errant* in 1823. He found the spiritual impulse that he needed in an English translation of Herder's *Philosophy of History*, and this he determined to translate into French, although he had first to learn German to do so. He published the book in 1825, and his remarkable Introduction procured him the friendship of Cousin, at whose house he met Michelet, for fifty years the 'brother of his heart and mind.' He had already travelled in Germany, Italy, and England, when in 1829 he was appointed to a post on a government mission to Greece. The fruit of his travels was *La Grèce Moderne* (1830). A speculative republican of ideas, one of the earliest writers for the *Revue des Deux Mondes*, and a student before their time of the old Chansons de Geste, Quinet played a conspicuous part in the Paris of his day, and made his name known beyond its walls by his *Ahasvérus* (1833), a kind of spiritual imitation of the ancient mysteries, in which the Wandering Jew stands as an emblem of humanity in its hopeless groping for certainty and rest. In 1834 he married, and next produced his less successful poems, *Napoléon* (1836) and *Prométhée* (1838). These three works fall naturally into a kind of trilogy, in which Ahasuerus represents the race, Napoleon the individual, and Prometheus the martyr, typical of the religious leader. In 1838 he published his *Examen de la Vie de Jésus*, in which he shows that Strauss is too analytic to detect the true principle of life in the gospels. Quinet's deepest conviction was that religion is the very substance of humanity, that the true founders of society have been teachers like Zoroaster and Moses, and that Christianity itself is the apotheosis of personality.

Appointed in 1839 professor of Foreign Literature at Lyons, he began those lectures which afterwards formed his brilliant book, *Du Génie des Religions* (1842). He was now recalled to Paris to the chair of 'Littératures Méridionales' at the Collège de France, and here for four years he lectured to a crowd of enthusiastic disciples on such themes as the revolutions in Italy, the Jesuits, Ultramontanism, and Christianity in relation to the French Revolution. He joined Michelet in attacking the Jesuits, and his epigrammatic eloquence, added to the enthusiasm and earnestness of his convictions, made the blow he struck the order the deadliest it had received in France since the days of Pascal. But his lectures caused so much excitement that government suppressed them in 1846. Next came the Revolution, in which Quinet took his place on the barricades, and after its success was elected to represent Ain in the National Assembly, where he voted in the Extreme Left. He was little of a practical statesman, but from the beginning he saw the traitor under the mask of Louis Napoleon. After the *coup d'état* he was exiled to Brussels, whence in 1857 he migrated to Veytaux on the shores of the Lake of Geneva. His mother had died in 1847, his wife in 1851, and soon after his exile he married the daughter of a Roumanian patriot, Georges Asaky. At Brussels he produced *Les Esclaves* (1853), and an edition of the chief writings of Marnix de Ste Aldégonde (1856); and in Switzerland *Merlin l'Enchanteur* (2 vols. 1860), a book of enormous rhetorical power, lofty but ill-sustained thought, and dazzling imagery. Other works were *La Révolution Religieuse au XIX.ᵉ Siècle* (1857); *Histoire de mes Idées* (1860), a delightful fragment of an autobiography; *Histoire de la Campagne de 1815* (1862), in which he showed that Napoleon's fall was due to his own outrage upon righteousness alone; *La Révolution* (1865), in which he demonstrated that its frightful crimes were the fruit of the suspicions and mistrust begotten by twelve centuries of despotic education. All the disasters of French history he traced to the national denial of righteousness in the Revocation of the Edict of Nantes; the Terror was the direct result of St Bartholomew and the Dragonnades, and again was itself the parent of the 18th Brumaire and the 2d December. After the downfall of Napoleon III. he returned to Paris, and during the siege strove to keep aglow the expiring fire of patriotism. He sat in the National Assemblies at Bordeaux and Versailles, and aroused great enthusiasm by his impassioned if somewhat vague orations. He died at Versailles, 27th March 1875.

Quinet's latest books were *La Création* (1870), a characteristically bold and imaginative incursion into the domain of science; *La République* (1872); and *L'Esprit Nouveau* (1874). *Le Livre de l'Exilé* appeared posthumously. His wife published in 1870 *Mémoires d'Exil;* his *Correspondance Inédite* followed in 1877 (2 vols.), his *Lettres d'Exil à Michelet et à Divers Amis* in 1884–86 (4 vols.). An edition of his *Œuvres Complètes* in 26 vols. (1857–79) was prepared by an influential committee as a national tribute of respect to the poet, the prophet, and the patriot. See the biography by Chassin (1859); *Edgar Quinet depuis l'Exil* (1889), by his widow; Richard Heath's *Edgar Quinet: His Early Life and Writings* (1881); also the essays by Professor Dowden in *Studies in Literature* (1878), and É. Montégut in *Mélanges Critiques* (1879).

Quinine is an alkaloid having the chemical formula $C_{20}H_{24}N_2O_2,3H_2O$. Along with cinchonidine, cinchonine, and a large number of other alkaloids, it is present in the bark of numerous species of Cinchona and Remijia, of which these substances constitute the active medicinal principles. Good barks yield an average of 5 to 6 per cent. total alkaloids, of which one-half is quinine and cinchonidine, the other half consisting of the other alkaloids in varying proportions. Quinine is by far the most important from a medical and commercial point of view; the yield of it varies greatly, 1½ and 8 per cent. being the extremes. Quinine is obtained from the powdered bark by treating it with lime, and then extracting the mixture with alcohol, neutralising with an acid so as to obtain a salt of quinine, and finally purifying the product. In 1820 Pelletier and Caventou isolated pure quinine, and demonstrated that it was the chief active ingredient in the bark. Many attempts have since been made to prepare it artificially, but without success. For the introduction of the bark into Europe, and the culture of the tree in South America and (recently) in India, see CINCHONA.

Quinine itself is not used in medicine, owing to the inconveniences arising from its insolubility in water, but many of its salts are, and two of them, the sulphate and hydrochlorate, are included in the British Pharmacopœia along with numerous preparations of cinchona-bark containing them. The sulphate is the most commonly used preparation, and it is popularly known as quinine. It occurs in small, silky, snow-white crystals, which have a purely and intensely bitter taste, and are sparingly soluble in water (1 in 700 parts); its solutions have a bluish or fluorescent colour even when very dilute. In alcohol or dilute sulphuric acid it is very soluble. The hydrochlorate closely resembles the sulphate, but is much more soluble in water (1 in 34 parts), and its solutions are not fluorescent. When treated with excess of chlorine water and a few drops of ammonia solution, solutions of quinine give a clear emerald green colour; if ferrocyanide of potassium be added this changes to a ruby red.

Preparations of quinine, and especially the sulphate, are very largely used in medicine. Locally applied dilute solutions (2 to 4 gr. to the oz. of water) have a germicidal, antiputrefactive, and antifermentative action, hence they are used as lotions in hay fever, diphtheria, cystitis, and similar diseases. As a bitter tonic small doses (½ to 2 grains) are frequently given in general debility, atonic dyspepsia, anæmia, scrofula, convalescence from acute diseases, and other conditions where tonic treatment is required. It is also of great value as an antipyretic and antiperiodic. In healthy persons it does not reduce the bodily temperature, but in typhus, typhoid, rheumatic, and some other fevers it is extremely valuable in this respect. A dose of 3 to 15 grains may be given in these cases. In certain fevers it does not reduce temperature. In malarial affections of all kinds it is supreme, and at present no other known drug can compare with it in efficacy. In intermittent fevers and ague the best plan is to begin its administration about eight hours before the attack is expected, and continue it in hourly doses for three or four hours until 15 to 30 grains have been given. It cuts short or aborts the recurring febrile attacks. It is also of great value as a prophylactic in persons who are exposed to the risks of malarial poisoning. In such cases three grains twice daily is usually considered a sufficient dose.

Quinine is also largely given in neuralgia and in inflammations. Large doses are very apt to irritate the stomach, and sometimes produce a train of symptoms known as cinchonism. There is singing in the ears, dizziness, deafness, a feeling of fullness in the head, and disturbance of vision—all of which usually pass off without leaving any ill results. In some cases the effects are more severe, and may lead to dangerous depression and collapse, especially if the patient be already weakened by disease. Certain persons are very susceptible to the action of quinine, and suffer from cinchonism after small doses. In others skin eruptions, œdema of the face, irritation of the bladder and kidneys, and other disagreeable effects are sometimes seen. Workers in quinine-factories also occasionally suffer from skin eruptions. These accidents are, however, comparatively rare.

The sulphate of cinchonidine and sulphate of cinchonine are also included in the British Pharmacopœia. They have the same actions and uses as quinine, but are very much less used. They seem, however, to be efficacious, and are cheaper.

See works by J. E. Howard (1876), C. R. Markham (1880), Manson (1882), and Flückiger (1884).

Quinoa (*Chenopodium Quinoa*), a valuable food-plant, a native of Chili and the high tableland of Mexico, which much resembles some of the British species of Chenopodium (q.v.). In the countries in which it is indigenous it is much cultivated for its seeds, which form a principal food of the inhabitants. The meal made from some varieties of the seed has a somewhat peculiar flavour, but it is very nutritious and is made into a kind of porridge and cakes. The plant is sometimes cultivated in British gardens for its leaves, which are a good substitute for spinach.

Quinoline, a pungent colourless liquid obtained by the distillation of bones, coal-tar, and various alkaloids. It is the base of many organic bodies, and is isomeric with Leucol (q.v.).

Quinquagesima (Lat., 'fiftieth'), the Sunday immediately preceding Ash-Wednesday. The common explanation of the name Quinquagesima, and of Sexagesima and Septuagesima, the two preceding Sundays, is that the Sundays are, roughly speaking, about fifty, sixty, and seventy days respectively before Easter. Quinquagesima, indeed, is exactly fifty days before the Octave of Easter—i.e. Low Sunday (q.v.). But probably the terms were adopted without any intention of expressing definite numbers, and simply on a false analogy with Quadragesima, the Latin name of Lent.

Quinqueremes, vessels with five banks of oars, however arranged (see TRIREME), may be regarded as the first-rates of the ancient navies.

Quinsy (originally *squinancy;* Fr. *esquinancie;* from Gr. *kynanchē*), known also as *Cynanche Tonsillaris* and *Tonsillitis,* or as 'inflammatory sore throat,' is an inflammatory affection of the substance of the tonsils, attended when fully developed by suppuration (see PALATE). The inflammation is seldom limited to these glands, but extends to the uvula, the soft palate, and the pharynx. The disease usually manifests itself by difficulty in swallowing, and a sense of heat and discomfort in the throat, often amounting to considerable pain. On examination the throat at first exhibits unnatural redness, with enlargement of one or both tonsils. The uvula is enlarged and elongated, its end either dropping down into the pharynx, and, by exciting the sensation of a foreign body, giving rise to much irritation, or else adhering to one of the tonsils. The tongue is usually furred, and the pulse rapid, and there are the ordinary symptoms of that form of constitutional disturbance known as inflammatory fever. The inflammation terminates either in resolution (if the attack is not severe, and yields readily to treatment) or in suppuration, which may be detected by the occurrence of slight rigors, and by the increased softness of the enlarged tonsil. The matter which is discharged has sometimes a very fetid smell, and the fetor may be the first indication of the rupture. The pain almost entirely ceases with the discharge of matter, and recovery is then rapid. The disease usually runs a course of from three to seven days; but it may be prolonged if, as sometimes happens, the two sides are successively affected. It almost invariably terminates favourably. It is most common between the ages of fifteen and twenty-five. The ordinary exciting cause of this disease is exposure to cold, especially when the body is warm and perspiring; and certain persons (or even families) are so subject to it that slight exposure is almost sure to induce it.

The patient should remain in the house (or, in cold weather, even in bed), and should be kept on low, non-stimulating diet. According to Sir Morell Mackenzie, the best treatment at the commencement of the attack consists in the administration of guaiacum. He gives it in the form of lozenges, each containing three grains, and one to be sucked every two hours, and states that by this means the disease may generally be averted. Baking-soda (bicarbonate of soda) applied to the affected part on the tip of the forefinger every hour or half-hour often has the same effect. In more severe cases the patient may gargle frequently with hot water, or may inhale the vapour of boiling water, and apply hot poultices or fomentations to the side of the neck. Blistering and leeching will sometimes give relief, but if suppuration is once established they do harm rather than good. If the tonsils are very much enlarged they should be pricked with a lancet to let out the pus.

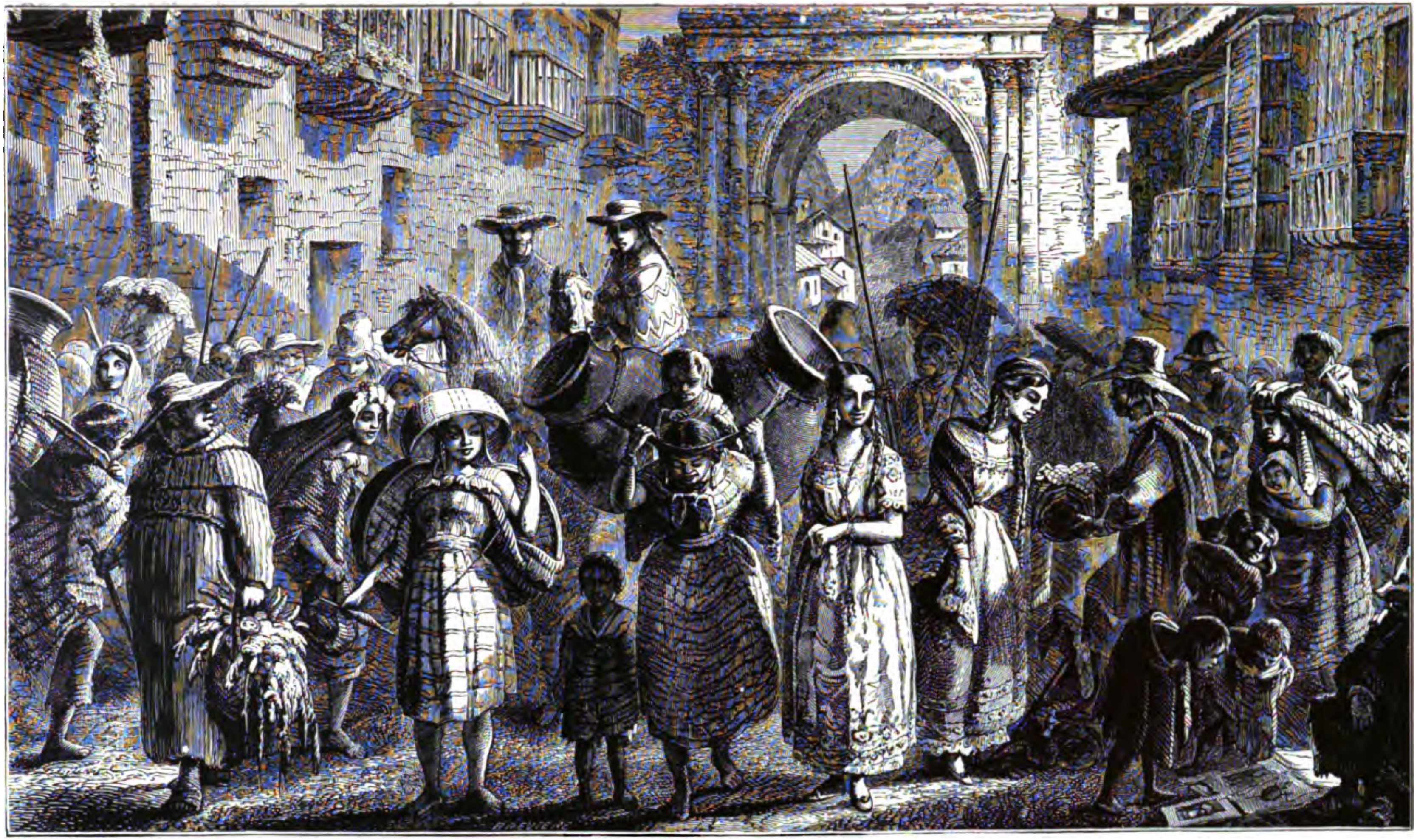
Quintain was an instrument used in the ancient practice of tilting on horseback with the lance. It consisted of an upright post, surmounted by a cross-bar turning on a pivot, which had at one end a flat board, at the other a bag of sand. The object of the tilter was to strike the board at such speed that he would be well past before the bag of sand, as it whirled round, could hit him on the back. At Offham in Kent, 7 miles WNW. of Maidstone, there are the remains of an old quintain; and at the May games held at St Mary Cray in Kent, near Bromley, in 1891 the quintain was also revived.

Quintal, a French weight corresponding to the English 'hundredweight,' was equal to 100 pounds (livres); on the introduction of the metrical system the same name was employed to designate a weight of 100 kilogrammes (see GRAMME). The metrical quintal, equivalent to 220 lb. avoirdupois, is thus more than twice as heavy as the old one.

Quintana, MANUEL JOSÉ, whose patriotic odes obtained for him the surname of the 'Spanish Tyrtæus,' was born at Madrid, 11th April 1772, studied at Salamanca, and established himself as an advocate in his native city, where his house became a resort of the advanced liberals of the time. Besides his Spanish Plutarch (*Vidas de los Españoles Celebres,* 1807–34), a work which is reckoned one of the finest Spanish classics, he published one or two tragedies, and an excellent selection of Castilian poetry. On the restoration of Ferdinand VII. in 1814 Quintana's liberalism caused his imprisonment for six years; but he ultimately forsook the liberal cause, held office, and died 11th March 1857.

Quintett, a musical composition for five solo voices, or for five instruments, each of which is *obligato.* Quintetts for strings have been written by Boccherini, Beethoven, Mendelssohn, Schubert, Onslow, &c.; for other combinations of instruments, generally including the pianoforte, by Mozart, Schubert, Schumann, Brahms, and Raff. Of vocal quintetts one of the most notable is that in Wagner's *Meistersinger.*

Quintilian. M. Fabius Quintilianus was born about 35 A.D. at Calagurris (*Calahorra*), in Spain, and attended in Rome the prelections of Domitius Afer, who died in 59. After this date, however, he revisited Spain, whence he returned in 68 to Rome, in the train of Galba, and began to practise as a pleader in the courts, in which capacity his reputation became considerable. He was more distinguished, however, as a teacher than as a practitioner of the oratorical art, and his instructions came to be the most eagerly sought after among all his contemporaries, his pupils including Pliny the Younger and the two grandnephews of Domitian. As a mark of this emperor's favour he was invested with the insignia and title of consul; while he also holds the distinction of being the first public teacher who benefited by the endowment of Vespasian, and received a fixed salary from the imperial



A STREET SCENE IN QUITO.

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exchequer. His professional career as a teacher of eloquence commenced probably about 72, but after twenty years of labour as advocate and teacher he retired into private life, and died probably soon after 96. His reputation rests securely on his great work entitled *De Institutione Oratoria Libri XII.*, a complete system of rhetoric, which he dedicates to his friend Victorius Marcellus, himself a court favourite and orator of distinction. It was written—as he tells us in his preface to his publisher Trypho—after he had ceased to be a public teacher, and was the fruit of two years' labour. In the first book he discusses the preliminary training through which a youth must pass before he can begin those studies which are requisite for the orator, and he gives us an elaborate outline of the mode in which children should be educated in the interval between the nursery and the final instructions of the grammarian. The second book treats of the first principles of rhetoric, and contains an inquiry into the essential nature of the art. The subjects of the five following books are invention and arrangement; while that of the eighth, ninth, tenth, and eleventh is style (*locutio*), with memory and delivery. Of these the eighth and ninth discuss the elements of a good style; the tenth, the practical studies requisite; the eleventh, appropriateness, memory, and delivery. The last, and in the author's view most important, book is devoted to the various requisites for the formation of a finished orator, such as his manners, his moral character, his mode of undertaking, preparing, and conducting causes, the style of eloquence most advantageous to adopt, the age at which pleading should be begun, and at which it should be left off, and other allied topics. The entire work is remarkable for its sound critical judgments, its purity of taste, admirable form, and the perfect familiarity it exhibits with the literature of oratory. The condensed survey of Greek and Roman literature with which the tenth book commences has always been admired for its clearness, width of intellectual sympathy, and vigour. Quintilian's own style is excellent, for though he is not free from the love of florid ornament and poetic metaphor characteristic of his age, he was saved from its extremes by his good sense, which refused to sacrifice clearness and simplicity to effect, and still more, by his wholesome admiration for Cicero. The style of Seneca he discusses almost as fully as he does that of Cicero, denouncing it as a dangerous model for the orator to follow. He makes an obvious effort to be fair in balancing his praise and blame, but a careful reader detects an undertone of dislike, whether to Seneca's philosophy or his person. Nineteen longer and 145 shorter *Declamations* (ed. C. Ritter, 1885), which have been ascribed to him, are now believed to be spurious, as they evidently belong to different authors, and even different epochs.

The best edition of Quintilian's works is that of Burmann (1720); of the *Institutio Oratoria*, those by Spalding, completed by Zumpt and Bonnell (1798-1834), the last volume (vi.) containing a lexicon, Halm (1868–69), and the hand-edition by Meister (1886–87). Of Book x. alone there are editions by Professor J. E. B. Mayor (1872, incomplete), Hild (Paris, 1885), Frieze (New York, 1889), and Principal Peterson (Oxford, 1891). There are English translations by Guthrie (1805) and the Rev. J. S. Watson (Bohn, 1855–56). See Karl Pilz, *Quintilianus: ein Lehrerleben aus der romischen Kaiserzeit* (1863), and C. Ritter, *Die Quintilianischen Declamationen* (1881).

Quintus Curtius. See CURTIUS.

Quipu, the language of knotted cords which was used by the Incas of Peru previous to the conquest of their country by the Spaniards. A series of knotted strings was fastened at one end to a stout cord; the other ends hung free. This was used for the purpose of conveying commands to officers in the provinces, and even for recording historic annals. The colours of the strings and the order of their arrangement, the character and number of the knots, their distance from the cord to which they were connected, and the methods of their interlacing were the principal elements in this 'knotty language.'

Quirinus (see MARS).—The QUIRINAL (Lat. *Collis Quirinalis*) is one of the seven hills of ancient Rome (q.v.), and next to the Palatine and Capitoline the oldest and most famous quarter of the city. For *Quirites*, also, see ROME.

Quiscalus. See GRAKLE.

Qui Tam actions are actions so called in the law of England from the first words of the old form of declaration by which informers sue for penalties, the plaintiff describing himself as suing as well for the crown as for himself, the penalty being divided between himself and the crown.

Quitch. See COUCH-GRASS.

Quito, the capital of Ecuador, and of the province of Pichincha, lies in 0° 14′ S. lat., on the east side of the great plateau of Quito, at the foot of the volcano of Pichincha (q.v.), at an elevation of 9351 feet above the sea. Its site, cut up with numerous ravines, is very uneven; but the streets are laid out regularly at right angles, plunging into and scaling the sides of the valleys which come in their course. The city is well paved, but the sidewalks are very narrow; and the streets are lit only with candles or kerosene lamps—oftenest those placed before shrines at the street-corners. The appearance of Quito is very picturesque, and its beautiful environment of mountains, together with its clear, healthy, and temperate climate, maintaining an eternal spring, renders it one of the most charming cities of South America; yet the abrupt changes from the hot sun of mid-day to the chills of evening make pneumonia and diseases of the chest very common. The chief edifices are built of stone, the others of adobes or sun-dried bricks, covered with tiles. In the great square stand the quaint cathedral, with its green-tiled dome, the archbishop's palace, the municipal building, and the capitol, built of brick and stucco, with wine-shops on the ground-floor and the two halls of congress on the third story. Other public buildings include the university, a seminary, an institute of science, an observatory, a museum, a library of 20,000 volumes, a penitentiary with 500 cells, a hospital with 500 beds, a lunatic asylum, a retreat for lepers, a score of churches, and three times as many monasteries. Most of these last are in a very dilapidated condition, for which it is hard to find any explanation but laziness; for they still retain their lands and revenues, and the offerings of the faithful, who are nearly all Indians, are as constant as ever. Indeed, Quito is the paradise of priests—of whom there are more than 400 in the city—and the bells are jangling all day long; for Ecuador is the most faithful province of the pope, and the one state in the world which still refuses to recognise the unity of Italy and the condition of affairs that resulted from the occupation of Rome. There are only two or three good shops, and no hotels; the daily market in the square before the monastery of San Francisco is the general purchasing-place, and the religious houses serve for hostels. The city boasts a telephone system, but water is still purveyed in great jars borne on the shoulders of carriers. The manufactures include cottons and woollens and beer; the drying of bird-skins (humming-birds'), the copying of religious paintings, and the production of images of the Virgin and of saints rank as important industries. Founded in 1534, Quito has suffered frequently from earthquakes (especially in 1797 and 1854) and from revolutions (recently in 1877 and 1883). Pop. about 50,000, mainly Indians and mestizoes. See Monnier, *Des Andes au Para* (1890); also Vincent, *Around and About South America* (1890).

Quit Rent, a term used to denote various nominal rents; properly speaking, a quit rent is a rent reserved in lieu of all services, because on paying it the holder of the land goes quit and free. In old records it is called white rent, because it was paid in silver money, as distinguished from corn rents. The Conveyancing Act, 1881, empowers an owner of land to redeem any quit rent to which it may be subject.

Quoad Sacra. See PARISH.

Quoin (Fr. *coigne*, from Lat. *cuneus*) is generally a wedge or an angle. In artillery the quoin is a wedge inserted beneath the breach of a gun, for raising or depressing the muzzle. Quoin, in Architecture, is one of the stones forming the solid corner of a building. Where the work is of brick or small materials the quoins are usually of ashlar.

Quoits, a game much practised in many districts of Great Britain, seems to have been derived from the ancient game of 'throwing the *discus*,' which was such a favourite amusement of the Greeks and Romans. The discus was a circular plate of stone or metal, 10 to 12 inches in diameter, and was held by its farther edge with the right hand, so as to lean upon the forearm, and was cast with a swing of the arm, aided by a twist of the whole body. It was generally thrown edge foremost, and upwards at an angle of 45°, so as to give it as great a range as possible, and the player who threw it farthest was the winner. Sometimes a kind of quoit was used. The modern game of quoits differs very considerably from this. A quoit is a flattish ring of iron, generally about 8 inches in external diameter, and between 1 and 2 inches in breadth; the weight accordingly varies a good deal, but may in any match be fixed beforehand. The quoit is convex on the upper side, and slightly concave on the under, so that the outer edge curves downwards, and is sharp enough to stick into the ground. The mode of playing is as follows: Two pins, called 'hobs,' are driven into the ground from 18 to 21 yards apart; and the players, who are divided into two parties, stand at one hob, and in regular succession throw their quoits (of which each player has two) as near to the other hob as they can. The points are counted as in bowls or in curling. To facilitate the sticking of the quoits at the point where they strike the ground, a flat circle of clay—about 1 or 2 inches in thickness, and 1½ feet in radius—is placed round each hob; this requires to be kept moist. The quoit, when to be thrown, is grasped with the right hand by one side, and pitched with an upward and forward jerk of the hand and arm, which give it a whirling motion, and cause it to strike the ground with its edge. Players acquire such dexterity in this game that they can very frequently 'ring' their quoit—that is, land it so that the quoit surrounds the hob.

Quorn, or QUORNDON, a village of Leicestershire, 2½ miles SE. of Loughborough, gives name to a celebrated kennel (and hunt) of foxhounds. Pop. 1816. See FOXHUNTING.

Quorra. See NIGER.

Quorum is a legal term denoting a certain specified number out of a larger number as entitled or bound to act for certain purposes. Thus, in statutes appointing commissioners or trustees of a public work it is usual to name a certain number of the whole body as sufficient to discharge the business when it may be inconvenient for all to attend. For the origin of the expression, see JUSTICE OF THE PEACE, Vol. VI. p. 378.

Quotidian Fever. See AGUE.

Quo Warranto, the title of a writ by which a person or corporate body is summoned to show by what warrant a particular franchise or office is claimed. In the reigns of Charles II. and James II. the writ was used oppressively, for the purpose of depriving cities and boroughs of their liberties. At the present day an information in the nature of a quo warranto may be filed, with the leave of the court; disputed questions in regard to municipal offices, &c. are sometimes brought to trial in this way. The information is now regarded as a form of civil process.

Qurân. See KORAN.

R

R is the eighteenth letter in our alphabet. In ancient Egyptian there seems to have been no clear distinction between the sounds of *r* and *l*, both of which are liquid trills, the breath escaping over the vibrating edges of the tongue—in the one case over the tip, in the other over the sides (see L). Consequently the hieroglyphic picture of the 'lioness,' from which our letter *l* is derived, was used almost interchangeably with the picture of the mouth (see ALPHABET), which became the source of the letter *r*. But the Semites, who obtained their alphabet from the Egyptians, made a clear distinction between the two sounds, and hence the two Egyptian symbols were specialised, the tailed hieratic form of the Egyptian picture of the mouth being exclusively adopted as the Semitic sign for *r*. It was called *resh*, 'the head,' because in the hieratic form, 9, it resembled the oval of the head supported on the neck. In the lapidary writing of the Phœnicians the letter became angular instead of rounded, and the Semitic form, 4, passed without alteration into the earliest Greek alphabet. When the direction of the Greek writing was reversed the form was somewhat rounded, giving for the sound of *r* the symbol P, which was called *rhō*. The Semitic name *resh* or *rhos* would become *rhosa* in Greek, but as in Greek an *s* normally disappears between two vowels, this would give *rhoa*, and finally *rhō*, owing to the coalescence of the vowels. In the primitive Greek alphabet, as in the Phœnician, the forms of the signs for *b*, *d*, and *r* differed little, and confusions arose. Hence the signs were differentiated in various ways. In the early Greek alphabet which found its way into Italy the tail of P was curved round, giving the form B with a lower loop, to denote *b*, while for *d* the tail was shortened and finally disappeared, giving D. For *r* a short tail was added, giving the form R, which ultimately became R, while the form P was retained to represent *r* in the Eastern alphabet and in the Western to represent *p*. The tail of R began to make its appearance in the Greek alphabet before it was transmitted to Italy, but subsequently disappeared, other ways of avoiding the confusion between the forms having been invented. For the lapidary and capital forms the old R has been retained, but in minuscule writing we use r and ꝛ, the first of which is an uncial form derived from R; the second, called the *r rotunda*, coming from the old Roman cursive, in which the vertical stroke of R has nearly disappeared, being represented only by the small tag at the top of ꝛ.

The sound of *r* is a true consonant in the north of England, where it is exaggerated in the Northumberland burr. In Sanskrit it is vocalic; in the south of England it is often reduced to a semivowel or even to a vowel; while in the Midlands, in Scotland, and in France it preserves the proper sound of a trilled liquid which it had in Latin and Anglo-Saxon. After a guttural vowel it is hardly heard, *farther* being now almost indistinguishable from *father*. The Irish *r* is a survival of the old English sound, the pronunciation *harum* for 'harm,' *arum* for 'arm,' and *boren* for 'born,' reproducing, it is believed, the mediæval English sound, which is now less resonant than it formerly was. The sounds of *r* and *l* are often interchanged. In the Indian alphabet the Semitic symbol for *r* represents *l*, and the symbol for *l* represents *r*. The Japanese sign for *r* was obtained from a Chinese sign for *l*, and some Polynesian and South African peoples replace *r* by the easier sound of *l*, as is also done by English children, who, however, often prefer *w*, saying *vewy* for 'very.' The sound of *r* is usually the last which children learn to pronounce. In English *l* frequently replaces *r* and occasionally *r* replaces *l*, as in 'turban' from *tolibant*. Sometimes *r* disappears, as in 'speak' from O.E. *sprœcan*, 'pin' from O.E. *preon*, 'palsy' from O. Fr. *paralysie*, and 'cockade' from O. Fr. *cocart*. It is intrusive in 'shrill' from O.E. *schill*, in 'hoarse' from O.E. *hás*, in 'partridge' from Lat. *perdix*, in 'cartridge' from Fr. *cartouche*, in 'corporal' from Fr. *caporal*, and in 'culprit' from Lat. *culpa*. It is also intrusive in *iron* and bride-*groom*. There is a modern tendency to insert a final *r*, as in 'taters' for 'potatoes' and 'Victoriar' for 'Victoria.' In the words *our*, *your*, *their*, *her*, the *r* is a survival of an old genitive suffix. Sometimes *r* is transposed, as in 'horse' from *hross*. In Latin *r* supplants *s* between two vowels and sometimes at the end of words, as in 'arena' for *asena*, 'dari' for *dasi*, 'plurima' for *plusima*, 'honor' for *honos*, 'arbor' for *arbos*.

Ra. See EGYPT, Vol. IV. p. 234.

Raab (Hung. *Györ*), a town of Hungary, stands on an extensive plain at the confluence of the Raab and the Little Danube, a branch of the great river of that name, 67 miles WNW. of Buda-Pesth. It contains numerous religious edifices, among which is a beautiful cathedral. The manufactures are chiefly tobacco and cutlery. Pop. 20,981.

Raalte, a town of the Netherlands, in the province of Overyssel, 11 miles NNE. of Deventer. Pop. 5795.

Raasay, one of the Inner Hebrides, lies between the Isle of Skye and the mainland of Scotland, and belongs to Inverness-shire. It is 13 miles in length from north to south, 3½ miles in greatest breadth, and 24 sq. m. in area. Pop. (1841) 647; (1891) 438. The western side of the island is bare and uninteresting. On the eastern and more sheltered side there is some striking scenery. Dun Caan (1456 feet) is the highest point, and Brochel Castle, on the east shore—now a mere ruin—the chief object of interest.

Rabanus Maurus (or more correctly *Hrabanus*), a great Carolingian churchman and divine, was born of noble parents at Mainz about 776, and had his education at Fulda and at Tours under Alcuin, who surnamed him Maurus after the favourite disciple of St Benedict. He was next placed at the head of his school at Fulda, where he trained scholars like Walafrid Strabo and Otfrid of Weissenburg. In 822 he became abbot, but resigned in 842 to retire to the neighbouring cloister of Petersberg, whence in 847 he was called to the archbishopric of Mainz. The chief event of his reign was his severity against the too logical monk Gottschalk for his views on predestination. He died in 856. His writings show erudition but little originality. They include Commentaries on the Old Testament, St Matthew, and St Paul's Epistles, homilies, doctrinal treatises, hymns, and a Latin-German glossary to the Bible (Graff's *Diutiska*, vol. iii.). Among these are *De Institutione Clericorum*, and *De Universo Libri xxii., sive Etymologiarum Opus*, a kind of encyclopædia of its time.

His *Opera Omnia* (so called) fill vols. cvii.–cxii. of Migne's *Patrologiæ Cursus Completus*—a reprint of the Cologne edition of Colvenerius (6 vols. folio, 1627), to which are prefaced the *Lives* by his disciple Rudolphus and by Joannes Trithemius. See the studies by Spengler (1856), Köhler (1870), and Richter (1882).

Rabat, also called New Sallee, a seaport of Morocco, and one of the most picturesque towns of the empire, is situated on the south side of the Bu-Ragrag, at its entrance into the Atlantic. It stands on cliffs in the midst of gardens, and is overlooked by a large citadel. The most conspicuous object is, however, the tower of Beni-Hassan (180 feet high), rivalling the great towers of Seville (Giralda) and Morocco (Kutubiya); near it is the ruined mosque of Almanzor, originally intended to be made the largest in the world. Ruins still exist of the sultan's palace that was immortalised by the feats of Dick Whittington's cat. Carpets, shoes, and mats are made, and woollens dyed. But, owing to the silting up of the mouth of the river, the commerce of Rabat has much declined. Formerly it was the centre of the European trade with Morocco; it still exports olive-oil, grain, hides, flax, wool, maize, and millet. There is a small import of cotton-stuffs, sugar, candles, and tea. Pop. 26,000. See *English Illustrated Magazine* (February 1890); also Sallee.

Rabbi (Heb., 'my master,' 'my teacher'), an honorary title of the Jewish Masters of the Law, which is first found applied after the time of Herod, subsequently to the disputes between the two schools of Shammai (q.v.) and Hillel (q.v.). It was in common use at the time of Christ, who is addressed as such by his disciples and the common people. Other forms of the same title are *Rab* ('master'), *Rabbān* ('our master'), and the Hellenistic *Rabboni* ('my master'). The title Rabbān was first given to the grandson of Hillel, Gamaliel (q.v.), as prince-president of the sanhedrim, and was only borne by seven other exalted chiefs of schools. At present nothing but the degree of *Morenu* ('our teacher'), bestowed upon a candidate who proves his erudition in the written and oral law and all its bearings before a college of rabbis, is wanted to render him eligible for the post of a rabbi, which, however, carries no authority whatsoever with it, save on a very few ritual points. It is a mere ignorant error to hold that the rabbi of our day is a kind of 'priest' in the sense of the Old Testament. He is simply the teacher of the young, delivers sermons, assists at marriages and divorces, and the like, and has to decide on some ritual questions. Up to the times of the removal of Jewish disabilities in Europe (see Jews, Vol. VI. p. 328) he had on some occasions also to give judgment in civil matters. For the later Jewish, or so-called *Rabbinical*, literature, see Jews, Vol. VI. p. 331 *et seq.*; for Rabbinical Jews and Rabbanites, see the same article, p. 330.

Rabbit (*Lepus cuniculus*), a well-known rodent in the same genus as the hare, from which it differs in some external features and yet more in its habits. The rabbit is smaller than the hare, with shorter head, ears, and legs; the ears are shorter than the head, and have no black patch at their apex, or at most a very small one; the hind-legs are not so much longer than the fore-legs as they are in the hare; the predominant colour is gray. Moreover, the rabbit brings forth blind and naked young, which it nurtures in the safe retreats afforded by the burrows. These burrows are often of great length, have a crooked course, and generally several openings. Rabbits live socially, and prefer for their warrens places where the soil is loose and dry, and where furze or other brushwood affords additional shelter. They feed on grass, herbs, and tender bark. Their reproduction is very prolific, for breeding may occur four to eight times during the year, the period of gestation lasts only thirty days, three to eight young are born at once, and sexual maturity is reached in about six months. A tame rabbit has been known to bear fifty-eight young in a year, and Pennant calculated that from one mother no less than 1,274,840 descendants might result by the end of four years, assuming that all the members of successive generations survived and reproduced. The young are born—naked, blind, and helpless—within the burrow in a special brood-chamber or nest lined by some of the mother's fur. The mother-rabbit takes much care of her young, nor is the male lacking in affection, though in abnormal conditions he sometimes destroys the brood. For periods at least rabbits are monogamous, and the males exhibit much affection for their mates and hatred of rivals. The normal length of life seems to be about seven or eight years. The gregarious life of a rabbit warren needs no description, but it may be noticed that adjacent burrows sometimes intersect. The senses of rabbits are acute, but their intelligence is not highly developed. They are most active in the gloaming and darkness. Their chief enemies are birds of prey such as hawks and owls, and carnivores such as fox and weasel. By stamping with the hind-legs the older rabbits give signals when danger threatens. It is said that the whiteness of the exposed under sides of the tails is of advantage in indicating the direction of movements, but one would think that it must be also disadvantageous in making the retreating rabbit more conspicuous.

Tame rabbits are varieties of the wild form, modified by the artificial selection usually associated with domestication. Among the more important breeds are the 'silver rabbits' with bluish-gray silvery fur, the 'Russian rabbits' with gray body and brown head, the 'Angora rabbits' with short ears and very long silken fur. Albinos with white hair and red eyes are common. The domestic varieties, especially the last, are much less hardy than those which run wild. Some remarkable modifications have occurred among rabbits in which cross-breeding has been prevented by insulation. Thus there are local varieties in the Falkland Islands and in Jamaica. Most remarkable are the dwarf-rabbits of Porto Santo, one of the Madeiras, which are said to be the descendants of a single litter left there in the beginning of the 15th century. These are so much modified that they do not breed with other rabbits. Hybrids between hare and rabbit are not uncommon in France. In regard to the keeping of tame rabbits, it may be noticed that they eat almost any kind of vegetable food; the coarser blades of cabbages, turnip-leaves, celery-tops, carrot-tops, and other produce of the garden, not suitable for human use, are readily consumed by them, as well as chickweed, sow-thistle, dandelion, and many other weeds. When the rabbit-enclosure contains a plot of grass and clover it affords them an important part of their food. Great care is requisite to keep their boxes dry, neglect of which, and a too exclusive feeding with green and succulent food, cause diseases, often fatal, particularly to the young. Dry food, such as corn, ought to be frequently given; and aromatic herbs, such as parsley, thyme, and milfoil, not only tend to preserve the health of rabbits, but to improve the flavour of their flesh. It is usual to give no water to tame rabbits; but it is better to supply them regularly with it, and the females particularly need it after producing young. See books on rabbit-keeping by 'Cuniculus' (1889), R. O. Edwards (2d ed. 1887), K. W. Knight (1889), and Rayson (2d ed. 1889).

It is believed by many that Spain was the original home of rabbits, and that they were, until comparatively recent times, confined to the Mediterranean region. It is certain that in Spain, and still more in the Balearic Isles, they did tremendous havoc in the 1st century B.C.; still it seems that bones of rabbits have been found in Quaternary deposits north of the Alps. Rabbits spread very rapidly, as may be inferred from the fact that they were not introduced into Scotland till the first quarter of the 19th century. Their introduction into Ireland is also recent. They are not able to stand great cold, and are therefore absent from Scandinavia and North Russia. The most signal instance of their rapid distribution is to be found in their present abundance in Australia and New Zealand, into the latter of which countries seven rabbits were first turned out near Invercargill, apparently about 1860. As to Australia, the agent-general for New South Wales writes (1891) that 'this department is unable to state the exact date when rabbits were introduced into the colony, but it is certain that they existed about forty years ago.' And according to the *Victorian Year Book* for 1887–88, tame rabbits were kept in Victoria during the early years of the colony (towards the middle of the 19th century); but rabbits were first turned out on an extensive scale by a landed proprietor in the western district. They bred rapidly, and for several years there was a demand for couples for breeding purposes in most districts, nobody guessing what a plague they were to become. In both Australia and New Zealand they have spread and multiplied to an extent which seriously affects the prosperity of farmers and rearers of stock. The climate and soil are suitable and their natural enemies are few. Many endeavours have been made to exterminate them, but without success. Trapping, poisoning, and hunting them down produce only a temporary reduction of numbers. Pasteur proposed to infect them with fowl-cholera, and to some extent this has been tried. It has been lately suggested that only the females should be killed, so that the predominance of males might result in unnatural conditions fatal to continued existence. Most practicable at present is the use of wire netting. Thus, if the pools where the rabbits drink are surrounded with netting, thousands die of thirst in a short time. In New South Wales alone the outlay on account of rabbit destruction between 1883 (when the first act dealing with the subject was passed) and August 1890 was £803,574. As many as 25,280,000 have been killed in one year, and their skins paid for.

Besides eating up crops and pasture, rabbits often do great harm by barking young trees, and also by their burrowing. On the other hand, the white flesh of rabbits forms excellent food, the skin and the fur are much used, and, as Gilbert White noticed, rabbits by their nibbling make 'incomparably the finest turf.' The preserving of rabbits in tins is in some places an important industry. Rabbits are not technically game (see GAME-LAWS). The old English name for the rabbit is *cony*, but the cony of Scripture belongs to the genus Hyrax, anatomically a very different animal. See HARE, RODENTIA.

RABBIT-SKINS have a regular commercial value in consequence of the hair being well adapted for felting purposes; its chief use is in making the bodies of felt hats and imitations of several of the more valuable furs. There has been a very large market in the United States for the imitation furs prepared from rabbit-skins, to which country British manufacturers have largely exported. Tasmania exports about 30,000 rabbit-skins per month to England. See FELT, FURS, HAT.

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Rabelais, FRANÇOIS. According to the statements of those who wrote while his tomb was still standing with his name and age upon it, who had access to the church register of Meudon, and who visited the place of his birth while his memory yet lingered, in order to collect every fact that could be found concerning him, this great humorist was born in the year 1483. His father, proprietor of a vineyard called La Devinière, was an apothecary in the town of Chinon, where his house, which afterwards became a *cabaret*, is still shown. François was the youngest of five sons. Of his elder brothers nothing whatever is known. Bishop Huet, annotator of Rabelais, found an old woman of the name in a village near Chinon, and gathered a local tradition that the last male representative of the family, an apothecary, had died at Chinon in great poverty.

At the age of nine the boy was sent to the convent of Seuilly, near his father's estate. 'There are some mothers,' he wrote years afterwards, 'who cannot bear to keep their children about the house more than nine, or, still oftener, seven years. By only putting a shirt over their frocks and cutting off a little hair from the crown of their heads, and saying certain magical words, they transpose them into birds—i.e. put them into monasteries and make monks of them.' He was, in fact, made a monk at the age of nine, and remained a monk all the best years of his life. One result was that, when he came out again into the world and began to write, he wrote of the world as he remembered it—of Touraine and the Tourangeaux, the stories and songs of the drinkers, the gossip of the women, the merriment and happiness—the wild, the careless happiness—of the whole.

After some time at Seuilly, the boy was transferred to the convent of La Baumette, near Angers. Here was a school founded by King René of Anjou in the year 1464, for providing an education on more liberal principles than those of the old method. At this school he founded a life-long friendship with the three illustrious Du Bellay brothers. Nothing is known about the range of his scholarship while at La Baumette. We may, however, very well understand, from the continued protection which Jean du Bellay (afterwards Cardinal) extended to him, that as a young man he had shown promise and proved his abilities. At the close of his course he took the step for which, no doubt, he had been long prepared—i.e. he became a novice of the Franciscan order. It has been asked why he took a step for which he was eminently unfitted; why he became a Franciscan, one of the order which professed to despise learning, and why he exchanged his own smiling country for the barren heaths of La Vendée. The answer seems obvious: for a poor lad the church offered in some form or other, either as priest, monk, or servant of the cathedral or monastery, a livelihood that was certain although humble. It is manifest that the youngest son of the Chinon apothecary could not expect a certain livelihood, with the power of continuing his studies, in any other occupation. He became a monk and entered the Franciscan convent of Fontenay le Comte simply because this was the convent where some kindly interest found him a place. It must not be supposed that the monasteries were at that or at any period willing to accept any lad who wanted to exchange a life of servitude and hard labour for one of ease. Not at all. Interest was required for the admission of a boy: in some houses he must be of good birth, in others he must have shown abilities beyond the common. Rabelais, in fact, had no choice at all but to become a monk if he could get into some convent, and he entered the house of Fontenay le Comte because it was the only convent which offered to receive him.

By this time the Franciscan contempt of learning had undergone some modification. It does not appear that Rabelais was hindered by the brethren in his studies. On the contrary, he had access to a large and well-furnished library, whether outside the house or in it is not known, and he read all the books that he could get; acquiring Greek, Hebrew, and Arabic; studying all the Latin authors within his reach, French of the 13th and 14th centuries, books of medicine, astronomy, botany, mathematics—everything in the omnivorous fashion of his time, when every scholar with a good memory wished to become a *Doctor Universalis*. He had companions in his ardour for learning, especially one Pierre Amy, a brother-monk. Also, the rules of the Franciscans, far less severe than those of the Cistercians, permitted the monks to go outside the house, and in the little town of Fontenay Rabelais found a friend, André Tiraqueau, lieutenant-general of the bailiwick, lawyer, scholar, and writer. Also his early and life-long friend, Geoffroy d'Estissac, Bishop of Maillezais, lived chiefly in his chateau of Ermenaud, close to Fontenay.

Many silly stories have been attributed to Rabelais in these years. They all tend to show him in the light of a monkey, mischievous and impish. We may dismiss them as childish; not, however, that we are to regard him—now a priest—as a person grave and serious, charged with the sense of his sacred responsibilities and his vows: to be a priest in the 16th century is not quite the same thing as to be a clergyman in the 19th. Rabelais was at all times a mirthful man, more given to laughter than to tears, and if he did not play silly tricks upon the brethren he certainly laughed at them. We find him corresponding with the great Budé, as one scholar with another. He is on terms of intimacy with Tiraqueau and his brethren learned in the law. He is on terms of friendship with Bishop D'Estissac. Evidently a monk of repute and distinction, he is far above the heads of his nameless and obscure brethren of the monastery. Then we hear of trouble and persecution. The Franciscan jealousy of the old learning has been transformed into jealousy of the new learning. The brothers take their books away from Rabelais and Amy—perhaps lay the pair by the heels in the convent prison.

When they were released a loathing of the convent fell upon these two scholars. What to do? They opened the Book of Oracles—Virgil—and chanced upon the following line:

> Heu! fuge crudeles terras, fuge littus avarum!

What could this mean but a direct injunction to escape? They obeyed the oracle and fled—they ran away. Rabelais, returning to the world, was past forty years of age. He seems to have sought the protection of his friend Bishop D'Estissac, by whom he was received. Through him, or perhaps through the kind offices of Cardinal Du Bellay, he obtained the pope's permission to pass from the Franciscan to the Benedictine order. But he was in no hurry to enter another cloister. He remained at Ligugé with the bishop for six years. It is said that during this period he took a small country living, but this is doubtful. Most likely he passed the whole time in study. Perhaps he paid visits to Paris and Bourges. He made the acquaintance of Marot, who wrote a sonnet for him. His reading had now ceased to be encyclopædic: its special aims may be inferred from the fact that on the 17th day of September 1530 he entered the university of Montpellier as a student. That he was already known as a scholar is also proved by the fact that two months afterwards he was excused the undergraduate course of three years, was admitted to the Bachelor's degree, and allowed to lecture on Hippocrates and Galen. He dissected publicly before the students, and left the university in the year 1532, returning in 1537 to take the Doctor's degree.

In 1532 Rabelais went to Lyons to get his first book, *Hippocratis et Galeni libri aliquot*, published. He remained there as physician to the hospital. At this time Lyons was as great an intellectual centre as Edinburgh about the beginning of the 19th century. Here the great printer Gryphe had his workshop, and issued no fewer than three hundred books, including the Latin Bible of 1550, remarkable for its correctness and for the beauty of its type, and the commentaries of the unfortunate scholar Dolet, in two folios of 1800 columns each, and only eight errata for the whole work. Round this printer was gathered a company of scholars and poets called the *Société Angélique*, a company of broad thought and advanced opinions. As regards religious opinions, it must be remembered that to the scholars of that period the Christian religion meant little more than the Roman ritual and the Roman discipline. They had no idea of Christianity apart from the superstitions they derided. It is not fair to call them atheists: they had adopted the vague but hopeful agnosticism of Cicero: they would not, being scholars, wholly die: they would, after death, be allowed still to watch the advance of learning. Men, for example, who were physicists, like Rabelais, would worship the Creator of the vast and wonderful cosmos. Dolet represents the scholars of Lyons, Desperiers the poets, Rabelais the men of science. All three despised and hated the Church of Rome. Two of them felt the heavy hand of the church in life, the third after death. Dolet was strangled and burned at the stake; Desperiers, starving and despairing, fell upon his sword; Rabelais, dying peacefully, has been assailed ever since as a buffoon and a reveller in foulness and filth.

It was at Lyons that Rabelais began the famous book, or series of books, by which he will for ever be remembered. In the year 1532 he brought out *The Great and Inestimable Chronicles of the Grand and Enormous Giant Gargantua*. Every Tourangeau knew this good giant. Rabelais had heard about him while a child. It was he who set up the dolmen at Poitiers and the *pierre couverte* of Saumur. When he scraped the mud from his shoes he made hills, which may still be seen. He drank at a ford and swallowed six bullocks, a loaded cart, and the driver. Once he swallowed a ship laden with gunpowder. In fact, Rabelais, who never invented anything, but embellished and adorned everything, did not invent Gargantua. In the sequel or second book, *Pantagruel*, the author departed from his first plan: he no longer wrote pure burlesque: serious ideas are set forth side by side with overwhelming nonsense, and the reader steps from unbridled fancy into regions of sense and wisdom. In order to make the first book correspond with the second, Rabelais wrote it all over again, with the result that it is fuller of sense and wisdom than the second. Both books had a prodigious success. They were published under the anagram of Alcofribas Nasier.

At the same time he began his almanac, which he continued for eighteen years. These are all lost except a few fragments.

In 1534 he accompanied his old friend and patron, Cardinal Du Bellay, to Rome. He promised himself great things on this expedition. He would visit the Italian scholars; he would find new plants; he would dig and discover great things; he would study the topography of Rome. In the end he returned with Marliani's book on Rome, which he translated and published with notes of his own.

In 1535 new editions appeared of the *Gargantua* and *Pantagruel*. In 1536 Rabelais again went to Rome. Some of his letters from Italy to his friend Bishop D'Estissac have been preserved. He obtained absolution from the pope for having forgotten to go into a Benedictine house, for neglecting his Hours, and for practising medicine. He also received permission to go into any Benedictine house which would receive him—time being of course taken to find one. He was enabled to hold ecclesiastical offices, to practise medicine without fees, without the knife, and without fire. He now had nothing to fear from his old enemies of Fontenay le Comte. He amused himself in Italy with collecting curious plants—to Rabelais France first, and we next, owe the melon, artichoke, and carnation; he sent seeds to the bishop and bought curiosities for him.

In 1537 he is found in Paris at the great literary banquet held in honour of Dolet's escape from a charge of murder rising out of accidental homicide. From 1537 to 1539 he resided and taught at Montpellier. In the latter year he went to Lyons, where he stayed a short time only, removing to Paris in 1540. Once more he made things right with the church, obtaining absolution for not having found a Benedictine house, and permission to enter the Collegiate Chapter of St Maur des Fossés instead of a convent, and to hold any benefices which might be conferred upon him. In 1543 he was at Symphorien near Lyons—where he witnessed the death of Guillaume du Bellay—at Chinon, Ligugé, and Angers.

During this time he was writing his third book. It was a dangerous time for heretics. A whisper of heresy at the outset might not only ruin the book, but also bring the author to the stake. He caused the first two books to be read to the king, who was so pleased with them that he gave permission for a new edition, and granted a license for the publication of the third. Rabelais did not avail himself of the permission for a new edition. Already many impieties had been pointed out which he declared were due to the printers, interpolations, misreadings, and so forth. Best not to bring out a new edition. But he printed his third book. This was in 1546.

In 1547 the old king died, and a reaction against liberty of thought immediately began. They attacked Rabelais. Not content with finding impieties in the first three books, they printed a thing which they called his fourth book. Rabelais fled: he went to Metz, where he practised medicine. Cardinal Du Bellay, himself suspected of liberal tendencies, withdrew to Rome, whither he called Rabelais. On the birth of King Henry's eldest son great rejoicings were held in Rome. Rabelais wrote an account of these, and sent the little book to the Cardinal De Lorraine, a stroke of policy which enabled him to return, and gave him the living of Meudon.

From both sides, Catholic and Protestant, cries came that his book should be suppressed and the author burned. Nothing, however, was done. But Rabelais did not dare to proceed further with the fourth book than the eleventh chapter. There it broke short off. This was in 1549. The author, now growing old, lived quietly at his living, preached, catechised the children, and led an exemplary life. Early in 1553, a fortnight before the parliament allowed the sale of the book, he resigned his living and went to Paris. Here, two months afterwards, he died. It was in the Rue des Jardins, parish of St Paul. They buried him at the foot of a tree, on which his name was carved. The tree was cut down a hundred years afterwards. Ten years after his death appeared the fifth and last book, which had been left in MS., unfinished and without the author's corrections.

These are the facts which have been gleaned concerning the life of this great humorist. The riotous license of his mirth, which is restrained neither by decency nor by reverence, has made him as many enemies as his wisdom has made him friends. This fault, which Rabelais shares with many writers of his age—our own dramatists were quite as bad—has been made the most of by the former, his enemies. We may grant the blot: yet it is not inherent in the book; it is not woven in the web: and when it is removed there remains the most astonishing treasury of wit, wisdom, common-sense, and satire that the world has ever seen. All, however, assumes the form of allegory: those who have no taste for allegory cannot appreciate Rabelais.

Among the many modern editions of Rabelais may be named those of Lacour and A. de Montaiglon (3 vols. 1868–73), that in the 'Collection Jannet' (7 vols. 1867–74), the Jouast edition (4 vols. 1885), and especially that in the 'Collection Lemerre,' by Ch. Marty-Laveaux (in 6 vols., i. to iv., 1868–81). See Delécluze, *Rabelais* (Paris, 1841); Lacroix, *Rabelais, sa Vie et ses Ouvrages* (Paris, 1859); Fleury, *Rabelais* (2 vols. Paris, 1874); Urquhart and Motteux's English translation (1653–94, suppressed); the present writer's *Rabelais* (Blackwood's Foreign series, 1879), and his *Readings in Rabelais* (1881); Stapfer, *Rabelais, sa Personne, son Génie, son Œuvre* (1889); Arthur Heulhard, *Rabelais: ses Voyages en Italie, son Exil à Metz* (1891).

Rabies. See HYDROPHOBIA.

Rabshakeh, an officer of the king of Assyria, taken in the Authorised Version of the Bible as the name of a person; but apparently an official title, presumably that of the chief cup-bearer.

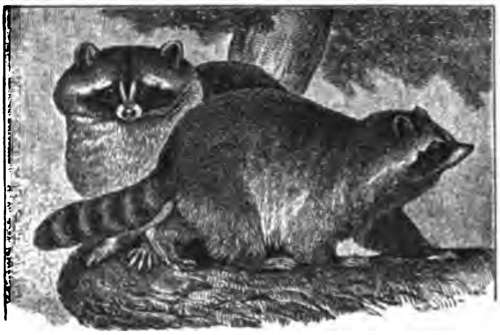
Rabutin, or BUSSY-RABUTIN. See SÉVIGNÉ (MADAME DE).

Racahout, a farinaceous food prepared from certain acorns. See OAK, Vol. VII. p. 561.

Racalmuto, a town of South Sicily, 13 miles by rail NE. of Girgenti. Pop. 13,133.

Racconigi, a town of North Italy, 23 miles by rail S. of Turin, with a royal palace. Pop. 7875.

Raccoon, or RACOON (*Procyon*), a genus of quadrupeds of the Bear family (Arctoidea), with six molar teeth on each jaw; like other Arctoids, it is plantigrade, and has no retractile claws. There



Racooon (*Procyon lotor*).

are certainly two, possibly three, but not more than four species of raccoon, which are restricted to the American continent. In North America we meet with the 'coon' (*Procyon lotor*), so called from the habit of soaking its food in water. This animal prefers open woods, and is a good climber, making its home in trees. The raccoons, however, descend to the ground to search for their food, which consists chiefly of aquatic animals, fish, crayfish, and various shellfish; they will also feed upon corn. These animals are among the most strictly nocturnal of mammals; they hibernate during the winter. In South America occurs *P. cancrivorus*, and a well-marked variety which may be a distinct species, and has been named *P. nigripes* on account of its dark-coloured feet. For the Raccoon Dog, see DOG.

Race. See BREED, SPECIES, ETHNOLOGY.

Race, CAPE. See NEWFOUNDLAND.

Racehorse. See HORSE, HORSERACING.

Raceme. See INFLORESCENCE.

Racemic Acid. See TARTARIC ACID.

Rachel, ÉLISA (properly ÉLISA RACHEL FÉLIX), a great tragic actress, was born of poor itinerant Jewish parents at Munf, in the Swiss canton of Aargau, 24th March 1821. At last the family settled at Lyons, and here Rachel and her sister Sarah used to sing for chance gratuities in the streets and cafés. About 1830 the household was transferred to Paris, and here Étienne Choron gave her her first lessons in singing, Saint Aulaire in declamation; but later it was Samson from whom she learned most. Mademoiselle Mars divined her genius, but it was not till Véron and Jules Janin had written glowing criticisms that she took the playgoing world of Paris by storm. She made her first appearance at the Gymnase in the *Vendéenne* in 1837 with but moderate success, but on 12th June 1838 she appeared as Camille in *Les Horaces* at the Théâtre Français. From this time forward, in the great parts supplied by the classic masterpieces of Corneille, Racine, and Voltaire, she shone without a rival; her fame may be said to have culminated in her appearance as Phèdre in Racine's tragedy in 1843. In *Adrienne Lecouvreur*, a piece expressly written for her by MM. Legouvé and Scribe, she had also immense success, though in other more modern parts her popularity was somewhat less. The *furore* excited in Paris in 1848 by her public recitation of the *Marseillaise* will continue to connect her name with the history of the Revolution. In 1849 she made the tour of the French provinces; before or afterwards she also visited London, Belgium—where Charlotte Brontë saw her—Berlin, and St Petersburg, everywhere meeting with enthusiastic applause. Her health now began to fail; in 1855, in the course of a professional visit to America, it altogether gave way, and she returned utterly prostrated. A residence at Cairo failed to restore her to strength; and on the 3d January 1858 she died at Cannet, near Toulon. As an artist, within the limits prescribed by her genius, Rachel has probably never been quite equalled. Of the burning intensity which characterised her rendering of passion in its fiercer concentrations no words can give an adequate image. 'She does not act—she suffers,' one observer well said of her. Her Phèdre—by common consent her masterpiece—was an apocalypse of human agony, not to be forgotten by any one who ever witnessed it. In character Rachel was neither exemplary nor altogether amiable. She gave her first love to a Jew, who used her shamefully, publishing her letters after the rupture; in 1844 she bore a son to Count Walewski, himself a son of Napoleon by a Polish mother. In her professional relations she was notoriously grasping and avaricious, although she could be royal in her munificence. She lavished her love upon her family, and heaped them with the wealth that she had gained. Her immense popularity enabled her to dictate her own terms to managers, and of this power she is said to have availed herself without scruple or generosity. She made over four millions and left one and a half million of francs. Her elder sister Sarah (died 1877) failed as an actress, but lived to make a fortune by the sale of the cosmetic 'eau des fées.'

See J. Janin, *Rachel et la Tragedie* (1858); D'Heylli, *Rachel d'après sa Correspondance* (1882); and the Life by Mrs Arthur Kennard (1885).

Rachis (Gr., 'backbone'), in Botany, the *primary floral axis*, an elongation of the stem or of a branch, from which arise the flower-stalks (peduncles), or to which the flowers are immediately affixed.

Racine, capital of Racine county, Wisconsin, is situated on Lake Michigan, and on both sides of Root River, which is crossed by five swing bridges, and whose mouth here forms an excellent harbour. By rail the city is 62 miles N. of Chicago and 23 S. of Milwaukee; and in summer there are daily steamers to Chicago and the north. Racine contains a handsome post-office and city hall, a hospital, the Taylor Orphan Asylum, and the University of the North-west (Episcopalian, founded in 1852, and formerly called Racine College). A large trade is carried on in lumber, and, besides flax, flour, and woollen mills, boiler-works, and linseed-oil works, there are manufactories of ploughs, pumps, wagons, fanning-mills, hardware, wire-work, cordage, furniture, refrigerators, boots and shoes, rubber clothing, &c. Pop. (1880) 16,031; (1890) 21,014.

Racine, JEAN, the greatest tragic dramatist of France, was born at La Ferté-Milon, in the modern department of Aisne, in December 1639, and was baptised on the 22d of that month. His father was a *procureur* or solicitor by profession, and held, like his father before him, the office of comptroller of salt at La Ferté. His mother died while he was still a child, whereupon his father married again, but soon after died also. The boy was taken care of by his maternal grandfather, and was sent for his education to the college of Beauvais, whence he passed to Port Royal in October 1655, being, indeed, closely connected, both on the father's and mother's side of the family, with the famous abbey. Here he studied hard under the especial care of Claude Lancelot, Nicole, and Le Maître, and at an early age discovered a faculty for verse-making and, still worse, a liking for romance that caused his good teachers no small uneasiness. He was almost nineteen when he left Port Royal to pursue the course of philosophy at the Collège d'Harcourt, and here he appears to some extent to have exchanged the severity of his Jansenist upbringing for the libertinism of the world of his day, as well as to have first felt the attraction of the life of letters. Naturally he became estranged from his Port Royal friends, who saw spiritual ruin in his worldliness and his intimacy with the abhorred actors and actresses. Meantime he had written an ode, *La Nymphe de la Seine*, on the marriage of Louis XIV., finished one piece and begun another for the theatre, and made the acquaintance of La Fontaine, Chapelain, and other men of letters. About this time he lived a while under the care of his cousin, N. Vitart, fifteen years his senior, and gave him some kind of assistance in his work as financial secretary to the Duc de Luynes. Many letters of this period to Vitart, the Abbé Le Vasseur, and La Fontaine are extant, and show how the lessons of Port Royal were fading into forgetfulness, as his true vocation opened itself up before his eyes. The great dispersion of the *solitaires* of Port Royal took place in 1661, and, from Racine's contemporary letters to the Abbé Le Vasseur, it troubled him but lightly. In November 1661 he went to Uzès in Languedoc, hoping, but in vain, to get a benefice from his maternal uncle, the vicar-general of the diocese, and here he divided his time between St Thomas, Virgil, and Ariosto. Again in Paris before the beginning of 1664, he obtained in August of that year a pension from the king of six hundred francs for a congratulatory ode. But indeed he received almost to the end of his life handsome rewards in money—'gratifications'—from the court. An ode of gratitude to the king for one of these, *La Renommée aux Muses*, gained him the life-long friendship of Boileau, and from about this time began the famous but much over-estimated friendship of 'the four'—Boileau, La Fontaine, Molière, and Racine. Unfortunately from about this point there is a break in his correspondence, so that we lack satisfactory evidence about the most doubtful and, at the same time, interesting points in his career—his singular spite against Molière, his bitter attack upon Port Royal, and his final conversion and retirement from dramatic work. His earliest play, *La Thébaide ou Les Frères Ennemis*, was acted by Molière's company at the Palais Royal theatre in June 1664; his second, *Alexandre le Grand*, in December 1665. After the sixth performance the latter was without explanation represented by the rival actors at the Hôtel de Bourgogne—a fact which of course involved a complete breach of friendship between Molière and himself. This famous quarrel is difficult beyond most to clear up, but there is at least light enough to see that the wrong did not rest with Molière. Racine showed himself as hostile to Corneille, most probably only because the older dramatist judged the younger's work somewhat severely. But he soon plunged into a yet more discreditable quarrel. Stung by one of Nicole's *Lettres Visionnaires* (January 1666) condemning the romancer or the dramatic poet as an 'empoisonneur public' in accordance with the ethics of Port Royal, he published a clever and stinging letter to the author, in which he heaped disgrace on his own head by indecent personalities upon Nicole and even his dead teacher Le Maître. Boileau's advice alone saved him from further shaming himself with a second. 'This letter,' said Boileau, 'may do credit to your intellect, but certainly none at all to your heart.' Later in life Racine himself said he would give his heart's blood to wipe out the most disgraceful blot upon his life. His repentance made noble atonement for the wrong—as for the literary quality of the letters, for brilliant wit and delicate irony they were not unworthy of the hand of Pascal.

During the next thirteen years Racine produced his greatest work, seeking relaxation from labour in at least one liaison with an actress. His plays followed in this order: *Andromaque* (1667), with its charming character Hermione; *Les Plaideurs* (1668), a delightful little comedy of satire against lawyers, which Molière was the first to appreciate; *Britannicus* (1669), which Voltaire styled 'la pièce des connaisseurs;' *Bérénice* (1670), written unconsciously in competition with Corneille, the same theme having been given to both poets by Henrietta of Orleans; *Bajazet* (1672), admirable, but anything rather than oriental; *Mithridate* (1673), produced almost at the moment of his admission to the French Academy; *Iphigénie* (1675), a masterpiece of pathos; and *Phèdre* (1677), a marvellous representation of human agony, which afforded a subject adequate even to the powers of Rachel. With the last ended abruptly his thirteen years of unbroken playwriting. A few days after its production the Troupe du Roi introduced an opposition *Phèdre*, by Phaon, which, though worthless by comparison, was eagerly supported by a powerful party, including the famous Duchess of Bouillon. Whether from disgust and mortification, or from the conversion attributed to him just at this period, Racine turned at once from dramatic work, made his peace with Port Royal, married on June 1, 1677, and settled down to twenty years of domestic happiness. His wife brought him money, if she bore him five daughters and two sons; and he himself had found ample profit in the drama, besides enjoying an annual *gratification* that grew gradually from 800 to 2000 livres, not to speak of the office of treasurer of France at Moulins, at least one benefice, and from 1677, jointly with Boileau, the office of historiographer-royal of France, with a salary of 4000 livres a year. The last involved the duty of accompanying the king on several of his expeditions, but in the case of both poets bore little historical fruit beyond a crop of good intentions and a few fragments. In January 1685 Racine emerged from his retirement to pronounce the discourse at the reception to the Academy of Thomas Corneille, and at last did himself honour by his admirable eulogium upon his greater brother.

In 1689 he wrote *Esther*, in answer to a request from Madame de Maintenon for a play suitable for her girls at Saint-Cyr. She had tried *Andromaque*, but found that the girls acted it 'a great deal too well.' Its success was great, but entirely warranted by the exquisite art of the poem. *Athalie* followed in 1691 with much less success, though it perhaps deserved even a greater. Four *cantiques spirituelles*, and an admirably written *Histoire abrégée de Port Royal*, make up the whole remainder of Racine's literary work. In his later years he lost the favour of the king—how is not by any means clearly understood. He is said to have prepared a memoir on the miseries of the people, and the king, finding Madame de Maintenon reading this, expressed his displeasure in some harsh words that broke the sensitive heart of the courtier-poet. On 4th March 1698 he wrote a long letter to Madame de Maintenon, to clear himself from the crime of Jansenism, but he never recovered the king's favour, and his acute mortification appears to have hastened his death. He said to Boileau, with the sweet graciousness of his nature, as he embraced him for the last time, 'Je regarde comme un bonheur pour moi de mourir avant vous.' He died 21st April 1699, and was buried by his own desire in Port Royal.

In France it remains an article of patriotism to claim Racine as the greatest of all masters of tragic pathos, yet this estimate does not very greatly exceed the truth. He took the conventional French tragedy from the stronger hands of Corneille, and added to it all the grace of which it was capable, perfecting exquisitely its versification, and harmoniously subordinating the whole action to the central idea of the one dominant passion. But he was a far greater poet even than a dramatist, and the tender sweetness and beauty of his rhythm, the finished perfection and flexibility of his cadence, and the indefinable yet ever present stamp of distinction that informs his style, combine to add a charm of its kind beyond almost anything else in the whole poetry of France. It may be that the highest poetry of all is beyond his reach, and that his verses are only for a sensitive ear, but such they haunt with a peculiar charm beyond the art of a Lamartine or a Hugo. Within its limits his poetry attains the perfection of the classic in the highest as well as severest sense of the term; it sums up in its content all that was noble in the royalism of the 18th century, and in the spiritual aspirations out of which grew a Mère Angelique and a Pascal; and it attains the Olympian height of distinct originality as well in the balanced proportion and harmony of all its elements as in the grandeur and sublimity of which it is capable of rising in a *Phèdre*, an *Esther*, and an *Athalie*. These high creations transcend and crown with the glory of completion his habitual tenderness and beauty, but into this empyrean also the poet soars no less naturally on the same strong and steady wing. Voltaire, when asked to write a commentary on Racine, answered, and with truth: 'Il n'y a qu' à mettre au bas de toutes les pages—beau, pathétique, harmonieux, admirable, sublime.'

The first collected edition appeared 1675–76; the last within his life-time in 1697. Of more important editions may be named the splendid folio of 1805, those of La Harpe (with commentary, 1807), Geoffroy (1808), Aimé Martin (1820), A. France (5 vols. 1874), and especially the splendid edition by Paul Mesnard in 'Les Grands Écrivains de la France' (8 vols. 1865–73). The first volume of the last contains a Life; the eighth, a Lexique by Marty-Laveaux. Of English translations are the *Distressed Mother*, by Ambrose Philips (1712), the *Phædra and Hippolytus*, by Edmund Smith, brought out at the Haymarket in 1707; and a complete metrical version by R. B. Boswell (vol. i. 1889; vol. ii. 1891). See vol. vi. of Sainte-Beuve's *Port Royal*, and vol. i. of *Portraits Littéraires;* also Henry M. Trollope's *Corneille and Racine*, in the series of 'Foreign Classics.'

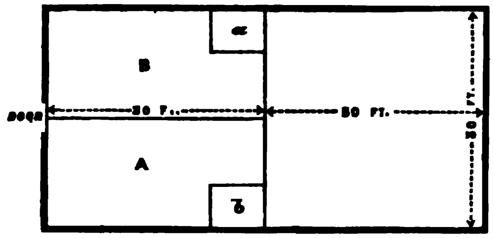
Racing. See ATHLETIC SPORTS, HORSE-RACING, ROWING, YACHT.

Rack, an instrument of Torture (q.v.) used for extracting confessions from actual or suspected criminals, consisted of an oblong frame of wood, with a windlass arrangement at each end, to which the sufferer was bound by cords attached to his arms and legs. The unfortunate being was then stretched or pulled till he made confession, or till his limbs were dislocated. The rack was known to the Romans in Cicero's time, and in the 1st and 2d centuries A.D. was applied to the early Christians. According to Coke, it was introduced into England by the Duke of Exeter, Constable of the Tower in 1447, whence it came to be called the 'Duke of Exeter's daughter.' Its use first became common in the time of Henry VIII., but could only take place by warrant of council, or under the sign-manual. Under Elizabeth it was in almost constant use. In 1628, on the murder by Felton of the Duke of Buckingham, it being proposed by Charles I. to put the assassin to the rack, in order that he might discover his accomplices, the judges resisted the proceeding as contrary to the law of England. In various countries of Europe the rack has been much used both by the civil authorities in cases of traitors and conspirators, and by the Inquisition to extort a recantation of heresy. It is no longer in use in any part of the civilised world.

Rackarock. See BLASTING.

Rackets (or RACQUETS; M.E. *raket;* Span. *raqueta*, 'racket,' 'battle-dore;' Arab. *ráhat*, 'palm of the hand'). No reference is made to the game of rackets before the early part of the 19th century, and the game as then played differed materially from that of the present day. From Dickens's account in *Pickwick* we should gather that the racket-court in which the insolvent debtors disported themselves in the Fleet boasted of more than one wall, but the usual game was played against a single wall, the ball having to rebound into a court marked out with paint. The erection of the courts at Prince's Club in 1853 showed that the four-wall game was coming into favour, and since covered courts have been adopted by the universities and public schools the old game has become practically obsolete. When the site of Prince's Club was invaded by the builder in 1886 the headquarters of rackets were transferred to the Queen's Club, Kensington, where championship matches have been instituted, and where the university and public school contests now take place.

The modern court is about 60 feet long by 30 feet broad and 40 feet high. It is enclosed by four walls, and covered by a roof with a double row of skylights. The walls and floor are coated with cement, usually coloured black, and marked out by white lines as shown in the plan. A line 8 feet from the ground painted across the front wall is called the 'service line.' Below this at 2 feet is the 'play line,' which is made of wood, so as to enable the players to judge by the sound whether a ball is 'up' or not. The racket has a small head with tightly strung gut and a long handle. The average weight is 9 oz. The ball is very hard, and about 1¼ inch in diameter. The server strikes the ball alternately from the two serving boxes *a* and *b* in such a manner that it flies direct from his racket to some part of the front wall above the service line, and rebounds into that quarter of the court opposite to him—viz. from *a* into A, from *b* into B. If the ball hits the wall below the play line, or goes 'out of court,' the server's 'hand is out,' and his opponent has the privilege of serving. If it strikes the wall between the play line and the service line, or falls on some part of the floor other than that indicated, it is a 'fault,' and the servee may refuse to take it. Two faults put the hand out. The servee must return the service above the play line. The game consists of fifteen aces, and the server scores an ace when the striker out fails to return his service or any ball in the subsequent 'bully.' See *Tennis, Lawn Tennis, Rackets, and Fives*, in the 'Badminton' series, by J. M. Heathcote and others (1890).



Plan of Racket Court.

Racoczy. See RAKOCZY.

Racoon. See RACCOON.

Racoonda, the fur of the Coypu (q.v.).

Racow, a village in the south of the Polish government of Radom, was in the 16th century a centre of the Socinians, who printed here their Catechism (q.v.). Pop. 2109.

Radcliffe, a town of south-east Lancashire, on the Irwell, 2¼ miles SSW. of Bury and 7 NNW. of Manchester. It has an ancient parish church (restored 1873), a ruined tower, a market-hall (1852), a co-operative hall (1878), cotton and calico works, bleachfields, and coal-mining in the neighbourhood. Pop. (1851) 5002; (1881) 16,267; (1891) 20,020.

Radcliffe, ANN, novelist, was born in London, 9th July 1764, of respectable tradespeople with good connections. Her maiden name was Ward, but in her twenty-third year, at Bath, she married William Radcliffe, a graduate of Oxford and sometime student of law, who became proprietor and editor of the weekly *English Chronicle*. She took to writing to pass the time when alone, and as early as 1789 published *The Castles of Athlin and Dunbayne*, which was followed by *A Sicilian Romance* (1790), *The Romance of the Forest* (1791), *The Mysteries of Udolpho* (1794), and *The Italian* (1797). For the last she received £800; for its predecessor, £500. From this time she published no more novels—'like an actress in full possession of her applauded powers,' says Scott, 'she chose to retreat from the stage in the full blaze of her fame.' She travelled with her husband abroad and all over England and Wales, and the jottings in her journal show how keen an eye she had for natural scenery, and how carefully she got up her castles and ruined abbeys. She was a modest and amiable woman, who did not publish herself nor sink the gentlewoman in the writer. So little was she known to the public that in her own lifetime there was widely current an absurd story that her mind had given way under the horrors evoked by her imagination. She suffered for twelve years from asthma, and died 7th February 1823. A sixth romance, *Gaston de Blondeville*, with a metrical tale, 'St Alban's Abbey,' and other poems, and a short life, was published in 1826.

As a novelist Mrs Radcliffe stands in time between Horace Walpole and Clara Reeve on the one hand and Sir Walter Scott on the other. She was mistress of every art of awakening the curiosity and enchaining the attention of a reader, and she displays great artistic power in the atmosphere of majestic gloom and mystery in which she enwraps her figures. She knew well how to make use of forest solitudes and every aspect of external nature suggestive of terror, but she ever failed lamentably in the conclusion of her stories by resolving the seemingly supernatural effects of the preceding pages into simple natural causes which the reader resents as inadequate. Further, her figures are mere shadows, without touch of reality, and her pages are unrelieved by ever a gleam of humour or even wit. But she was dear to our grandfathers, dearer still to our grandmothers; Crabb Robinson preferred her stories to *Waverley;* and so sagacious a writer as Dunlop could write, 'life has few better things than sitting at the chimney-corner in a winter evening and reading such absurdities.'

See Sir Walter Scott's *Biographical Notices of Eminent Novelists*, and Julia Kavanagh's *English Women of Letters* (2 vols. 1863).

Radcliffe, JOHN, physician, was born at Wakefield in Yorkshire, in 1650, and studied at Oxford, passing M.A. in 1672, and M.B. in 1675. Beginning practice, he immediately made himself conspicuous by the originality of his ideas, claiming to take nature for his guide, and in less than two years was on the high road to celebrity. In 1682 he became M.D., and in 1684 removed to London, where he soon became the most popular physician of his time. It is said that his conversational powers, ready wit, and pleasantry contributed to this result quite as much as his professional skill. In 1686 the Princess Anne of Denmark made him her physician; and after the Revolution he was sent for by King William. In 1694 he was called upon to attend Queen Mary, when attacked by the smallpox, and did what he could to save her, but in vain. In 1713 he was elected M.P. for Buckingham. He had a country-house at Carshalton, and here he was living in 1714 when Queen Anne was attacked with what proved to be her last illness. Dr Radcliffe was summoned to attend her; but he was ailing, and either would not or could not come. The queen died in August; and the populace were so enraged against Dr Radcliffe that he dared not again show his face in London. He must have been really ill when sent for to the queen; he died of gout at Carshalton on 1st November 1714, and was buried at Oxford in St Mary's Church with much ceremony. He bequeathed all his large property to public uses, leaving £40,000 for the erection of the Radcliffe Library, whose books were mostly taken in 1861 to the University Museum; while the building now serves as a reading-room for the Bodleian (q.v.). Other bequests were made to University College and St Bartholomew's Hospital, London.

Radclyffe. See DERWENTWATER.

Raddle. See REDDLE.

Radetzky, JOHANN JOSEPH, COUNT, an Austrian field-marshal, was born at Tzrebnitz Castle near Tabor in Bohemia, on 2d November 1766. Entering the Austrian army in 1784, he made his first campaign against the Turks in 1788–89, and afterwards fought in nearly all the wars waged between the Austrians and the French, especially distinguishing himself at the battles of the Trebbia, Novi, Hohenlinden, Wagram, and as Schwarzenberg's chief of the staff at Leipzig. In 1831 he was sent to take command of the Austrian forces in the Lombardo-Venetian territories, and five years later was made field-marshal. When the people of Lombardy rose in revolt against Austrian rule in 1848 Radetzky, an old man of eighty-two, after five days' street fighting, was driven out of Milan. Concentrating in Verona and Mantua, he proved the chief mainstay of the House of Hapsburg during the 'year of revolutions.' Nevertheless he was defeated by the king of Sardinia at Goito on the Mincio, when marching to the relief of Peschiera, in May. Peschiera capitulated immediately afterwards. Having received heavy reinforcements, Radetzky towards the end of July broke out of Verona, routed the Sardinian-Piedmontese army at Custozza, and on 6th August re-entered Milan. Three days later an armistice was concluded, the king of Sardinia abandoning all places east of the Ticino. On the resumption of hostilities in March 1849 the Austrian general in a campaign of less than a fortnight crossed the Ticino and almost destroyed the Piedmontese army at Novara (23d March). In the following August he compelled Venice to surrender, it having been in revolt since 1848. After this Radetzky was appointed governor of the Lombardo-Venetian territories, and ruled them with an iron hand until the beginning of 1857. He died at Milan on 5th January 1858, and was buried at Metzdorf near Vienna.

See Life by Strack (Vienna, 1849) and Schneidawind (Augsburg, 1851); Radetzky's own *Denkwürdigkeiten* in *Mitteilungen des kaiserlichen Archivs* (new series, vol. i. Vienna, 1887); Trubetskoi, *Campagnes du Comte Radetzky dans l'Italie* (Leip. 1860); Kunz, *Die Feldzüge des Feldmarschalls Radetzky in Oberitalien* (Berl. 1890); and Hübner, *Une Année de ma Vie* (1891).

Radhanpur, chief town of a protected state in Bombay Presidency, India, 150 miles NW. of Baroda. It is surrounded with walls and encloses a fortified castle, the residence of the native prince. Pop. 14,722. The state of Radhanpur has an area of 1150 sq. m. and a pop. of 98,129.

Radiant Energy. See ENERGY.

Radiata, one of the four *embranchemens* into which Cuvier (1812) divided the animal kingdom, the other three being Articulata, Mollusca, and Vertebrata. In the division Radiata Cuvier recognised five classes—viz. (1) the Echinodermata, (2) the Entozoa (or Intestinal Worms), (3) the Acalephæ (or Jelly-fish), (4) the Polypi (Hydroids and Polyzoa), and (5) the Infusoria (Rotifers and Protozoa). It is hardly necessary to say that this exceedingly heterogeneous assemblage, or 'radiate mob,' as Huxley termed it, is now broken up into numerous distinct classes.

Radiation. See HEAT.

Radical, in Chemistry, is a term applied to a group consisting of two or more elementary atoms which is capable of entering into a series of different compounds without itself undergoing change or decomposition. In this respect a radical resembles an atom of an elementary substance. Radicals are, in a sense, incapable of a separate existence, and must be in combination with other radicals or elements. Two similar radicals can, however, combine with each other, and in such cases the compound produced has been looked upon as the radical in the free state.

The radical *methyl*, CH_3, consisting of one atom of carbon and three atoms of hydrogen, is known in combination with chlorine, iodine, oxygen, and sulphur in the respective compounds, methyl chloride, CH_3Cl, methyl iodide, CH_3I, methyl oxide, $(CH_3)_2O$, and methyl sulphide, $(CH_3)_2S$. Two methyl groups occur in combination with each other in the substance ethan or dimethyl, $(CH_3)_2$ or C_2H_6. A very large number of other compounds contain the radical methyl.

The sulphates, the nitrates, and the acetates contain the respective radicals SO_4, NO_3, and $C_2H_3O_2$. These are frequently called the *salt-radicals* of the respective series of salts. In double decompositions the salt-radical occurring in combination with one metal is transferred, without decomposition, to another metal. For instance, the equation

$$MgSo_4 + Ba(NO_3)_2 = BaSO_4 + Mg(NO_3)_2$$

represents the mutual exchange of salt-radicals by the metals magnesium and barium.

In chemical notation short symbols are frequently employed to represent complicated radicals. Thus, the complex salt-radical of the tartrates, $C_4H_4O_6$, is shortly represented by the symbol $\overline{T}$. Tartaric acid is then represented by $H_2\overline{T}$, potassium tartrate by $K_2\overline{T}$, potassium hydrogen tartrate (cream of tartar) by $KH\overline{T}$, &c.

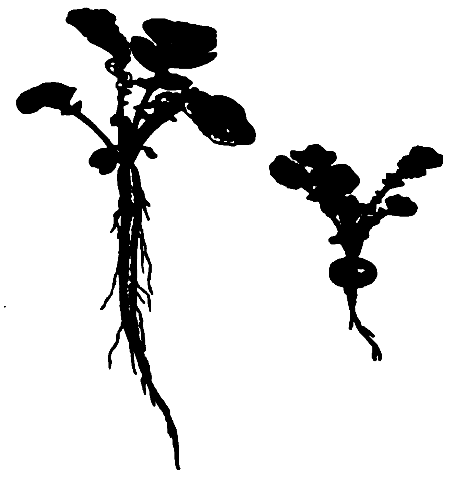
Radical, in English politics, is often used to denote the advanced wing of the great Liberal party. The name seems to have been first used in the reign of George III. in the phrase 'radical reform' (*Anti-Jacobin*, 1797 and 1798), though one instance at least occurs much earlier in the *Remains* of Archbishop Leighton, written in the reign of Charles II. (see ROOT AND BRANCH MEN). But the modern radicals are descendants of the French Revolutionists of 1789. The principal objects of the men so designated have been chiefly concerned with parliamentary reform, the extension of the franchise, the enlargement of the public privileges of the people, and with endeavouring to weaken and curtail the exclusive privileges and prerogatives of the oligarchical ruling classes. In a word, the radicals of England have been the pioneers of the democratic movement, and have sought to achieve their ideals almost exclusively through the agency of parliamentary government. The word is meant to indicate the thoroughness of the reforms advocated, being derived from the Lat. *radix*, 'a root.' Inseparably associated with the great reform movements of the 19th century, the radicals began to be generally so called about 1816; and the name figured prominently in the movements in which Orator Hunt (q.v.), Thistlewood, Watson, and others played the chief parts. A clever poem setting forth the aims of these men, entitled *The White Hat* (1819)—i.e. the hat of Hunt, nicknamed King Harry the Ninth—and written by E. L. Swifte, will be found in *Notes and Queries*, series 3, vol. x. p. 436. See also W. Harris, *History of the Radical Party in Parliament* (1885); and S. Bamford, *Life of a Radical* (1842).

Radiolaria, a class of marine Rhizopod Protozoa. Thread-like processes of living matter radiate outwards on all sides; a membranous capsule with fine pores, or with one or more apertures, separates an internal nucleated region of the cell from an outer part supported by a gelatinous framework; there is a hard skeleton of silica or of a 'horny' material called acanthin. They multiply by dividing or by forming spores within the central capsule. Most of the Radiolarians are minute, under $\frac{1}{25}$ of an inch, but a few which form colonies may measure an inch or even 4 inches in length. Most of them include 'yellow cells' or algæ, with which they live in a partnership known as Symbiosis (q.v.). Radiolarians occur in all seas, in every latitude, and at all depths, though many kinds predominate on the surface, where they are wafted about by currents. The siliceous skeletons form most of the ooze which has been dredged from depths of 2000 to 3000 fathoms. Fossil forms are abundant in certain deposits—'Barbadoes earth,' 'Tripoli powder,' and various marls, &c. See Haeckel, *Report on the Radiolaria* (*Challenger* Reports, xvii., 1887).

Radiometer, an instrument consisting of four horizontal arms of very fine glass, carefully poised so as to revolve easily on a point; the tips of the arms having pith discs blackened on one side. The whole is contained in a glass vessel almost but not quite exhausted of air. When exposed to light or heat the arms move round, more or less swiftly according to the strength of the rays. The blackened sides of the vanes are warmer: the molecules of air striking those sides are more heated by the vanes: they rebound after impact with greater velocity: the vanes are driven back by a greater recoil on the blackened sides. The radiometer was invented in 1873–76 by Crookes (q.v.).

Radiophone, an instrument, essentially similar in principle to the Photophone (q.v.), for producing sound by means of heat rays.

Radish (*Raphanus*), a genus of plants, of the natural order Cruciferæ, having a spongy Silique (q.v.). The flowers are yellow, red, or purple. The Common Radish (*R. sativus*) has thick, round, tapering, and pointed pods, little longer than their stalks, very slightly contracted between the seeds, and not falling to pieces. It is not known in any country in a wild state, but has been cultivated from time immemorial in China, Japan, India, and in Europe. But some varieties of the Wild Radish found growing on the Mediterranean coasts resemble



Long-rooted and Turnip-rooted Radishes.

so closely the Garden Radish as to suggest the possibility that the latter may be but a cultivated race of it. Radish is a well-known salad root, much appreciated for its succulent roots with their warm pungent taste. In this way the young and tender leaves were also formerly used. The varieties of radish in cultivation are extremely numerous, but they are generally classed under the two heads of *Long-rooted* and *Turnip-rooted* Radishes, the roots of the former resembling the carrot in shape, and the latter the turnip. The varieties differ very much, not only in form of root, but in colour and size, a red colour generally prevailing. Some of the darker-coloured turnip-rooted radishes, such as the black Spanish, grow to a large size under good cultivation, and are grown in gardens chiefly for their usefulness in winter when the ordinary varieties cannot be grown. Radishes are sown at different seasons, and are generally used when young and small. The root of the radish possesses demulcent, stimulant, and diuretic properties, and is sometimes used in cases of atony, or of excessive secretion of mucus by the organs of digestion or the urinary organs. Radish-juice, mixed with sugar-candy, is a popular and useful German remedy for hoarseness and cough. Distinct from both the varieties above named is the Oil Radish, which has a slender—scarcely fleshy—root, a short much-branched stem, and many-seeded pods. It is cultivated in China for the oil of its seeds. Another species of radish (*R. caudatus*), a native of Japan, is there cultivated as an esculent. To this genus belongs the Jointed Charlock of the cornfields (*R. raphanistrum*), which has found its way from Europe to North America, and is a troublesome weed there also. The seeds, however, may be advantageously crushed for oil. The Sea Radish (*R. maritimus*) is a rarer British species, the roots of which are of fine quality and great pungency.

Radius. See Circle.

Radley, a Berkshire village, near the right bank of the Thames, 5 miles S. of Oxford. The Bowyers' seat here was in 1847 converted by Professor W. Sewell into a High Church public school—St Peter's College—for 130 boarders. It has a fine chapel.

Radnorshire, a border county of South Wales, bounded by the counties of Montgomery, Salop, Hereford, Brecon, and Cardigan. Measuring 36 miles by 30, and 432 sq. m. in area, it is the tenth in size and twelfth in population of all the twelve Welsh counties. The beautiful Wye traces all the south-western and southern boundary, the Teme the north-eastern; and the surface generally is hilly or mountainous, in the Forest of Radnor attaining a maximum altitude of 2163 feet. Of half-a-dozen mineral springs, those of Llandrindod are in most repute. The rocks are mainly Lower Silurian, and the soils poor, less than half of the total area being in tillage, whilst woods and plantations cover nearly 8000 acres. The rearing of stock is the principal industry. Radnorshire returns one member; and till 1885 another was returned by the Radnor district of parliamentary boroughs—Cefnllys, Knighton, Knucklas, New Radnor, Presteigne, and Rhayader. Pop. (1801) 19,135; (1841) 25,458; (1881) 23,528; (1891) 21,791. See Williams' *History of Radnorshire* (Tenby, 1858).

Radom, an old but uninteresting town of Poland, on a sub-tributary of the Vistula, 60 miles S. of Warsaw. It is the seat of an active trade; dyeing is the most important industry. Pop. 12,402.—The *government* has an area of 4768 sq. m. and a pop. (1893) of 782,274.

Radowitz, Joseph von, Prussian statesman, born February 6, 1797, at Blankenburg, was the son of a nobleman of Hungarian descent, and in 1813 entered the Westphalian army as an officer. After the peace in 1815 he taught in the military school of Cassel; but in 1823 he entered the Prussian service, and in 1830 became chief of the general staff of artillery. By his marriage he became connected with the Prussian aristocracy, and soon became the leader of the anti-revolutionary party. In 1836 Radowitz was sent as Prussian military commissioner to the German Diet at Frankfort, and held diplomatic posts at Carlsruhe, Darmstadt, and Nassau. He was the confidant and adviser of King Frederick-William IV. in his endeavours to bring about a reform of the German Diet. After the revolution of 1848 the endeavours of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work. He wrote several works, mainly political, and died 25th December 1853. See Lives by Frensdorff (1850) and Fischer (1874); and Hayward's *Biog. and Crit. Essays* (1st series, 1858).

Rae, John, Arctic traveller, was born in Orkney in 1813, studied medicine at Edinburgh, and went to Hudson Bay as doctor of the Company's ships. In 1845 he undertook an exploring expedition, and in 1846–47 a more extensive one, wintering in Repulse Bay. He was second under Richardson in 1848 on a Franklin search voyage. In 1853–54 he commanded an expedition that proved King William's Land to be an island. In his various journeys nearly 1800 miles were travelled over for the first time. In 1860 he surveyed a telegraph line to America by the Faroes and Iceland, and visited Greenland; and in 1864 he made a telegraph survey from Winnipeg across the Rocky Mountains. He published reports of his expeditions, and many geographical papers. Dr Rae, who was LL.D., F.R.S., &c., died 24th July 1893.

Raeburn, Sir Henry, R.A., portrait-painter, was born 4th March 1756, at Stockbridge, then a village near Edinburgh, where his father was a manufacturer and mill-owner. His parents died when he was about six years old; and he was educated in George Heriot's Hospital, and apprenticed to James Gilliland, a goldsmith and jeweller in the Parliament Close. While in this employment his turn for art attracted the attention of David Deuchar, the etcher and seal-engraver, who gave him some instruction; and he afterwards studied under David Martin, producing at first water-colour miniatures with such success that he was soon able to devote himself exclusively to portraiture in oils. A careful miniature of Deuchar, still preserved, forms a curious example of Raeburn's earliest style. At the age of twenty-two he married one of his sitters, Ann Edgar, widow of Count Leslie, a lady of means; and, after practising his art for a time in Edinburgh, he resolved to study in Italy. In passing through London he visited Reynolds, who received him kindly, recognising his talent, and furnished him with introductions to Pompeo Battoni and other leading painters in Rome. After remaining two years in Italy he returned and settled in Edinburgh in 1787, the date of his fine portrait of the second Lord President Dundas. He soon received full employment as a portrait-painter, and before long attained acknowledged pre-eminence among the artists working in Scotland. In 1812 he was elected president of the Society of Artists in Edinburgh; in 1814 Associate of the Royal Academy, London; and in the following year full Academician. He was knighted by George IV. during that monarch's visit to Scotland in 1822, and was appointed king's limner for Scotland a few days before his death in Edinburgh on the 8th of July 1823.

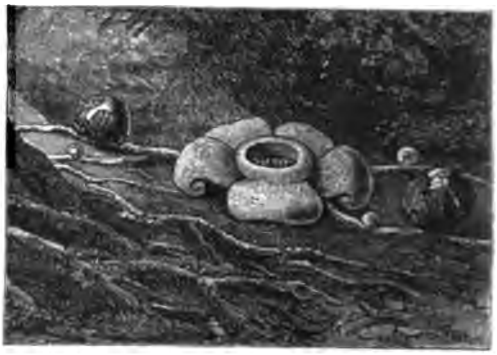
Raeburn's style was, to some extent, founded upon that of Reynolds. Like Sir Joshua, he aimed at breadth of effect, a result attained by massing together the lights, and keeping them as far as possible distinct from the shadows, and so making each respectively effective; but he attained his aim in a manner and with a feeling that was characteristic and original. He seldom attempted to produce texture and luminosity of effect by thick impasto and semi-transparent painting, but adopted the opposite mode of painting, in a low tone, with a crisp, definite touch, working his colours with little admixture of any unctuous medium. In its decision and power of handling his style has been justly compared to that of Velasquez. In his portraits of men, in particular, the heads are most vigorously modelled, and the characteristic expression is seized in a singularly simple, direct, and effective manner; but works like the seated portrait of his wife and the portraits of the two Misses Grant Suttie sufficiently prove that he could portray the grace and dignity of comely womanhood. His reputation, always high in his native country, is becoming more widely spread, and his works are now much sought after. Among his sitters, who included almost all the celebrated Scotsmen of his day, were Sir Walter Scott, Lord Melville, Sir David Baird, Henry Mackenzie, Neil Gow, Harry Erskine, Dugald Stewart, Principal Robertson, Lord Jeffrey, and Lord Cockburn. Technically one of his finest and most complete productions is the bust portrait of James Wardrop. Exhibitions of his collected works were held in Edinburgh in 1824 and 1876; and an excellent series of his portraits was included in the Old Masters Exhibition of the Royal Academy in 1877. His art is fully represented in the National Gallery of Scotland, and examples of his brush are preserved in the National Gallery, London, and in the Louvre. Numerous engravings have been executed from his portraits.

See Life by his great-grandson, W. R. Andrew (Lond. 1886); *Portraits by Sir Henry Raeburn* (photographs, edited by Dr John Brown; Elliot, Edin.); *Sir Henry Raeburn, a Selection from his Portraits* (photogravures, edited by W. E. Henley; Edin. 1890).

Raff, Joachim, musical composer, was born at Lachen on Lake Zurich on 27th May 1822. He began life as a schoolmaster, but, encouraged by Mendelssohn, he devoted himself to music. From 1850 to 1856 he lived near Liszt in Weimar, then taught music at Wiesbaden until 1877; and from that year until his death, on 24th June 1882, he was director of the musical conservatory at Frankfort-on-Main. From the time he turned to music down to the end of his life Raff poured forth an incessant stream of musical productions, more than 200 in all. His works include many classes of composition, as symphonies, overtures, concertos for violin, 'cello, and piano, operas, quartetts, a great variety of pieces for piano and violin, and for piano alone. The symphonies *Lenore* and *Im Wald* are reputed his best works. He wrote with considerable poetic charm, much fluency, and great technical mastery, but undoubtedly wrote too much: he is often diffuse, and over-elaborates insignificant themes. In *Die Wagnerfrage* (1852) and numerous papers contributed to the *Neue Zeitschrift für Musik* he advocated the works and aims of the new German musical school.

Raffles, Sir Thomas Stamford, British administrator, was born, a sea-captain's son, off Port Morant in Jamaica, on 5th July 1781. In 1795 he was appointed to a clerkship in the East India House, and in 1805 assistant-secretary to a new establishment at Penang; eventually he was made principal secretary. In 1808 he made a voyage to Malacca, respecting which place, and the East Indies in general, he collected much valuable information. In 1811 Raffles accompanied the expedition against Java (q.v.) as secretary to the governor-general, Lord Minto, who himself took the chief command. The island was captured, and Raffles appointed lieutenant-governor of it and its dependencies. Much had to be done in the way of conciliating the native princes and chiefs to the British rule. He appointed British residents at the native courts, and framed rules and regulations for their conduct. He ordered a general survey to be made of the whole island, and checked the attempt of the native sultan of Jokjokarta to expel the Europeans from Java. His efforts were, however, chiefly directed to effecting a complete reform in the internal administration. By frequent personal interviews with the natives he sought to become acquainted with their manners and character, and to educate them and civilise them; and by them he was regarded with great esteem and affection. But at length his health gave way, and in 1816 he returned to England, stopping by the way at St Helena, where he had an interview with Napoleon. On his arrival in England he wrote his *History of Java* (2 vols. 1817), and received the honour of knighthood. Java having by this time been restored to the Dutch, Sir Stamford Raffles was appointed lieutenant-governor of Bencoolen, a settlement upon the coast of Sumatra, where he landed in March 1818. Shortly afterwards, to paralyse or combat the commercial prosperity of the Dutch in the eastern seas, and to repress the piratical propensities of the Malays, he was sent to form a new settlement at Singapore. In 1824 he was again compelled by ill-health to return to England. But the vessel in which he set sail took fire 50 miles out from Sumatra, and the crew and passengers escaped with difficulty in the boats. By this accident Sir Stamford Raffles lost the greatest part of his effects, including a fine collection of natural history, materials for various East Indian grammars and dictionaries, and for a history of Borneo, Celebes, Singapore, &c. After his arrival in England he lived to carry out what had been one of his favourite projects—namely, the formation of the Zoological Society of London, of which he was named president. He died on 5th July 1826. See *Memoir* by his widow (1830).

Rafflesia, a remarkable genus of plants belonging to the small natural order Rafflesiaceæ, an order composed entirely of parasitic plants, which consist merely of a flower, and form part of the Rhizantheæ (q.v.) of Lindley. The Rafflesiaceæ are natives partly of the Indian islands and partly of South America. The plants of the genus Rafflesia have neither stalk nor leaves, but are enormous flowers seated upon the roots of species of Cissus, making their appearance at first as a hemispherical swelling



Rafflesia patma.

of the bark of the root, and, after the bark has broken, rising up in the form of a head of cabbage, whilst the perianth is covered with imbricated bracteæ, which are more or less recurved after it has opened. The perianth is thick, fleshy, and 5-partite. The ovule is inferior, and contains many ovules; and the anthers, which are numerous, are seated under the revolute margin of the top of the style column. After the flower has expanded it diffuses a carrion-like smell, that even attracts flies, and induces them to deposit their eggs. The largest and first-discovered species, *R. arnoldi*, was discovered in 1818 in Sumatra by Dr Arnold, and was sent to the eminent botanist, Robert Brown, by Sir Thomas Stamford Raffles (q.v.). Its flower measures fully 3 feet in diameter, is capable of containing almost 2 gallons of fluid, sometimes weighs 10 pounds, and is the largest of all known flowers. A smaller species, *R. patma*, whose flowers are 16 inches to 2 feet in diameter, is highly prized by the Javanese as a medicine, for its strong styptic powers. *R. horsfieldii*, another Javanese species, is still smaller, its flowers being only 3 inches broad.

Rafn, Karl Christian, critic and archæologist, was born at Brahesborg in Fünen, 16th January 1796, and educated at the university of Copenhagen, of which he was appointed sub-librarian in 1821. It is to Rafn's unwearied exertions that Denmark owes the foundation (1825) of the 'Society for Northern Antiquities.' As secretary of this society he edited and published a great many ancient Scandinavian MSS., occupying about seventy volumes. He was named professor in 1826, and died at Copenhagen 20th October 1864. Among his numerous important works we may mention a Danish translation of Norse Mythic and Romantic Sagas (1821-26), and his *Antiquitates Americanæ* (1837), in which he shows that America was discovered by Norsemen in the 10th century (see Vinland).

Ragatz, a spa of Switzerland, in the south-east corner of the canton of St Gall, by rail 68 miles SE. of Zurich and 13 N. by W. of Chur (Coire); it stands at the mouth of the ravine leading to Pfäffers (q.v.), from which town it gets its healing waters by means of a pipe (1838-40) 2½ miles long. Schelling, the German philosopher, is buried in the parish churchyard. Pop. 1996.

Ragged Schools. The Ragged School, as distinct from the Certified Industrial School, is a voluntary agency providing education for destitute children, and so preventing them from falling into vagrancy and crime. Vagrant children, and those guilty of slight offences, are provided for in the Certified Industrial School; but the two institutions are frequently combined. The movement which established ragged schools was almost simultaneous with that which instituted reformatories. John Pounds, a poor shoemaker at Portsmouth, has the honour of originating the idea. For twenty years, up to the time of his death in 1839, he gathered the ragged children of the district round him as he sat at work. They came freely, and were taught gratuitously. The success attending his humble efforts soon led many more influential friends of the 'outcasts' to engage in the same work. In 1838 London had a Ragged Sunday School, which eventually became a free day-school. Field Lane followed in 1843. But the first ragged feeding-school was opened in 1841 by Sheriff Watson, in Aberdeen. In 1845 the Rev. Dr Robertson, not then aware of the existence of Sheriff Watson's, opened a similar school in the Vennel, Edinburgh. Soon afterwards Dr Guthrie's famous *Plea for Ragged Schools* appeared, a work which gave an irresistible impetus to the movement, and caused the author to be generally regarded as the father of ragged schools. A ragged school was founded at the Castle Hill in 1847 (since 1887 at Liberton). After this ragged schools spread over all the land, until there was scarcely a town of any importance that had not one or more. The Education Acts—England, 1870, and Scotland, 1872—introduced the principle of compulsory attendance at school; under this provision, a large number—especially in England—of such as were merely free day-schools became public schools. But, as the Education Acts make no provision for feeding the children, the managers of feeding-schools find themselves compelled to continue their efforts. In places where the system has been efficiently conducted juvenile crime has sensibly diminished. The ragged schools do not receive government aid. The capitation grant of £2, 10s., allowed by a Privy-council minute in 1856, was withdrawn in 1859.

Raghuvansa, a great Sanskrit epic, attributed to Kálidása (q.v.). The subject is similar to that of the Rámáyana, but begins with an account of Ráma's ancestors, 'the family of Raghu,' an ancient king of Ayodhya (Oudh). The text, with a Latin translation, was published by Stenzler (Lond. 1832).

Raglan, Lord. Fitzroy James Henry Somerset, eighth son of the fifth Duke of Beaufort, was born September 30, 1788. He entered the army in his sixteenth year, and in 1807 served on the staff of the Duke of Wellington in the expedition to Copenhagen. He went to the Peninsula as aide-de-camp to the duke, and in 1812 became his military secretary. As Lord Fitzroy Somerset his name became a household word. He was present at all the great actions of the Peninsular campaign, being among the first to mount the breach at the storming of Badajoz; and it was to him that the governor gave up his sword. On the return of Napoleon from Elba he served under the duke in Flanders, and lost his sword-arm in the crowning victory of Waterloo; and the very next day he was seen practising writing with his left hand. For his brilliant military services he was made K.C.B., and received orders from several foreign potentates. He was minister-plenipotentiary at Paris in 1815, and secretary to the French embassy from 1816 to 1819. The duke was appointed in 1819 Master of the Ordnance, and Raglan again became his secretary; and in 1827, when the former became commander-in-chief of the British army, Raglan was called to the Horse Guards as his military secretary. This office he held until the death of his chief in September 1852. He was then made Master-general of the Ordnance, and in October was called to the House of Peers as Baron Raglan of Raglan, in the county of Monmouth (q.v.). He had previously sat in the Lower House during the parliaments of 1818 and 1826 for the borough of Truro. While Master-general of the Ordnance he was general of the English forces despatched to Turkey in February 1854 (see Crimean War). The desperate infantry battle of Inkermann obtained for Raglan the baton of field-marshal; but as the campaign proceeded unfavourable comments began to be made upon his conduct of the war. During the winter of 1854-55 his soldiers suffered unspeakable privations, and hundreds perished in camp and on board transports for want of the food, clothing, and medicines which were in store, but could not be found in the confusion and mismanagement that prevailed—the fault mainly of the home authorities. The siege continued without much apparent success until June 18, when a general assault was ordered, and when Raglan's troops, as well as the French, received a terrible repulse. Raglan had been suffering from a slight attack of cholera, and the disaster of June 18 weighing upon his mind, he suddenly became worse, and died of exhaustion, June 28, 1855. His remains were brought to England and buried in the family cemetery at Badminton. He proved himself to be a skilful tactician, although it may be doubted whether he had the qualities of a great general. His personal bravery won universal admiration; and his courteous and noble bearing, his gentleness of temper and firmness of mind, and his constant worship of 'duty,' invest his character with something of the chivalrous. See Kinglake, *Invasion of the Crimea* (1863–87); and Hamley, *The War in the Crimea* (1891).

Ragman Roll (*ragman*, a word of uncertain origin, used in ancient diplomatic language for an indenture or legal deed), the name given to the collection of instruments which record the acts of fealty and homage performed by the Scottish nobility and gentry to Edward I. of England during his military progress through Scotland in 1296, and afterwards at the parliament held at Berwick. The original instruments of homage under the seals of the parties were deposited in the Royal Treasury of England, and have almost entirely perished; but the roll in existence in the Tower preserves a record of them. Its contents were given in an abridged form in Prynne's *Records*, and afterwards printed *in extenso* by the Bannatyne Club in 1834. An especial value attaches to the Ragman Roll as containing the largest and most authentic enumeration extant of the nobility, barons, landholders, and burgesses, as well as of the clergy of Scotland, prior to the 14th century, and the only genuine statistical notices of Scotland of the period.

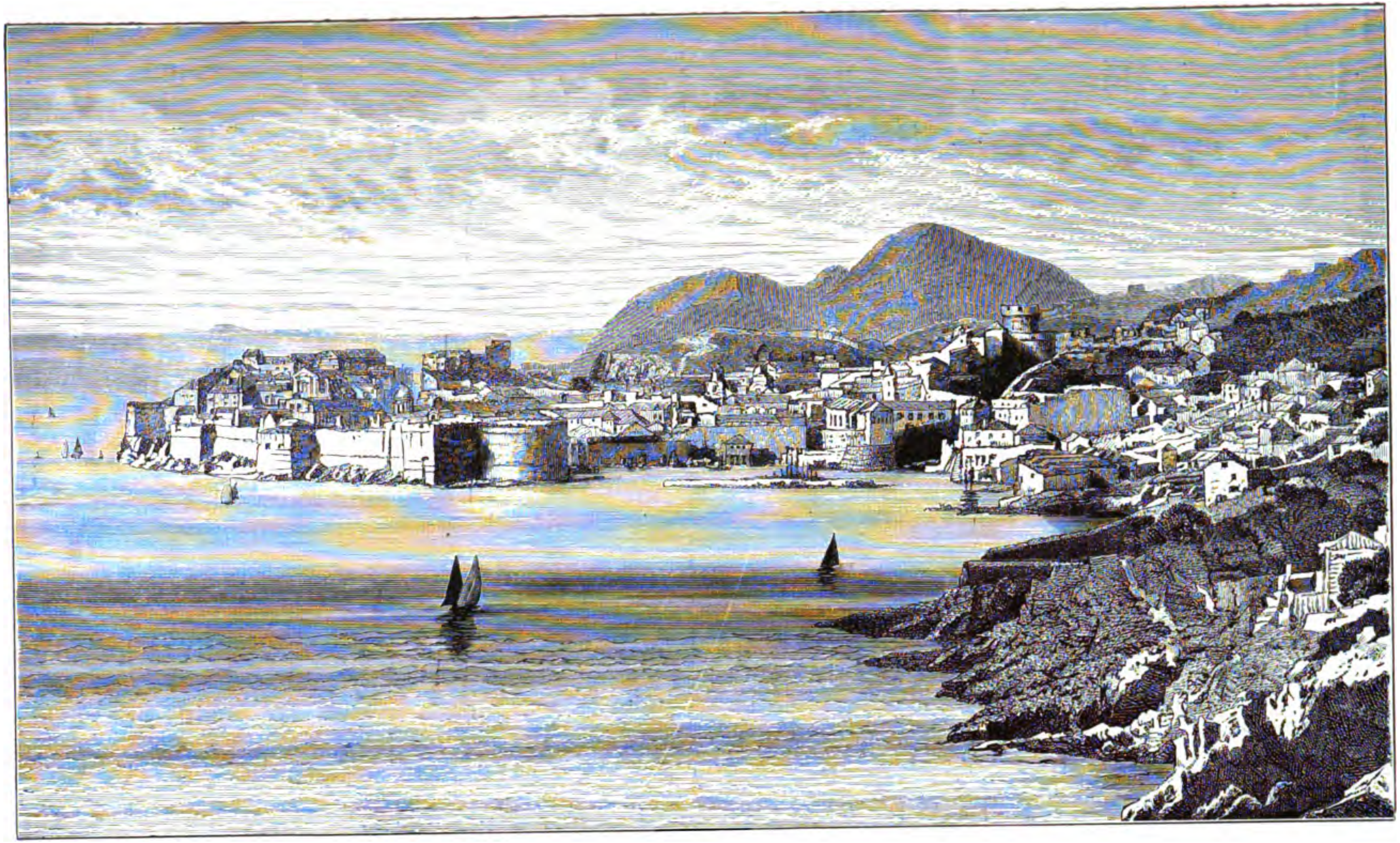
Ragnarök (Ger. *Götterdämmerung*), the end of the world, when the gods (Odin, Thor, &c.) shall be overcome by their enemies and the world be burned up. See SCANDINAVIAN MYTHOLOGY.

Rags. Fragments of almost all kinds of textile materials have now a commercial value. In the middle of the 19th century all white papers were made of rags, but the great increase in the consumption of printing-papers for daily newspapers and cheap periodicals has for many years necessitated the use of other materials, such as esparto, wood-fibre, &c. (see PAPER). Linen and cotton rags alone are still, however, used for bank-note and other fine and strong papers, and are mixed with other materials, such as wood-pulp, for inferior kinds. These rags furnish the manufacturer with a material already half made into paper, so to speak, because the preliminary processes of boiling out the silica, &c. from straw or esparto are not required in the case of woven linen or cotton. Hence rags of vegetable fibre will always be valuable for paper-making.

Woollen rags have a higher value than linen or cotton kinds, or at least than mixtures of these. Old woollen clothes or shreds of such are called, in the manufacturing districts where they are worked up, 'Old Mungo' (see SHODDY). These rags are torn up, or 'ground up,' as it is termed, and re-manufactured into coarse flannels, druggets, comforters, &c. Some are actually ground into a sort of powder for flock wall-papers. The imports of linen and cotton rags into Great Britain in 1863 (before esparto was much in use for paper-making) amounted to 25,287 tons, valued at £502,681. In the same year 14,417 tons of woollen rags, valued at £551,824, were imported. In 1889 the imports were, of cotton and linen rags, 42,443 tons, valued at £426,322, and of woollen rags, 31,335 tons, valued at £669,438 (217,000 tons of esparto fibre were imported in the same year). A comparison of these figures will show the increased quantities now imported, as well as the depreciation in the value of rags. A large quantity, probably amounting to from one-third to one-half of the amount of British imports of linen and cotton rags, is re-exported to the United States; or at least rags to this extent are shipped from England thither, but a certain proportion of them may be of British production.

Rag-stone, an impure limestone, consisting chiefly of lime and silica, much used in Kent. It breaks up into pieces about the size of a brick, and is hard and flat bedded. The name is also applied to the hard irregular rock which frequently overlies better building materials. Besides being used for building purposes, hones or sharpening stones for scythes, &c. are made of it.

Ragusa (Slav. *Dubrovnik*), a decayed city of Dalmatia, stands on the east shore of the Adriatic, 100 miles SE. of Spalato and opposite the Gulf of Manfredonia in Italy. It is surrounded with strong walls, and has a very picturesque appearance when seen from the sea. The city seems to have been colonised by refugees from Epidaurus (now Old Ragusa, a few miles to the south-east), Salona, and other Græco-Roman towns destroyed by the Slav invaders of the Balkan peninsula. For some centuries Ragusa was a Roman outpost on the edge of the Slav states, and flourished greatly under the suzerain protection of Byzantium. Towards the end of the 12th century Ragusa was made to acknowledge the supremacy of Venice, though she retained a large share of autonomy. In 1358 Venice ceded her Dalmatian possessions to Hungary, and from that time down to the era of the Napoleonic wars Ragusa was generally accustomed to look to Hungary (i.e. the German empire) for help against her enemies, although from the beginning of the 15th century she was a free and independent republic. It was at the same time that she began to take a prominent place amongst the trading states of the Mediterranean, her prosperity being due to her position between the Christian powers and the empire of the Turks, and the privileges she enjoyed of trading freely with the subjects of the sultan. Her 'argosies' (i.e. 'vessels of Ragusa') traded as far as the Baltic; and a contingent joined the great Armada when it set sail for the invasion of England. Ragusa was the home from the middle of the 15th century of a remarkable literary movement, stimulated by the Renaissance (see SERVIA). During the course of the Napoleonic wars the French entered the city in 1805; this led the Russians to bombard the place. But in 1808 Napoleon declared the republic of Ragusa to be at an end, and in the following year incorporated it in the kingdom of Illyria. Since 1814, like the rest of the Dalmatian seaboard, it has belonged to Austria. Ragusa had, however, long before this declined from her former greatness. Though spared the attacks of foreign foes, she suffered repeatedly from fires, plagues, and earthquakes. The earthquake of 1667 was particularly disastrous. Yet Ragusa still contains several striking and interesting buildings, chief amongst them the palace of the rectors (chief-magistrates), built in the Gothic and Classic Renaissance styles between 1435 and 1464; the custom-house and mint, dating from before 1312 and finished in 1520; the Dominican church (1306) and monastery (1348), the former containing a picture by Titian; the Franciscan church and monastery (1317); the church of St Biagio (Blaise), the patron saint of the town, built in 1348–52, but rebuilt in 1715; and the churches of San Salvatore and Alle Dancé. The old cathedral, which tradition says was founded by Richard I. of



RAGUSA.

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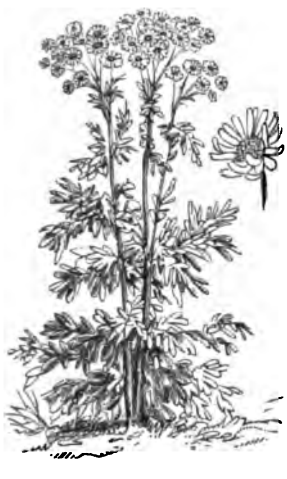
England when on his way home from Palestine, was destroyed by the earthquake of 1667; its modern successor (1671-1713) possesses some valuable silver ornaments and curiosities. There is also a large Jesuits' church (1699-1725). The harbour is small and now sanded up. Merchandise is landed and embarked at the harbour of Gravosa, a short distance to the north. Pop. 7245.

See T. G. Jackson, *Dalmatia* (vol. ii. 1887), and Pypin and Spasovitch, *Geschichte der slavischen Litteraturen* (vol. i. Leip. 1880), where the best books are quoted.

Ragusa, an old town in the south of Sicily, 31 miles WSW. of Syracuse, stands on the right bank of the Ragusa, 14 miles from the sea. In the cliffs below the walls and around the town ancient tombs have been excavated. A neighbouring grotto yields stones impregnated with petroleum. Ragusa is supposed to occupy the site of the ancient *Hybla Heræa*. It consists of two communes—an upper, with 24,183 inhabitants, and a lower, with 6260.

Ragwort, the common English name of those species of Senecio (q.v.) in which the heads of flowers have a spreading ray, the involucre has small scales at the base, and the leaves are pinnatifid. The British species are large coarse weeds, with erect stem, and yellow flowers; one species, the Common Ragwort (*S. Jacobæa*), a perennial, is too plentiful in many pastures. It is refused or disliked by horses, oxen, and sheep. It generally disappears from thoroughly drained land, at least after a little labour has been expended in grubbing up its roots. The fresh herbage has been used to dye wool green, but the colour is not permanent.



Common Ragwort (*Senecio Jacobæa*).

Rahel, the wife of Varnhagen (q.v.) von Ense, a woman of great intellectual abilities and wide intellectual sympathies, might almost be called the foster-mother of German genius. Her name was RAHEL ANTONIE FREDERICKE LEVIN; she was a Jewess by birth, a sister of the poet Ludwig Levin (afterwards Robert-Tarnow), and she was born in Berlin on 19th May 1771. The first half of her life was spent in various towns of Germany, in Paris, and in Prague. Her first love having been killed in battle against Napoleon's army, Rahel became a Christian and married (in 1814) Varnhagen von Ense. Her house in Berlin was a gathering-place for men of genius—philosophers, poets, artists, and writers. She herself was greatly influenced when a girl by the writings of W. von Humboldt and F. Schlegel, and especially by Goethe, whom she called her *god;* and she in her turn recognised and encouraged the genius of Jean Paul, Tieck, De la Motte Fouqué, F. von Gentz, Fichte, Hegel, Gans, Heine, Thiers, Benjamin Constant, and others, but especially the writers of the Romantic school. Into the patriotic struggle against Napoleon she threw herself heart and soul. She died in Berlin on 7th March 1833. Her husband published a collection of her writings and letters as *Rahel* (1833), and three years later *Galerie von Bildnissen aus Rahels Umgang und Briefwechsel.* See also her *Briefwechsel* with D. Veit (1861) and with Varnhagen (6 vols. 1874-75); Schmidt-Weissenfels, *Rahel und ihre Zeit* (1857); and L. Assing, *Aus Rahels Herzensleben* (1877).

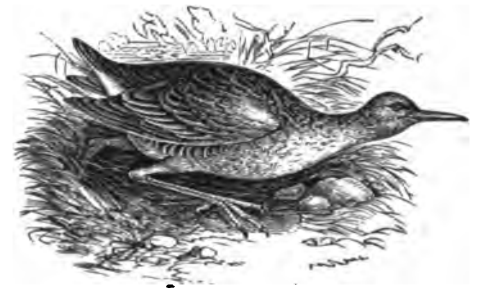
Ráhu is, in Indian mythology, the demon who is imagined to be the cause of the eclipses of sun and moon.

Rahway, a city of New Jersey, on the Rahway River, 4 miles from its mouth, and 20 miles by rail W. of New York. It contains manufactories of carriages, wheels, springs, axles, printing-presses, shoes, and clothing. Pop. (1870) 6258; (1890) 7095.

Rai Bareli, or RAI BAREILLY, a town of Oudh, India, stands 48 miles SE. of Lucknow, and has a large brick fort (15th century), a magnificent palace and tomb of a former ruler, and some fine mosques. Pop. 11,781.—The *district* has an area of 1738 sq. m. and a pop. of 951,905, and the *division* an area of 4882 sq. m. and a pop. of 2,756,864.

Raikes, ROBERT, originator of Sunday-schools, was born at Gloucester, September 14, 1735. His father was printer and proprietor of the *Gloucester Journal*, and he succeeded to the business, keeping it till 1802. He loved children all his days, and his pity for the misery and ignorance of many in his native city led him about 1780 to start a school where they might be taught to read, and to repeat the Catechism. Accounts of the scheme in the columns of his journal attracted attention, the movement grew, and Raikes himself lived to see his schools widely spread over England. He died 5th April 1811, and was buried in the church of L'Mary de Crypt, Gloucester, all the children that attended his funeral being given by his directions a shilling and a plum-cake. See the Lives by A. Gregory (1877) and P. M. Eastman (1880).

Rail (*Rallus*), a genus of birds of the family Rallidæ, having a slender bill rather longer than the head, wings of moderate length, long, powerful legs, and very long, completely-divided toes. The only European species is the Common or Water Rail, or Bilcock (*R. aquaticus*), found in marshy districts throughout England and in many parts of Scotland and Ireland. Many of the birds migrate southwards on the approach of winter. Like most of its relatives, the water-rail is very shy in its habits, and though it does not readily fly, generally escapes detection by threading its way swiftly and quietly through the reeds when its nest is approached. During the breeding season, however, it frequently utters a loud, harsh, groaning cry. The nest of the rail is made of coarse grass or reeds, usually well hidden among thick aquatic plants. The eggs, numbering seven to eleven, are 'pale creamy-white, sparsely flecked with reddish brown and ash-gray.' Two broods are reared in a season. The food consists of worms, snails, and soft vegetable substances. The adult bird is about



Water-rail (*Rallus aquaticus*).

a foot in length; the prevailing colours of the plumage are olive-brown on the upper, ash-gray on the under parts. The tints of the female are duller than those of the male, while the young bird has the under parts creamy-white, barred with brown. Nearly allied to the water-rail are the Moor-hen and the Corn-crake (q.v.). Typical of the American rails is the Virginian Rail (*R. virginianus*).

Railways. The addition to tractive power through the diminution of friction to be obtained by the use of rails upon a roadway is so obvious a fact in mechanics that it is not surprising to find records from very early times of the employment of various materials with this object (see TRAMWAYS). Stone or wood was first used, but towards the end of the 18th century the improvements in the production of iron permitted the substitution of that metal on lines laid down in collieries and quarries. The employment of steam-power for locomotion on ordinary roadways was the subject of numerous experiments in various countries during the 18th century, but the credit of producing the first practical working engine is ascribed to Nicolas Joseph Cugnot (1725–1804), a native of Void in Lorraine. His carriage, constructed in 1769 at the French National Arsenal at the cost of the Comte de Saxe, ran on three wheels, and had two single-acting cylinders turning the front wheel. In the United States Oliver Evans (1755–1819) in 1804 constructed a steam dredging-machine which propelled itself on wheels to the river, a distance of 1½ mile. The improvements of the steam-engine effected by the inventions of James Watt soon led to better forms of locomotives, and comparatively successful models were produced by William Murdock; by William Symington of Dumbarton, the pioneer of steam navigation; and later by Richard Trevithick, whose steam-carriage was exhibited in London in 1808. The development of the high-pressure engine was largely due to Trevithick's numerous experiments and inventions. The first railway locomotive was tried, it is said, on the Merthyr tramroad in 1804, but the experiment was not successful, and to the venerable 'Puffing Billy,' patented in 1813 by William Hedley, and now to be seen in the museum of the Patent Office, must be ascribed the honour of being the progenitor of the enormous stud of iron horses now existing in all quarters of the world. In previous experimental lines rack rails and toothed wheels had been provided under the mistaken notion that the adhesion of a smooth wheel to a smooth rail would not be sufficient. 'Puffing Billy,' after many trials and alterations, commenced regular working at the Wylam Colliery, near Newcastle-upon-Tyne, in 1813, and was kept in constant use until 1872, when it was purchased by the government.

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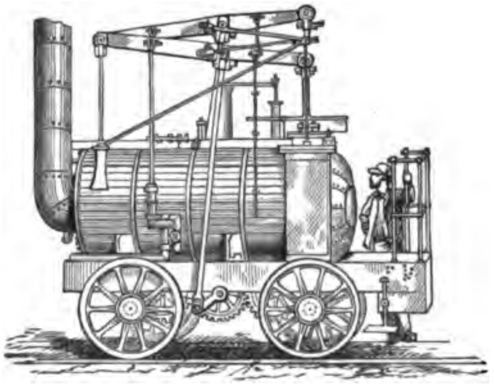


Fig. 1.—'Puffing Billy.'

A standing difficulty with the earlier forms of engine was the want of adequate and uniform steam-power, various devices being employed to secure the requisite draught to the furnace. The problem was first solved by George Stephenson. In 1815, after many previous experiments made while acting as colliery engineer, it occurred to him that the waste steam might be utilised as a blast to stimulate combustion, and from this idea, with the subsequent invention of the multitubular boiler (by Booth), securing enormously increased heating surface, the present form of locomotive was evolved. Other improvements made by Stephenson comprised the direct communication between the cylinders and the wheels, and joint adhesion of all the wheels by the use of horizontal connecting-rods. An engine constructed by him was the first to run on the Stockton and Darlington line, opened for public traffic on 27th September 1825. The engine weighed about 8 tons, and could make a speed of nearly 16 miles an hour. The Stockton and Darlington line was constructed for mineral traffic; and it was not until the opening of the Liverpool and Manchester Railway that the vast possibilities of the new form of transport were proved beyond cavil. The directors of that company, with a view to settle the method of traction on the line then approaching completion, offered a £500 prize for the best locomotive engine. Stephenson's 'Rocket,' comprising the improvements above mentioned, was the only one that complied with the conditions laid down, and at the competition which took place at Rainhill in October 1829 its superiority was at once manifest. It drew a coach with thirty passengers along the prescribed course at the rate of 30 miles an hour. The 'Rocket' went into regular service on the opening of the railway in the following year. It weighed, with its supply of water, only 4¼ tons, and long after it had been superseded by heavier engines, on one occasion ran 4 miles in 4½ minutes. All the many changes which have since been effected in the appearance and size of the locomotive have been more matters of detail than of principle. The 75-ton express passenger-engine, which runs at a speed of a mile per minute for miles together, does not differ materially in construction from George Stephenson's pioneer engines.

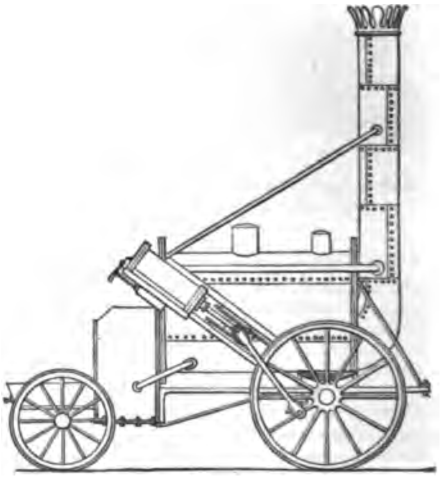


Fig. 2.—The 'Rocket.'

A modern development, however, of importance for economy of fuel is the adaptation to the locomotive of the 'compounding' principle which has effected such a revolution in steam navigation. By this invention (see STEAM-ENGINE) the steam after doing duty in one cylinder or pair of cylinders is made available through its expansive power in another and larger cylinder. Engines formed on this plan are used extensively on the London and North-Western Railway, the North-Eastern, and the Great Eastern. A saving of from 10 to 15 per cent. in fuel is claimed by advocates of compound locomotives, the objection being a complication of parts.

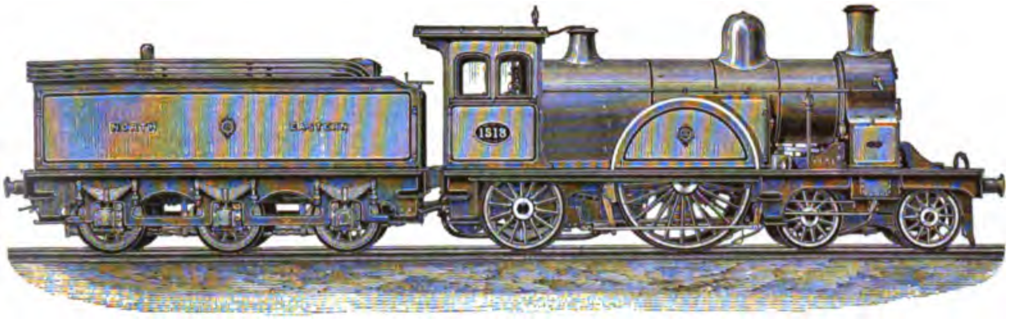


Fig. 3.—Compound Express Passenger-engine, North-Eastern Railway.

Considerable diversity has hitherto existed in the type of locomotive on various lines; but the policy now adopted by nearly all the leading companies of manufacturing their own rolling-stock, and the obvious advantage of having interchangeable parts, has led of late to the gradual adoption of a more uniform style of construction for the different kinds of service required. As a general rule inside cylinders are in use on the through lines of the United Kingdom, it being contended by many authorities that for high speeds the placing of the weightier parts of the machine close to the centre of gravity minimises oscillation. It is held further that the moving part of the machinery is better protected by being placed within the wheels. On the other hand, the objections to be urged are the increased cost and complication of the driving-axle and the comparative inaccessibility of the valves and pistons for purposes of repair. Outside cylinders have been adopted on the London and South-Western Railway and on other lines; and, supported by the bogie-truck, this form of engine approximates closely to the type in use on American railroads. The bogie-truck consists of a separate frame carried by two or more sets of wheels and attached to the engine or carriage by a central pivot; by this contrivance the wheels adapt themselves more readily to inequalities or to sharp curves. The boiler on English locomotives is invariably carried on a stiff plate frame, while in the comparatively cheaper form in use in the United States the running portion of the machinery is attached directly to the boiler by means of a bar frame, which in Britain is thought to throw undue strain upon the structure. Be that as it may, the types of passenger express engines in England and in the United States are undoubtedly approximating more and more closely (see fig. 4). The large single-driving wheel at one time generally used on express locomotives is now more rare, except in the case of some of the new compound engines, but for high speeds it possesses some advantages. For goods-engines the six-coupled wheel, inside cylinder type, is in most general use, while the forms of tank-engines for local and suburban lines and for shunting purposes vary with the different companies and the different services to be performed. Of acces-

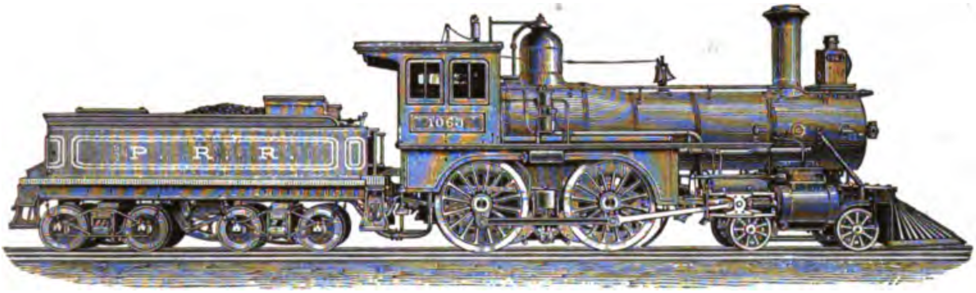


Fig. 4.—Typical American Engine.
(From *The Railways of America.*)

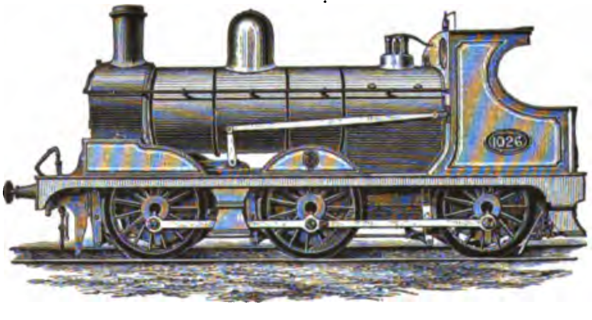


Fig. 5.—Six-coupled Goods-engine, L. & Y. Railway.

sories to working perhaps the most important added in recent years is the injector, a contrivance for picking up water in transit from troughs placed between the rails. It is the invention of Mr Ramsbottom of the London and North-Western Railway, and is in use on some lines where long distances are run without stopping.

In the matter of fuel some very successful experiments have been made on the Great Eastern Railway in the use of oil refuse in conjunction with coal, and liquid fuel is now employed on several of the company's locomotives and stationary engines (see FUEL). The use of liquid fuel by itself in locomotive work is open of course to some objections, such as the starting of the fires and the sudden reduction of temperature when the fuel is shut off, but these do not apply where the two fuels are interchangeable. The consumption and cost of coal alone per mile passenger express train may be taken at 34 lb. of fuel and 3⅙d. To do the same work 10½ lb. of liquid fuel and 15 lb. of coal are used, say 25½ lb., at a cost of 2⅙d. Of various contrivances designed to supersede or supplement ordinary forms of railway construction may be mentioned the atmospheric railway described at PNEUMATIC DESPATCH. Later developments in the form of electrical power (see ELECTRIC RAILWAYS) promise in the future more formidable rivalry.

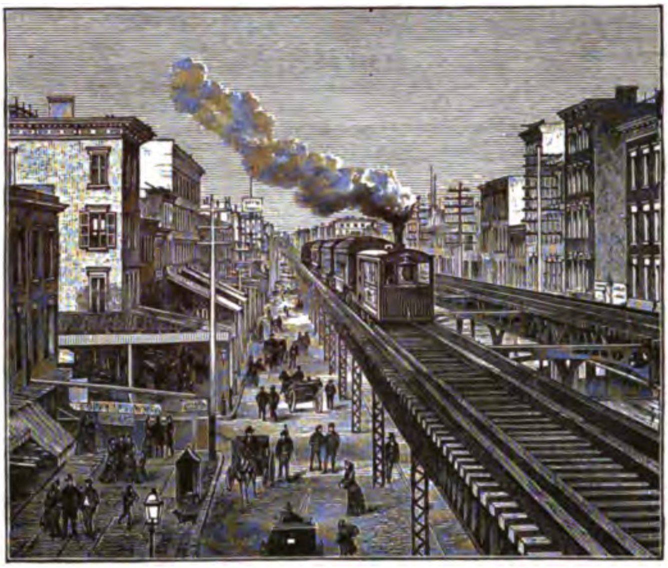


Fig. 6.—Elevated Railway, Sixth Avenue, New York.

The overhead railways of New York are supported on iron columns, and traverse the principal streets, affording accommodation to an enormous number of passengers. Liverpool has also adopted an overhead railway for communication along the line of docks. The project for the carriage of ships and their cargoes by railway was brought to a practical test by the Chignecto Ship Railway (1889–92), across the narrow neck connecting Nova Scotia with the mainland. Lines have also been surveyed across the Central American isthmus. The rack system of railways, which was the earliest form of iron road, has been since adopted with advantage for the working of lines having steep grades. The Mont Cenis (1865) and Rigi Railway (1871) in Switzerland are among the best-known instances of this form of construction. The Zermatt Railway, 22 miles in length, opened in 1891, is the best example of the 'combined' working. The engine (metre gauge) has four cylinders, the outer pair of which are connected with wheels running on ordinary rails. The inner pair operate a central toothed wheel which runs on a single racked rail laid on such portions of the line as are of steep gradient. The two sets of cylinders can be worked separately or together as required. A similar line has been constructed ascending Pike's Peak in Colorado to a height of 14,134 feet. The highest points reached by the locomotive are Galera, a village in Peru, 15,635 feet, and those touched by a line from Galera rising 215 feet higher. The railway crossing the Andes in South America, from Buenos Ayres to Valparaiso, is to be worked on this system for some 17 miles, and on part of the state railways in Bosnia and Herzegovina it is employed.

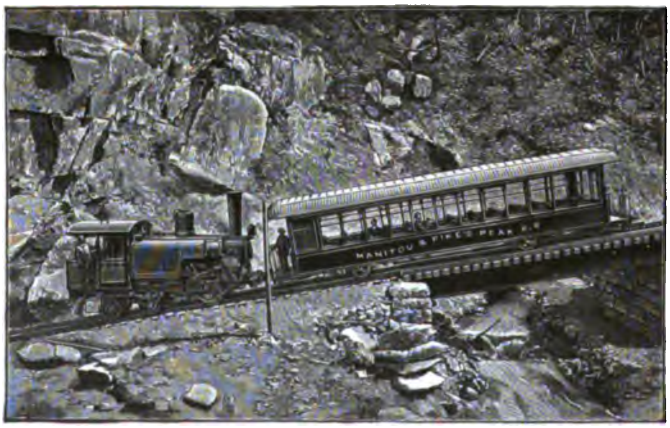


Fig. 7.—Train on the Manitou and Pike's Peak Railway.

The Lartigue system of light railways, of which several short lines have been constructed—one in Ireland and others in France—comprises only a single rail. The carriages or receptacles for goods are balanced on either side, pannier fashion, on a pyramidal structure of wood or iron, 3 or 4 feet in height, which carries the rail (fig. 8). A 'bicycle' railway has been proposed and an experimental line constructed in the United States, the engine and carriages being retained on the single rail by an overhead support held between small horizontal wheels. In the French 'gliding railway' (1888) a thin film of water is kept between the rails and the sledge which supports the carriage.

Carriages.—The builders of the earliest railways did not intend them for passenger so much as for goods traffic. On the Stockton and Darlington line ordinary coaches placed on suitable wheels were used for the small passenger business which was encouraged, and until comparatively recent years the coach was the model for railway-carriage builders. Third-class passengers were accommodated in open wagons, with or without seats. So late as 1845 many of these vehicles had no windows, slight ventilation being provided by venetian blinds. On several of the lines no lamps were supplied in third-class carriages even for the night journeys. The first-class passengers booked their tickets as in coaching days, and their luggage was packed on the roof of the carriage to which they were allotted. As the passenger traffic increased the public became more exacting in their demands, and to-day the carriages provided for long-distance journeys leave but little to be desired in the way of comfort. A type of carriage now being built for the London and North-Western Company's main-line service, for instance, is 42 feet in length, with accommodation for three classes of passengers, and a compartment for their luggage, provided with a lavatory for the first-class passengers—third-class carriages with this addition are also running—mounted upon the best of springs, well lighted with gas and warmed during the winter. In the matter of lighting gas and electricity are both largely used. In the United Kingdom there were, at the close of 1890, 16,237 locomotives, or equal to 0·81 per mile of open railway; 37,068, or 1·85 per mile, carriages used for the conveyance of passengers only; and 526,415, or 26·22 per mile, of wagons. In addition to these there were 13,813 vehicles attached to passenger-trains, and 14,163 vehicles of other descriptions; making a total, exclusive of locomotives, of 591,459, or 29·47 per mile, of vehicles used on the railways.

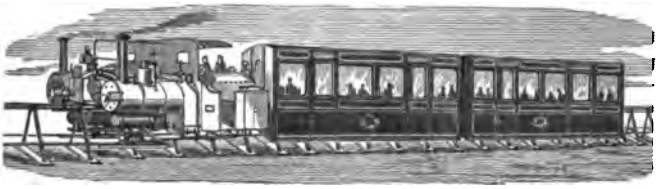


Fig. 8.—The Lartigue Railway.

The cost of the passenger express locomotive may be put at from £2500 to £3500; the more powerful engines, if made by locomotive builders, would cost from £4000 to £4500, but, like most of the carriages and wagons, they are usually built by the companies themselves. A goods-engine such as that illustrated would cost £1800 to £2200, and a tank-engine (without tender) £1500 to £2000. The cost of a Pullman carriage is from £2000 to £3500; of an ordinary first-class carriage, £550 to £700; second, £450 to £600; third, £350 to £450; of a coal wagon carrying eight tons, £60 to £70; a wagon carrying ten tons, £70 to £90.

Brakes.—The supply of brake-power has been the subject of many ingenious patents, and is dealt with in a separate article in this work. The use of continuous brakes of some approved form on all passenger-trains in the United Kingdom was made compulsory by the Railway Regulations Act of 1889. See the article Brakes.

Railway Construction.—The cost of constructing railways is dependent on many conditions, such as cost of labour, the nature of the district traversed, and value of the land required. In England the last-named item has been a very serious one, and heavy parliamentary expenses have also added largely to the cost per mile, which, including equipment, averages £44,710 for the United Kingdom. The most expensive railway system in the world is that which forms what is known as the 'Inner Circle' line of London. A circular railway of this description was recommended by a parliamentary committee in 1864. The scheme has been carried out by two companies, the Metropolitan and the Metropolitan District, which have since extended their respective systems into the suburbs. This circle, including the purchase of land, which was the heaviest item, has cost from £600,000 to nearly £1,000,000 per mile. The Metropolitan line from Bishop's Road to Farringdon Street was opened on 10th January 1863, but the circle, owing to financial and other difficulties, was not completed until October 1884. Another very costly section of railway is that of the South-Eastern between Charing Cross and Cannon Street, London, which includes two large stations with hotels and two bridges over the Thames in its length of two miles. The cost of this short piece of line has been over £1,000,000 per mile. In other countries the land acquired has been of much less value, and in many cases has been given by the government. Moreover, the traffic has not been so heavy, and consequently lighter works have sufficed than those which the Board of Trade require in Great Britain. The average cost of railways in the United States is thus under £12,000 per mile, and in Western Australia the railways have been built and equipped at about £4400 per mile. In flat tracts, such as the prairies, where the traffic is light, the rails can be laid with but little prepared roadway; but this is an exceptionally favourable condition, engineers in most cases having to span rivers (see Bridge), pierce through hills or mountains (see Tunnel), cut through elevations, and carry the line over low-lying ground on embankments. In an ordinary clay soil the cost of cutting and embankment may be taken at from 1s. to 1s. 3d. per yard, with about 2d. extra for trimming slopes, &c. In the case of chalk, hard rock, or sand the cost would naturally be much higher; and the length of cartage is also another important item. The roadway having been completed, a substantial bedding of gravel, burned clay, or other suitable material is laid, and in this are imbedded the 'sleepers,' to which the rails are fixed. A good navvy will dig and throw out into a barrow in a day of ten hours in common ground from 8 to 10 cubic yards, in stiff clay or firm gravel about 6 cubic yards, and in hard ground, where picking is required, from 3 to 5 cubic yards. The 'steam navvy' is now largely employed in railway work, and does in one day the work of from seventy to eighty men (see Excavators).

In laying out a line it is of great importance that heavy gradients and sharp curves should be avoided, as the former add to the cost of working and the latter interfere with speed. Some of the sharpest railway curves in the United Kingdom are on the narrow gauge Festiniog line, where there are curves as sharp as the sweep of Oxford Circus—of but 116 feet radius—for short lengths. This line runs to a point 700 feet above Portmadoc in less than 12 miles, giving an average gradient of one in 92, and a maximum gradient of one in 80. On the Sleaford and Bourne section of the Great Northern Railway the line, on the other hand, is practically level, the gradients averaging about one in 400. The advantage of an easy gradient will be seen from the following calculation: If an engine and tender weighing together 56 tons, is capable of drawing a maximum load of, say, 40 loaded wagons, weighing 560 tons, at 25 miles per hour on the level, it will only take the following loads over the gradients named below, and the speed would also be considerably reduced.

Level		40	wagons	weighing	560	tons.
Incline	1 in 100	20	"	"	280	"
"	1 in 50	10	"	"	140	"
"	1 in 80	6	"	"	84	"

Before the Board of Trade will sanction the opening of a line it has to be satisfied as to the strength of the bridges, that a minimum distance of 6 feet has been left between the lines, and as to other conditions.

The form of 'permanent way' has altered considerably since the laying of the first railways. The first wrought-iron rails used on the Stockton and Darlington weighed 28 lb. to the yard. The cheapening of steel which followed the invention of the Bessemer process has led to the use of that material for rails throughout the world, and the size of the rails has been successively increased until between 80 and 85 lb. per yard is the usual weight. In British railway practice the rails are supported on cast-iron chairs held by wooden wedges, and the chairs are spiked on to transverse wooden sleepers. On American and colonial lines chairs are dispensed with, and the rails are spiked direct on to the sleepers. The joints are made by 'fish-plates' bolted on each side of the rails, and the bolt-holes are made oblong or elliptical to permit of the expansion and contraction of road under changing temperatures. Blocks of stone were sometimes used in the early history of railways to support the metals, but the rigidity obtained was found to be very destructive of rolling-stock, and wooden sleepers lying on gravel ballast are now almost universally employed. Iron sleepers have been found serviceable in some countries where wood is liable to the attacks of insects.

Stations.—In the early days of railway construction the termini were generally constructed, so far as their elevations were concerned, on severely classical lines—whilst the wayside depôts were often mere sheds. Euston, the London terminus of the London and North-Western, is built in this style; but the front of the neighbouring St Pancras Station and hotel, opened in 1868, was designed by Sir Gilbert Scott on Gothic lines. The station area of this depôt is covered by an arch 100 feet in height, with a span of 240 feet and 700 feet in length. The New York Central Company's terminus in New York is covered by a roof which exceeds by a few inches the span of the Midland Company's station. After the St Pancras building the largest station in the United Kingdom is that of the North-Eastern at York, 800 feet in length by 234 feet broad. The St Enoch Station of the Glasgow and South-Western Company claims the third place in the list of British stations.

Signals.—At a very early stage of railway working a system of signals was found to be necessary. In 1830, when the Liverpool and Manchester line was opened, a flag by day and lamp by night were adopted; but this soon proved inadequate for the traffic, and in 1837 the managers of the Grand Junction Railway erected poles about 12 feet in height, with discs and lamps turned through a quarter circle by the pointsman working a lever at the base. About 1842 a semaphore signal, somewhat similar to those now in use, was introduced. Up to 1846 there was no 'distant' signals, but in that year this extra precaution was adopted. The successful concentration and interlocking of the levers working both points and signals was effected in 1856 at the Bricklayers' Arms Junction, and in 1859 the first interlocking frame was fixed at Willesden Junction. Since that date the interlocking and concentration of signal and point levers has made rapid progress, and of the total signals and points in the United Kingdom over 91 per cent. are thus protected. The signals now in use may be classified as 'home,' 'distant,' 'starting,' 'advanced starting,' and 'disc,' the last named used on goods sidings. By the interlocking of points and signals, if the signalman has for instance moved a lever that opens a pair of points to enable a train to come out of a siding on to the main line, the 'home' and 'distant' signals must be at 'danger' to stop any train from approaching on the main line, and it is impossible for him to lower them.

In the working of a railway the telegraph plays a very important part. By its means trains are started and protected throughout their journey; the signalmen are placed in communication with each other, and are warned if the signals are not acting properly. On the London and North-Western system there are over 11,000 miles of wire used for purely railway purposes, apart from the 6800 miles of Post-office wires. Before the introduction of telegraphy on the railway signals were placed at certain points, and kept fixed at 'danger' for a certain time before another train was allowed to pass. In 1853, however, the absolute block-telegraph system was introduced. Under the absolute block there can be only one train in a given section at the same time, while under the 'permissive' system there may be more than one train in each section. Taking A and B as the stations at each end of the section, the working of the absolute block system is thus arranged: the signalman at station A gives to station B what is called the 'Be Ready' signal, which indicates the nature of the approaching train. The man at station B, if the previous train has passed his cabin, and he knows that the section between A and B is clear, repeats this signal to the next box. The train is then despatched from A, the signalman at that box giving the warning 'Train on Line,' which the man at B acknowledges, and at once gives the 'Be Ready' signal to C, and so on. As soon as the train has passed B, the man in that box telegraphs 'Line clear' to A, who acknowledges the message. Of the double lines in the United Kingdom over 94 per cent. are worked on the absolute block system. On most single lines the 'train-staff and ticket' system is adopted. In this case, supposing there are three trains at the terminus of a line or section to proceed to the other end, the first and second start with a ticket, but the third carries a staff which is the only key for the box in which the tickets are placed. No train is allowed to enter the opposite end of a section until the train staff arrives, so that it is impossible for two trains to meet. The proper distance between trains running in the same direction is maintained by fixed signals, and the block telegraph is the same as on double lines. If necessary, the line is divided into sections with crossing places, each section being worked as a separate line. By the 'train-tablet' system, a circular metal disc is electrically controlled from the other end of the section, forming practically a 'train-staff' and block-telegraph system combined. Mechanical details of signalling have on occasions to be superseded by manual work. In case of fogs a man, generally one of the platelayers, is stationed at the foot of each 'distant' signal, and as the semaphore is raised to 'danger' he places on the rails two detonating signals, which are exploded by the engine as it passes over them. If the engine-driver hears no explosion he knows the line is clear.

Gauge.—In deciding upon the gauge to be adopted the constructors of the first railways naturally adopted that of the tramroads then in existence—viz. 4 feet 8½ inches, that standard having been fixed upon as being in common use for the ordinary vehicles of the country. On all the lines built by George Stephenson, and most of the other leading engineers in the United Kingdom, this 4 feet 8½ inches gauge was adopted; but in 1838 Brunel, in his desire to secure double the attained speed and capacity of the then constructed railways, determined upon a 7-feet gauge for the Great Western Railway. This brought about the now historic battle of the broad and narrow gauges. The Eastern Counties (the present Great Eastern), opened for traffic in 1843, had a 5-feet way, the Caledonian 5 feet 6 inches, and in Ireland there were 5 feet 2 inches and 6-feet gauges. So long as lines of different gauges serving separate districts did not come into contact the inconveniences of breaks of gauge were not felt, but when the broad and narrow gauges met at Gloucester in 1845, and at other points later on, the evil effects were soon felt. Goods and passengers had to be transferred from the one set of carriages to the other, and no through services were possible until at a later period the Great Western laid a third rail to accommodate the narrow-gauge trains. So serious became the difficulties which arose through the breaks of gauge that in 1845 a commission was appointed; it reported in favour of the narrow gauge, and in August 1846 an act was passed enacting that thereafter it should not be lawful to construct any railway for the conveyance of passengers on any gauge other than 4 feet 8½ inches for Great Britain and 5 feet 3 inches for Ireland. It was, however, provided that railways constructed before the passing of the act on any other gauge should be allowed to maintain their independence. The Great Western, therefore, continued to maintain its broad gauge, and as late as 1867 there were 1456 miles of line on this system, having junctions at twenty-six points with the narrow gauge. In 1869, however, the directors of the Great Western realised the disadvantages of their isolation; the narrow gauge has been gradually adopted on the system, and the date fixed for the final disappearance of the broad gauge was the 20th May 1892. Parliamentary sanction has, however, been given to various exceptionally narrow gauge lines. In most European countries the gauge adopted has been about the same as the British standard, with the exception of Spain and Russia, where the gauge is somewhat wider.

Accidents.—The number of persons killed on the railways of the United Kingdom in 1890 was 1076, and injured 4721. Of those killed 118, and of the injured 1361, were passengers; but of the fatal accidents only 18, and of the injuries 496 were due to causes beyond the control of the passengers—viz. accidents to trains—the others arising from various causes, especially want of caution on the part of individuals themselves. Taking the number of passenger journeys, exclusive of those of season-ticket holders, at 817,744,046, the proportion of passengers returned as killed by accidents beyond their own control was one in 45,430,224, and of injured one in 1,648,677. In the case of railway servants 12 were killed and 147 injured by train accidents, and 487 killed and 2975 injured by other accidents. The number of persons employed on the railways of the United Kingdom is estimated at 346,426, so that one in every 694 was killed and one in 111 injured by train and other accidents. These are very high proportions, but it is only fair to the managers to say that every precaution is taken to secure the safety of employés. Too often, however, salutary regulations are broken and mechanical appliances for their protection neglected by the men themselves. The proportion of deaths and injuries has moreover steadily declined of late years. It having been suggested that many accidents were due to men working overtime, railway companies have now to make periodical returns as to the hours of labour on their systems.

Speed.—Mr Worsdell, the locomotive engineer of the North-Eastern Railway, with a powerful engine and a moderately heavy train attained on one occasion a speed of 86 miles an hour. On the Philadelphia and Reading Railroad in the United States in August 1891 a distance of about 3 miles was run at a rate of 90 miles an hour. Mr Stroudley, engineer of the Brighton line, said that a light engine could easily attain 100 miles an hour. The actual running-time of trains is of course considerably below such limits. The fastest speed in ordinary service and the largest proportion of high-speed trains are to be found on the railways of Great Britain—the careful finish of the road-beds, the fencing of the track, and the comparative absence of level crossings giving an undoubted advantage in this respect over all foreign systems. The best regular running-time as yet made on railways was in the 'race to the North,' between the East and West Coast routes, commenced in 1888. The London and North-Western in May of that year announced their intention of reducing their time between Euston and Edinburgh from 10 to 9 hours. The East Coast companies accepted the challenge, reducing their time from 9 to 8½ hours, and in August the time by both routes was reduced to 8 hours. The distances to be covered were by the East Coast 393 miles, and by the West Coast 400¾ miles, the gradients on the former being more favourable. The East Coast train, taking the average of 27 runs, was nearly 5 minutes before time in arriving, once getting in 33½ minutes before time, whilst on the last day, deducting stoppages, the journey was done at the rate of 57·86 miles per hour, some miles being done at the rate of 76 miles per hour. The average of the West Coast trains was 56·11 miles per hour for the whole journey, excluding stops, and the fastest recorded speed was 74 miles an hour. The competition was given up at the end of the month, and the time reduced to 8½ hours. On the New York Central in 1891 a special run was made from New York to Buffalo, a distance of 437 miles, in 440 minutes, including three stops aggregating 15 minutes. The following may be taken as the best express services now regularly running in different parts of the world in miles per hour, including and excluding stops respectively:

England—London to Leeds, G.N.R.	48·4	51
United States—New York to Philadelphia	47·9	49·8
France—Paris to Calais	43	44
Germany—Berlin to Hamburg	37·3	40·5

The average rate for express trains may be taken as under, all trains running above 40 miles an hour being taken as 'express' in Great Britain and the United States, and all above 29 miles an hour on the Continent:

Great Britain	with stops	41·6	without stops	44·6
France	"	32·8	"	36·2
Holland	"	32·5	"	35
Germany	"	31·7	"	34·8
Belgium	"	31·7	"	33·5
Austria	"	30	"	32
Denmark	"	30	"	32
Italy	"	29½	"	31·2
Sweden	"	29	"	31·5
Russia	"	29	"	31·6
United States	"	41·4		..

On the Canadian Pacific line a special train to convey the Japanese mail in 1891 performed the distance from Vancouver to Brockville, opposite the New York frontier, in 77 hours, at a speed of 36 miles an hour for the whole 2800 miles. On the Grand Trunk line the best service is 36·8 miles including stops, and 38·2 excluding stops. The best service in India is from Bombay to Calcutta, about 25 miles an hour. The distance from Melbourne to Sydney is run at 33 miles an hour including stops, and 37 miles excluding stops.

Fares and Rates.—The standard English passenger fares may be taken at about 1½d. per mile first class, 1¼d. per mile second class, and 1d. per mile third class. The experience over a series of years has shown a constant increase in the volume of third-class travel, which in 1890 formed ⅞ths of the whole passenger business in the United Kingdom. In 1872 the Midland Company decided on the abolition of the second class, and in 1890 the Manchester, Sheffield, and Lincolnshire Company and the Caledonian Company partly adopted the same policy. The Midland Company, however, by running Pullman drawing-room and sleeping cars at an extra fare, practically re-established the three classes. In the United States the average fare may be taken at 1⅛d. per mile, extra charge being made for drawing-room and sleeping cars. The following official statistics as to the comparative fares per kilometre in the different countries of Europe were published by the French government:

	First Class.	Second Class.	Third Class.	Free Baggage.
England	12·5 centimes.	9·5	6·5	27 to 54 kilogs.
France	12·8	9·2	6·7	30
Germany	11·2	8·7	6·2	25
Italy	12·4	8·7	5·6	none
Belgium	9·5	7·5	5·0	none

With regard to goods, the charges on British railways are higher on the whole, but the speed of the goods-trains and the character of the service is superior. With long hauls in some foreign countries of course lower mileage rates can be charged. The grain rates in America have been reduced to about ⅓d. per ton per mile, and on Indian railways, with cheap labour and fuel, a standard of ⅓d. per ton per mile has been reached.

Capital, Revenue, &c.—The act of parliament authorising the construction of the Stockton and Darlington Railway, the first used for passenger traffic, received the Royal assent on 19th April 1821. The first rail was laid on 23d May 1822, and on 27th September 1825 the railway was opened with great ceremony. Four hundred and fifty passengers were conveyed in the first train. The train arrived at Darlington, a distance of 8¾ miles, in 65 minutes. When fifty years later the jubilee of the railway system was celebrated there were 16,449 miles of railway working in the United Kingdom, representing a capital cost of £600,895,000, and producing from traffic a revenue of £56,898,000, of which £24,893,000 was received from passenger fares and £32,005,000 from the conveyance of goods and minerals. At the close of 1890 there were 20,073 miles of railway open for traffic. The authorised capital for the construction of railways was £1,004,529,164, being within a comparatively small amount double the whole of the 2¾ per cent. British consols. The total receipts of these railways were £79,948,000. This is only 10 millions short of the actual receipts paid into the National Exchequer from all sources of revenue for that year.

The receipts from passengers, mails, &c. in 1890 were £34,327,000, and 817 millions of persons travelled on the railways; while from minerals and merchandise the receipts were £42,220,000. The companies also received £3,401,000 from steamboat services and other sources. In order to earn this amount of revenue the railway companies expended, in various working charges, £43,188,000. So that the net profit resulting from the working of the railways was £36,760,000. This aggregate of profit was mainly distributed to three classes of proprietors. The debenture stock-holders received, in varying rates of interest, about 9 millions, giving an average of 3·99 per cent. on their investment. The guaranteed and preference capital received 13 millions, or an average of 4·13 per cent., while the ordinary, including the divided stocks of preferred and deferred, took 14 millions, equal to an average of about 4·51 per cent. To sum up, the expenses of working the railway absorbed 54 per cent. of the gross receipts, and the net receipts were equal to 4·10 per cent. on the whole of the paid-up capital.

The railway system of the United Kingdom has not been developed according to any plan previously marked out, nor does it owe any of the position which it now holds to support or assistance given to it by the state. It is the outcome of private enterprise carried on in very many instances under great difficulties, in spite of much national and local prejudice, and at an expenditure of capital greatly in excess of that which would have been required under more favourable conditions. In 1830 the Duke of Wellington, then at the head of the government, was asked to appoint some engineers to lay out four or more main lines which would form the great highways for the locomotive. The duke's reply was that he did not like railways; and Mr Goulburn, the Chancellor of the Exchequer, declined to take any action in the matter, on the ground that interference with vested interests would create an amount of opposition which the government could not withstand. Private enterprise speedily supplied the impetus to railway development which the national government refused to give. The Liverpool and Manchester Railway was opened for traffic in 1830, and in 1838 there was a completed line between London and Birmingham. During the interval of the opening of these two lines—now absorbed in the London and North-Western system—fifty-six acts of parliament were passed authorising the construction of 1800 miles at a total estimated cost of 45 millions.

The Railway Mania.—A later period marked with greatly increased activity on the part of promoters and engineers culminated in the 'Railway Mania,' followed by a great financial collapse. Parliament had required as a condition precedent of considering any new railway bills that a deposit of ten per cent. of the estimated cost should be lodged with the accountant-general by the promoters, and five per cent. for parliamentary expenses. On the 30th of November in 1845, the latest date at which the Board of Trade would receive plans of new railways, there had been lodged 1263 bills, with plans and sections for new railways, representing a capital of 563 millions, and requiring the deposit of a total sum of 59 millions. The amount required for payment of the deposit exceeded by more than 20 millions the whole amount of gold and coin in the Bank of England and notes in circulation. The publication of these figures created alarm, and a panic ensued, the stocks of existing railways were greatly depreciated, and the premiums on the shares of the newly-promoted companies, which had been created by a wild spirit of speculation, disappeared, and wide-spread ruin and commercial disaster ensued. The result was that, of the 1263 companies which were promoted, 120 only survived the ordeal of parliament.

Railway Administration.—Up to 1891 there had been passed over 4000 separate acts of parliament authorising the construction of new or dealing with the constitution and working of existing companies. In order to compensate to some extent for the lack of original design and system in connection with the railways, the companies have resorted to numerous plans for amalgamation, fusion, purchase, or working agreements between themselves. There were in 1891, after numerous changes and dissolutions, 516 railway companies in the United Kingdom. Of the railways owned by these companies 266 are worked or leased by other companies. The

Great Western, for instance, has thirty-six railways of which it is the lessee, and has joint-ownership of nine other lines. The movement of the traffic over the separate systems of railways is provided for under the Clearing-house Association (see CLEARING-HOUSE); and in 1888 an act was passed giving to the Board of Trade authority to call for returns, and deal with the schedules of rates and classifications of the companies.

The earliest railways were authorised on the supposition that they would, like canals, be highways for the use of carriers. A scale of maximum tolls was prescribed in each act, and the canal classification of goods adopted. Later on the railway companies prepared a new classification. Each railway act also contained a clause authorising the railway company to charge a reasonable sum in addition to the maximum tolls, in order to cover carriers' services, risks, and profit; and from about the year 1845 each railway act prescribed a scale of maximum charges for conveyance. To these maximum rates most of the companies were allowed to add a terminal charge for the services of loading, unloading, covering, collection, and delivery, &c. Although the companies had thus power to charge certain rates, the *maxima* were seldom enforced; but even with the lower level of actual charges the traders were dissatisfied, and demanded frequent inquiries into the working of railways. Three such inquiries were held between 1866 and 1884, but the companies were on the whole acquitted of the charges brought against them. As the result of the inquiry of 1872 the Railway Commission was appointed to specially deal with disputes between traders and the railways. In 1885 the government made an attempt to deal with the whole subject of railway rates, but it was not until 1888 that an act was passed. The later part of 1889 and the whole of 1890 were occupied with inquiries before the Board of Trade and a joint committee of both Houses of Parliament, as to the rates and classifications of the railways, and the result has been acts which come into force on 1st August 1892, amending the powers and classifications of nine of the leading lines.

Zone System.—In 1889 a new departure was inaugurated on the Hungarian state railways by the introduction of the Zone system for passengers, under which each station, taken as a point of departure, is considered as the centre of certain zones, which increase in a regular ratio, and in which the fares are arranged on a simple plan. This was followed by the introduction on the Austrian railway system of the Kreuzer tariff, which is a combination of the Zone and the Kilometre systems; and in 1891 the Zone system was also applied in Hungary to the goods traffic.

Results of Railway Working.—At the time when the Liverpool and Manchester Railway was completed, ten miles an hour travelled by the fast stage and mail coaches was about the limit of speed attainable. At that time the population of the United Kingdom was about 25 millions; in 1891 it was nearly 38 millions. At the opening of the London and Birmingham Railway there were 3026 stage-coaches, 54 four-horse and 49 pair-horse mail-coaches in use. The full seating capacity of these vehicles, each being licensed to carry fifteen passengers, would represent 16,500,000 individual journeys in the course of the year, and it may be safely assumed that not more than 10 millions of such journeys were made. The extent of correspondence among the population was officially stated at 82 millions of letters. In 1890 the number of passengers carried on the railways was 817 millions. On the basis of work done by stage-coaches in 1837, we should require over a quarter of a million of these vehicles to move the passengers now conveyed over the 20,000 miles of railway. On 30th November 1830 the first of Her Majesty's mails was transferred from the mail-coach to the railway. The increased facilities thus afforded converted a uniform penny post from a theory into a reality when that system came into operation on 5th December 1839. In 1890 the Post-office celebrated the jubilee of the penny postage, and in that year carried 1650 millions of letters, 207 millions of post-cards, 442 millions of book-packets, and 159 millions of newspapers. To have conveyed this would have required more than thirty times the number of coaches which carried the mails half a century since. The news in those days was carried at an average speed of 8¾ miles per hour. The railways carry the mails at an average speed of over 40 miles per hour.

The total traffic in coal on the railways of the United Kingdom amounted to over 126 millions of tons in 1890. Of the total meat supply of London the railway companies convey about 64 per cent.; whilst of milk four companies alone import about 22 millions of gallons each year. The supply of vegetables, fruits, and flowers for London and other large towns is also mainly dependent on the railways. The fish trade of the country also owes its development mainly to the railway facilities of recent years—in 1890, 383,000 tons of this valuable item of our food supplies were conveyed by rail from the ports to inland markets.

State Ownership of Railways.—It may be assumed in general that railway construction and development has been less hampered by state interference in the British Islands and in the United States and Canada than in any other parts of the world, and it is precisely in these countries that railways have attained their highest development. In other British colonies the government has either built or subsequently purchased the lines. Railway construction in France was undertaken in a much more methodical manner than in Great Britain. The country is partitioned out among six great companies, and competition has thus been entirely avoided. The government owns about one-third of the capital invested, and will ultimately about the middle of the 20th century become the absolute proprietor of the various systems. The state has the right to fix fares and charges, and to determine the amount of new mileage to be constructed from time to time. So far as technical skill is concerned, the railways of the country are well managed, but the accommodation provided is far inferior to that in Great Britain or the United States; passenger-trains are comparatively few and crowded, and the freight service is very slow. The main lines are very remunerative in their operations, but the local roads are mostly worked at a loss. In Germany the roads are owned and managed by the government, and political and military considerations are paramount in the working of the system. The lines have been cheaply constructed, the cost being less than half per mile that in Great Britain. The tendency in most other European countries is towards state ownership or control of railways. The Russian government since 1880 has been actively engaged in buying up private railways and building new lines, and at the present time some 40 per cent. of the system is owned by the state. In Belgium the whole of the lines have been so purchased by the government. In Austria only one line is a state railway.

Railways in the United States.—By far the greatest and most rapid development of railway construction in proportion to population has taken place in the United States, and the working of railways in all parts of the world owes much to the characteristic inventive genius of Americans. The building of railways has not been hampered on the

American continent by undue legislative restrictions. State ownership has never been seriously discussed; land has been cheap or free for occupation; the distances to be traversed are great, and it is small wonder, therefore, that the iron road has in most districts preceded or superseded the ordinary highway. Before the date of the celebrated locomotive trial which evolved the 'Rocket,' an engine was run in America called the 'Stourbridge Lion,' a machine made in England, and imported by the Delaware and Hudson Canal Railroad Company. The first railroad in the United States was, however, begun in 1828 by the Baltimore and Ohio Company, a section of 15 miles from Baltimore to Ellicott's Mills being opened in May 1830. Horse-traction was first used on this line. American engines are now found competing with English-built machines in many parts of the world, including the British-Australian colonies.

It is, however, in the matter of carriage construction that the American railroad engineer has marked out an independent path and obtained the most striking results. For many years European railway carriages adhered closely to the model of the old stage-coach. The longer distances travelled on the American continent, and the republican spirit which objected to the division of classes, led to the adoption across the Atlantic of the long railroad car, with a central passage between the seats. The great size and weight of these structures necessitated increased attention to such details as springs, couplings, and brakes, and in the provision of such accessories for comfort and safety American railroad practice has long been in advance of that in any other part of the world. Republican simplicity notwithstanding, the demand for improved accommodation gave rise to drawing-room, sleeping, and dining-room cars, and the stock turned out for these purposes by the Pullman and Wagner companies challenges comparison with the provision made for the travel of royalty in the Old World. The 'Vestibule' trains running on most of the trunk-lines for long distances—say between New York and Chicago—represent the highest ideal yet obtained of luxurious travelling. Railway stock of this character is mostly owned by independent companies, whose officials collect the extra fares for the accommodation.

In the United States, between 1830 and 1890, a total length of 167,000 miles has been constructed, or an average of nearly 2800 miles a year. Previous to 1850 the greater portion of the railroads made were in the states bordering on the Atlantic, and were for the most part isolated lines employed for local traffic. A great development to this form of enterprise was given by the discovery of gold in California, and lines were rapidly pushed towards the centre of the continent. The great civil war at the commencement of the next decade emphasised the necessity of direct communication with the growing Pacific states to cement the Union, and government assistance was freely given both in land-grants and money to the two companies, the Union Pacific and Central Pacific, which, building respectively from the east and the west, met near Salt Lake City in May 1869, the total length from the Missouri River to San Francisco being 1700 miles. Since that date five transcontinental lines have been completed, including the Canadian Pacific Railway on British territory. The rate of general railroad construction has varied considerably, but the most active period was that between 1880 and 1890. In 1882 11,569 miles were built, and in 1887 no less than 12,878. A large extent of this mileage was built in advance of the necessities of the districts traversed, and in other cases existing lines were paralleled to the heavy loss of the interests concerned. These periods of over-construction and resulting competition, combined with a necessary reduction of mileage rates as the centre of agricultural production moved westward across the continent, caused at times much depression in railroad securities. The system of finance under which the companies borrow money on mortgages with foreclosure powers (not possessed by owners of British railway debentures) has also been the cause of heavy loss to investors in American railroads, many of which have passed through the ordeal of reorganisation with the accompanying 'assessment' or 'wiping out' of junior securities.

To remedy the effects of over-competition, a system of 'pooling' receipts was adopted by the various trunk-lines. Under this plan the receipts from any given description of traffic were made into a common purse, and divided among the companies concerned in an agreed ratio. The state railroad commissions were powerless to deal with traffic originating or passing out of their respective territories; but in 1888 the Interstate Commerce Commission was appointed with federal authority to deal with questions affecting railway traffic. Under the law appointing the commission, 'pooling' receipts was made illegal, and the well-known 'long and short haul' clause, establishing uniform mileage rates, was, contrary to the result, expected to produce disastrous results to railway revenues.

The total railway capital in the United States in 1890 was $10,122,000,000, of which rather less than half, or $4,640,000,000, consisted of capital stock, and the remainder of different forms of indebtedness. The cost per mile of completed road was $59,638. The gross earnings were $1,097,847,000, equal to 10·8 per cent. on the investment, and the net earnings $346,921,000, or 3·4 per cent. on the outstanding capital. Of this amount 4·18 per cent. represents interest on indebtedness, while the average return in the way of dividend to stockholders was 1·80 per cent. The work done was represented in 1890 by 793,925,000 train miles run. Passengers were carried to the number of 520,439,000, and an average distance of 24·06 miles, while 701,344,000 tons of freight were carried an average distance of 112·91 miles. The average earnings per passenger per mile were 2·185 cents, and per ton of goods per mile 0·935 cents, the latter a lower average than in most other countries, the distances hauled being unusually great.

Colonial and Foreign Railways.—Canadian railways follow closely in their characteristics the construction and methods of working of the lines across the boundary. The return of 1890 gives a total of about 14,000 miles completed, the greater proportion of the mileage being divided between two companies, the Grand Trunk and the Canadian Pacific. The nominal capital, including advances made and aid granted by the Dominion government, was $786,447,000, or $56,174 per mile. The earnings were returned at $46,844,000, and the net profits at $13,930,000. Passengers were carried to the number of 12,821,000, and 20,787,000 tons of freight.

In Mexico for many years the line from Vera Cruz to the capital, constructed in 1850 at a heavy cost by British capital, was the only railway in existence; but routes connecting with the systems of the United States were subsequently constructed under American auspices.

Of railways in other Central American states the Panamá line constructed by American capital, as the first transcontinental route, claims chief attention. Other routes between the Atlantic and Pacific are under construction, and a great scheme, traversing the Isthmus from north to south, was discussed and steps taken for the necessary surveys at a meeting of representatives of the various republics held in 1890 at Washington. The project vies in magnitude with the Trans-Siberian railway scheme in the Old World. The Argentine Confederation represents the chief railway development in the southern half of the continent.

In the early days of railway enterprise in India the agency of private companies guaranteed by the state was exclusively employed, and nearly all the great trunk-lines of the country were made under this system. The government gave the land for the lines free of charge, and guaranteed interest generally at five per cent. on the share capital and a lower rate upon the debentures for ninety-nine years. Any surplus earnings after the guaranteed rates were paid were divided equally between the government and the companies. Moreover, the government retained the right of buying the undertakings at specified dates on payment of the value of the stock calculated at its market price on the average of the three preceding years. In this way the East Indian Railway was acquired in 1880, the Eastern Bengal in 1884, the Sind, Punjab, and Delhi in 1885–86, the Oudh and Rohilkund at the end of 1888, and the South Indian in 1890. In 1870 a new policy of railway development by the direct agency of the state was inaugurated; and in 1880–81 the system of encouraging private enterprise by state assistance was again adopted. Both agencies are now employed. In some instances—notably the Bengal and North-Western line—railways have been constructed without any direct pecuniary assistance; in others a subsidy or limited guarantee has been granted. The agency of private companies has also been employed by the government both in the construction and working of state lines. In all cases the government has the power of taking over the railways at specified periods on stated terms. In 1884 a select committee reported in favour of a more rapid extension of railways than had been taking place, and recommended the broad gauge—i.e. 5 feet 6 inches—except in tracts where the metre or smaller gauge was already in successful operation, and for local lines where the traffic could only be light. The first railway opened in India was that of the Great Indian Peninsular Company from Bombay to Tannah, traffic being commenced on 4th May 1853, and at the close of 1890 there were 16,996 miles in working. Of this total 8077 miles were state lines worked by companies, 4680 miles state lines worked by the state, 2588½ miles were worked by guaranteed companies, 381 by assisted companies, 539½ miles were owned by native states and worked by companies, 124 miles were owned by native states and worked by state railway agency, 547¼ were owned and worked by native states, and 58¾ miles were in Portuguese and French territory.

The first railway in Australasia was projected in 1850 in New South Wales by private enterprise, but was completed by the government. With a few small exceptions the railways of the Australasian colonies are owned and worked by the governments. The dates of opening of the first lines and latest mileage returns of each colony are: Victoria (13th September 1854), 2762 miles; New South Wales (29th May 1855), 2182 miles; Queensland (31st July 1865), 2113 miles; South Australia (26th April 1856), 1810 miles; Western Australia (21st January 1864), 569 miles; New Zealand (1st December 1863), 1965 miles; Tasmania (10th February 1871), 374 miles. In Australasia in 1870 there were but 948 miles of railway, but in 1890 there were about 12,000 miles. The distribution of this total is shown above. It is unfortunate that in Australia different gauges have been adopted, so that where the systems join transhipment of goods and passengers is necessary. The Victorian lines are built on the 5 feet 3 inches gauge, which is also the national standard in South Australia, but this colony has also 700 miles on the 3 feet 6 inches gauge. In New South Wales a 4 feet 8½ inches gauge is the standard, but there is also a 5 feet 3 inches line. In Queensland, Western Australia, Tasmania, and New Zealand all the railways are on a 3 feet 6 inches gauge. The capital cost per mile of the Australasian lines has been: Victoria, £13,612; New South Wales, £12,532; Tasmania, £8436; New Zealand, £7582; Queensland, £6766; South Australia, £6444; and Western Australia, £4374 per mile. In Cape Colony the first railway was opened 26th June 1860, and when the government took over the railways in 1873 there were only 63½ miles; in 1890 there were 1890 miles.

In China the first short railway at Woosung was torn up after a few months' working, but the line to the Kaeping collieries was not disturbed. Some 100 miles of the Tien-tsin line has since been constructed, and plans are under discussion for the construction of a trunk route. See the articles on the several countries.

Railway Mileage.—The dates of the opening of the first railways, and the mileage in 1891, of the principal countries are as under:

Austria-Hungary	20th September 1828	16,467
Belgium	5th May 1835	3215
Denmark	18th September 1844	1228
France	1st October 1828	22,586
Germany	7th December 1835	25,969
Great Britain and Ireland	27th September 1825	20,073
Greece	18th February 1869	239
Italy	3d October 1839	8117
Netherlands	18th September 1839	1887
Norway	14th July 1858	970
Portugal	9th July 1854	1280
Russia	4th April 1838	19,027
Spain	30th October 1848	6127
Sweden	9th February 1851	1628
Switzerland	15th June 1844	1929
Turkey	4th October 1860	1096
Egypt	26th January 1856	1494
India	18th April 1853	16,996
United States	17th April 1827	167,000
Canada	19th March 1847	14,000
Mexico	8th October 1850	5827
Argentine Republic	14th December 1864	5798
Brazil	30th April 1854	5779
Chili	January 1852	1926
Colombia	January 1880	280
Paraguay	1st October 1868	149
Peru	29th May 1851	994
Uruguay	1st January 1869	587
Venezuela	9th February 1866	441

See Francis, *History of the English Railway* (1851); W. Galt, *Railway Reform* (1865); Smiles, *Lives of George and Robert Stephenson* (1868); Colburn, *Locomotive Engineering* (1871); Arthur Helps, *Life of T. Brassey* (1872); Francis Trevithick, *Life of Trevithick* (1872); Adams, *Railroad and Railway Questions* (1878); Redman, *Law of Railway Companies as Carriers* (1880); Burdett's *Official Intelligence* (1891); Barry and Bramwell, *Railways and Locomotives* (1881); Bigg, *Railway Acts*, 1830–66 (1867), and Supplement to, 1875–83 (1883); Minot, *Railway Travel in Europe and America* (1882); Clifford, *Private Bill Legislation* (2 vols. 1885–87); Ivatt's *Railway Management of Stations* (1885); Waring, *State Purchase of Railways* (1887); Professor Marshall on State Ownership, in *Trans. Brit. Assoc.* (1890); Jeans, *Railway Problems of Working in Different Countries* (1887); M'Dermott, *Life of Firbank* (1887), and *The Railway Clearing-house* (1887); Williams, *Our Iron Roads* (1888), and *The Midland Railway* (1883; new ed. 1888); H. Grierson, *Railway Rates, English and Foreign* (1886); Findlay, *Working and Management of an English Railway* (1889); Acworth, *Railways of England* (1889), and *Railways of Scotland* (1890); Hodges, *Law of Railways*, by Lely (7th ed. 1889); Hyde, *The Royal Mail* (3d ed. 1889); Foxwell and Farrer, *Express Trains, English and Foreign* (1889); Fisher, *Railway Accounts and Finance* (1891); *Railways of America* (1890); Bradshaw's *Railway Manual; Board of Trade Railway Returns* (of capital, revenue, accidents, brakes, signals); Poor's *Manual of the Railroads of the United States* (annual); *Reports of Interstate Commission of the United States*; and for foreign works on railways, see the *Catalogue* of M. Dunod, Paris.

Raimondi. See MARCANTONIO.

Rain. Whatever lowers the temperature of the air below the point of saturation, or the dew-point, may be regarded as a cause of rain. Various causes may conspire to bring about this change of temperature, but by far the most important of these originate in winds and other movements of the atmosphere. The more prominent principles of the connection of the winds to the rainfall are these: (1) When the winds have traversed a considerable extent of ocean before reaching land the rainfall is large; (2) when the winds, on arriving at the land, advance into higher latitudes or into colder regions the rainfall is largely increased, for the simple reason that the air is now more rapidly brought below the point of saturation; (3) if the winds, even though they arrive directly from the ocean, have not traversed a considerable breadth of it, the rainfall is not large—indeed, in the case of the sea-board of Lower California the mean annual amount, as at San Diego, is only 10 inches; (4) if the winds, even though they have crossed a great extent of ocean, yet on arriving at the land at once advance into lower latitudes or into warmer regions, the rainfall is small; (5) if a range of mountains lie across the onward course of the winds, the rainfall is largely increased on the side facing the winds, but reduced over the region on the other side of the range; the reason being that, as the air on the windward side of the ridge is suddenly raised to a greater height in crossing the ridge, the temperature is still more reduced by mere expansion, and a more copious precipitation is the consequence. On the lee side, as the air descends to lower levels, it gradually gets drier, and hence the rainfall of necessity diminishes with every stage of the descent to lower levels.

Attention may be here drawn to the diminished velocity of the wind over land as compared with the open sea, as has been fully shown by the observations of the *Challenger* expedition. From these it has been proved that an envelope of stiller air, or air of less velocity as compared with that of the ocean, broods over the land, and by its presence forces the wind blowing across the land to a greater height, thus augmenting the rainfall. This dragging effect of the land on the wind, and the important consequences resulting from it, explain how it is that during north-easterly storms of rain the foreshores of the Firth of Forth, Moray Firth, and Pentland Firth, which look to the north-east, receive a much heavier rainfall than other parts of Scotland in these circumstances. On the Ayrshire coast the annual rainfall at Ayr is 38 inches, but at Girvan it rises to 51 inches. Both stations are close to the coast, the only difference being that the hills to the eastward approach much nearer the coast at Girvan.

For short periods the heaviest rainfalls occur with thunderstorms, and with tornadoes, water-spouts, and other forms of the whirlwind, for the reason that not only is their rapid expansion due to the rapid ascent of the air, but also to great rarefaction produced by the extreme velocity of the gyrations of the air round the axis of the whirlwind. One of the heaviest rainfalls yet recorded in the British Islands was 2·24 inches in 40 minutes at Lednathie, Forfarshire, during a severe thunderstorm on 18th June 1887. At Camberwell, London, 3·12 inches fell in 2 hours 17 minutes on 1st August 1846. Of heavy falls during one day the following may be mentioned: Ben Nevis Observatory, 7·29 inches, 3d October 1890; Seathwaite, 6·78 inches, 8th May 1884; Tongue, 6·00 inches, 7th September 1870; Newport, Wales, 5·33 inches, 14th July 1875; and Camusinas, Argyllshire, 5·60 inches, 24th January 1868.

In the United States, where severe thunderstorms and tornadoes more frequently occur, the daily rainfalls repeatedly exceed these amounts. Thus, during the years 1885–89 the following heavy rainfalls of one day were recorded: Brownsville, Texas, 12·94 inches in September 1886; Pensacola, 10·70 inches, June 1887; Key West, 7·80 inches, September 1889; Chattanooga, 7·61 inches, March 1886; Shreveport, 7·54 inches, January 1885; and a day's rainfall of from 5 to 7 inches is repeatedly recorded in the United States. These amounts are greatly exceeded in lower latitudes. Thus, on the Khasi Hills, India, 30 inches on each of five successive days have been recorded; at Bombay, 24 inches in one night; and at Gibraltar, 33 inches in 26 hours.

As regards the ocean little is yet known from observation. This, however, is clear, that in the equatorial belt of calms between the regions swept by the two trades the rainfall of the ocean reaches the maximum; and the parts of the Atlantic and Pacific which are longest within the belt of calms as it shifts northward and southward with season have the heaviest ocean rainfall. But, though the cloud-screen is unquestionably dense and the rainfall frequent and heavy, the observations of the *Challenger* and the *Novara* show that the statements generally made as to these are very greatly exaggerated. Over the open sea in the regions of the trades the rainfall is everywhere small, owing to the circumstance that these winds are an immediate outflow from anti-cyclonic regions, their dryness being further increased since their course is directed in regions that become constantly warmer.

The trades, however, deposit a larger rainfall over islands and other land-surfaces which they traverse; the amounts being proportional to the height of the land, but more particularly to the degree in which the high land ranges lie across the paths of the winds. Thus, at Ascension, which is within the south-east trades the whole year round, the annual rainfall is 8·85 inches; and at St Helena on the coast 5·36 inches, but on the high land in the interior of the island it rises to 24 inches. In the western division of the Pacific, for some distance on each side of the equator, the rainfall is very slight, and extensive guano deposits are formed on Malden and other islands scattered over that region. In Mauritius, on the weather shore of the island, the annual rainfall is about 30 inches; but at Cluny, 16 miles inland, it is 146 inches, the latter place being in the neighbourhood of extensive forest-clad mountains.

The heaviest rainfalls of the globe are brought by the winds which have traversed the greatest extent of ocean within the tropics. These conditions are most completely fulfilled from June to September by the winds which, beginning their course from about 30° S. lat., blow home on southern Asia as the south-west monsoon, which accordingly distributes a heavier rainfall over a larger portion of the earth's surface than occurs anywhere else in any season. On these summer winds the rainfall of India chiefly depends, and the 'lie' of the mountain-systems with respect to the winds intensifies the effects. The following in inches are the annual amounts at different points in the west from Surat southward: Surat, 41; Bombay, 74; Mahabaleshwar, 263; Banca, 251; Honawar, 139; Calicut and Cochin, 115. In the west of Ceylon the rainfall is also large, being at Colombo 88, at Galle 90, at Ratnapura, inland among the hills, 150; but in the east of the island, before reaching which the monsoon is deprived of much of its moisture, it is considerably less, being at Mannar 91, at Jaffna 49, and at Trincomalee 62. The rainfall is also very large in Burma, being at Akyab 194, Sandoway 214, Diamond Island 119, Rangoon 99, Tavoy 197, Mergui 162, and Port Blair 117. In the north-east angle of the Bay of Bengal, and thence north to Bhutan, where the summer monsoon curves to a westerly course up the valley of the Ganges, the rainfall is great, rising at Cherra-punji, in the Khasi Hills district, to 472 inches—or nearly 40 feet—being the largest known rainfall anywhere on the globe. Owing to this diversion in the course of the monsoon, the valley of the Ganges enjoys a generous rainfall. On the other hand, the rainfall is small over the plains of the Punjab, being at Multan 6·79, and at Kurrachee 7·25, increasing over the higher parts of the province, at Lahore 21, Umballa 36, Simla 70, and Dharmsala 122.

The key to the distribution of the rainfall over the East Indian Archipelago and Australia is the distribution of pressure from south-eastern Asia to Australia, with the resulting prevailing winds. During the winter months pressure diminishes rapidly from Asia southwards, and northerly winds prevail. Now, as these winds have travelled a great breadth of ocean, they arrive in a highly saturated state and deposit a heavy rainfall over these islands and the north of Australia. The degree to which these rains penetrate into Australia depends entirely on the strength of the winter monsoon. On the other hand, during the summer months pressure increases from Asia southwards, and southerly winds set in from Australia to Asia, distributing in their course a very large rainfall over the islands of the Eastern Archipelago, rising at several places to 30 inches a month. The small rainfall in such islands as Timor, which are more immediately sheltered, as it were, by Australia during these southerly winds, impresses on the region well-marked dry and wet annual seasons. These marked differences among the climates of this archipelago really depend on the geographical distribution of land and sea in this part of the globe, and must therefore be regarded as permanent differences, and as having played no inconspicuous part in the unique distribution of animal and vegetable life which is so characteristic of the archipelago. Since in the summer of the southern hemisphere the winds blow from the sea inland, and in the winter from the land seaward, it follows that generally the summer is the rainiest season. In the interior, along the Murray River and its affluents, the rainfall everywhere is necessarily small. In the north of New Zealand the winter rainfall is the heaviest, but farther south, where the wet westerly winds prevail with some constancy at all seasons, the rainfall is distributed pretty equally through the year, and is of course largest on the western slopes of these islands. Thus, while in the east it is at Dunedin 34 and at Christchurch 28 inches, in the west it is at Hokitika 120, and at Beaby, inland, 106 inches.

Europe as regards its rainfall may be divided into two regions—the countries bordering on the Mediterranean, and the rest of the continent. A vast ocean on one hand, a great continent on the other, and a prevalence of westerly winds rule the distribution of the rainfall in western and northern Europe. Now, since these westerly winds have traversed a vast extent of ocean before arriving at the land, they distribute a large rainfall, particularly on hilly regions opposing their course. Thus, over a large part of the Highlands of Scotland more than 80 inches fall annually, and over fully one-third of the British Islands the annual amount exceeds 40 inches. On the other hand, in eastern districts on the lee side of the great mountain-ranges, the rainfall does not exceed 30 inches over a large portion of England, and in some of the best agricultural districts of Scotland. In the west of Norway it is 72 inches at Bergen, 46 inches at the Lofoden Isles, and 10 inches at the North Cape; over large portions of Sweden it is 21 inches, and in Russia and Siberia it varies from 20 to 2 inches. Spain presents great extremes, from 70 in the north-west to 13 inches at Saragossa. In the plains of France and Germany it varies from 20 to 35 inches, rising, however, on approaching the Alps to more than 100 inches. In western Europe the greater part of the rain falls in winter, but in the interior of the continent in summer. The summer climates of the extreme south of Europe and in the north of Africa, situated at comparatively low levels, are practically rainless, owing to the northerly winds that set in with considerable force at this time of the year towards the heated plains of the Sahara.

The summer winds in the south-east of the United States are southerly; and, as they have previously traversed a considerable extent of ocean, they arrive well but not super-saturated, and pour down a monthly rainfall of 6 inches or more from Louisiana to Chesapeake Bay. The comparative equableness of the rainfall over the eastern states is the result of no mountain-ridges lying athwart their path and of the winds passing into higher latitudes and therefore cooler regions. Again, the distribution and amount of the summer rainfall in the west and north of the United States is really determined by the low atmospheric pressure which has its centre in the region of the Rocky Mountains. To the west of this low pressure winds are generally north-westerly, and as they thus pass into hotter regions the summer rainfall in these parts of the United States and Canada is either nothing or very small; whereas on the east side winds are southerly, and the rainfall consequently equals, or even exceeds, that of the finest agricultural districts of Great Britain.

As regards the rainfall of the two extreme months, January and July, the following show in inches the amounts for various places: Vera Cruz, 5·10 and 35·90; Para, 6·51 and 3·26; Manaos, 7·33 and 1·82; Buenos Ayres, 2·37 and 1·70; Corrientes, 5·24 and 2·67; and in Africa, Alexandria, 1·95 and 0·20; Algiers, 4·43 and 0·04; Senegal, 0·28 and 3·00; Sierra Leone, 0·69 and 24·20; Capetown, 0·28 and 3·83; Durban, 5·00 and 1·70; and Zanzibar, 2·02 and 2·35. The explanation of these and similar differences is found in the seasonal changes of the wind. The South African colonies present the strongest aspects of climate, so far as the rainfall is concerned, being divided into two totally distinct classes, the climates of the Natal coast and of the inland regions where the rains occur during the summer months, and the climates of the other regions where the rains fall chiefly during the winter months. The driest region of Africa is doubtless the Sahara, and the wettest the region from the Victoria Nyanza northwards, including the gathering-grounds of the Nile.

See METEOROLOGY, RAIN-GAUGE; also BLOOD-RAIN, and, for showers of frogs and fishes, SHOWERS. For maps of annual rainfall of the globe, see Loomis in *Silliman's Amer. Jour. Sci.*, Murray in *Jour. Roy. Scot. Geo. Soc.*, and Hann in *Climatological Atlas*. For particular countries, Symons, and Buchan for the British Islands; Raulin for France and Algiers; Blanford and Elliot for India; the Dutch for East India Islands; Tod, Russell, Hector Ellery, and Wragge for Australasia; the Signal Service for the United States; Carpmael for Dominion of Canada; the Meteorological Services of the different European countries, &c.

Rainbow. The rainbow is the best known of all optical meteorological phenomena, consisting of a coloured arch formed opposite the sun on falling raindrops, and visible whenever the necessary conditions of a passing shower on one side and a clear and not too high sun on the other occur. Two bows are frequently seen, each exhibiting the full spectrum of colours from red to violet; but in the inner or primary bow the red is the outer edge and violet the inner, while in the outer or secondary bow the order is reversed, the red being inside and the violet on the exterior. The colours are always arranged in a definite order, that of the solar spectrum—viz. red, orange, yellow, green, blue, indigo, and violet, but shade imperceptibly into each other. The cause of this breaking up of the sunlight into its constituent colours is explained in most physical and meteorological text-books (see *Light*, by Professor Tait, chap. x., or *Meteorology*, by E. Loomis, par. 416), but may be briefly summarised as follows:

For the primary bow (fig. 1), let PQR represent the section of a raindrop, and SP a ray of light falling on it. The ray enters the drop at P, meets the surface again at R, is reflected to Q, where it leaves the drop in the direction QE. The ray is refracted or bent on entering the drop at P and again on emerging at Q—the amount of this refraction depending on the acuteness of the angle at which the ray meets the surface. Now it may be shown that there is a particular point P, such that any ray from S striking the surface below P emerges again above Q, and any ray above P also emerges above Q—the former owing to the more acute angle of the reflection, and the latter to the greater refraction on entering and leaving the drop. The course of two such rays is shown by the dotted lines in fig. 1. Q is thus a turning-point in the emerging rays, and near it a very large number of rays pass out, and an observer at E sees a bright image of S in the direction EQ. This statement applies to any one colour of sunlight; but, as the refrangibility increases from red to violet, the latter is bent more at P and Q, and the line EQ lies at a flatter angle. The observer, therefore, sees the violet rays reflected on drops at a less altitude than those that reflect the red, the other colours being intermediate. The raindrop being spherical, this reflection takes place in all directions, the fixed condition being the radius of the bow, that is the angle between the line from the observer to the bow and that passing from the sun to the observer, or, in other words, the observer's shadow. For red light this angle is 42° 39′, and for violet 40° 13′. If the sun were a luminous point each colour would be sharply defined, but as the disc of the sun subtends an angle of about 30′ each colour is broadened to this amount, and they overlap.

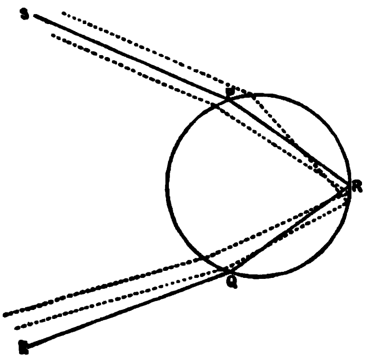


Fig. 1.

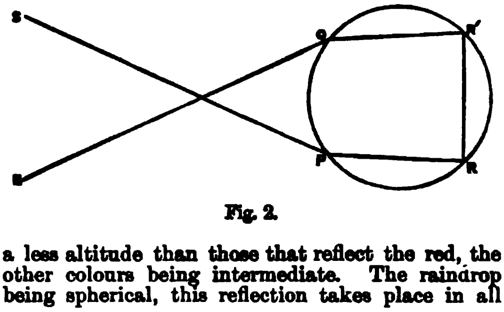


Fig. 2.

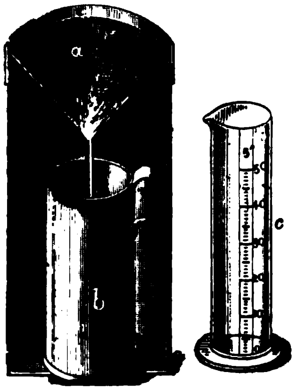
Exactly similar reasoning explains the secondary bow (fig. 2). The light that forms it has been twice reflected, at R and at R′, the point Q lies above P, and rays entering either above or below P all emerge below Q. A glance at the diagram will show that the greater bending of the more refrangible rays makes the line EQ more nearly vertical, and therefore the violet rays form the outer edge and the red the inner of the secondary bow. The radius of the red is 50° 5′, and of the violet 54° 0′. The space between the bows gets no reflected light, but that inside the primary and outside the secondary is faintly illuminated by rays such as are indicated by the dotted lines in fig. 1 and their equivalents in fig. 2, which are not shown. These rays 'interfere' (see INTERFERENCE) with each other, and cause alternations of colour which appear as spurious bows inside the primary and outside the secondary. They can only be seen with strong sunlight and small drops of rain.

The radius of the primary bow being roughly 40°, it is evident that it cannot be seen when the sun is at a greater elevation than this, as the highest part of the bow would lie below the horizon. Hence in the latitude of Edinburgh rainbows cannot be seen for several hours about noon at the time of the summer solstice. If the drops of water be very small the interference of the rays causes such a complete overlapping of the colours that the bow appears white: this is the case generally with a fog-bow.

Intersecting rainbows have frequently been seen. When the sun is reflected from a surface of still water a bow is formed by the reflected image as well as by the sun itself. Lunar rainbows often occur, but the feebleness of the moon's light usually prevents any colours being observed. There are many popular weather prognostications connected with rainbows, all dependent on the fact that they imply local passing showers. 'A rainbow in the morning is the shepherd's warning: a rainbow at night is the shepherd's delight,' is easily understood when we remember that the rainbow is formed opposite the sun, and that weather-changes in the British Islands generally pass from west to east.

Rainey's Corpuscles. See GREGARINIDA.

Rain-gauge. Rain-gauges measure the quantity of rain which falls, and are of various constructions. One of the best is that known as Symons' rain-gauge, consisting of a funnel-shaped receiving vessel, and a glass measure of much smaller diameter so as to allow as nice graduation as may be desired. In the fig. *a* is the funnel-shaped receiving vessel (shown in section in the fig.), 5 inches in diameter, with an upright, sharp-edged and strong rim, in order that it may retain its circularity; *b*, the vessel which receives the rain collected; and *c*, the graduated glass measure which measures the amount in tenths and hundredths of an inch. If desired it may be graduated to still greater nicety. Another excellent gauge is one which is a modification of Glaisher's gauge, brought into use by the Meteorological Office. The diameter of this gauge is 8 inches, and there is added to it a vertical cylinder on the top of the receiving funnel, to retain the snow as it falls and prevent its being blown out of the gauge, as is likely to happen when the funnel is shallow. Beckley's is perhaps the best continuously recording rain-gauge, and is now very generally superseding Osler's so long in use.



Symons' Rain-gauge.

Since different amounts are collected at different heights above the ground, it is indispensable, if uniformity and comparability is to be attained, that the rims of rain-gauge be placed at one uniform height above the ground. The height now generally adopted is 12 inches. The points it is necessary to secure at the height adopted are (1) the prevention of in-splashing as the rain-drops strike the ground and are broken into minute droplets, a large number of which in their second descent fall into the gauge; (2) the prevention of out-splashing, which occurs when the funnel is very shallow; and (3) the protection of the gauge as much as possible from strong winds, which so seriously interfere with the amount collected, by placing it as near the ground as can be done consistent with the prevention of in-splashing. These conditions are best fulfilled by using the gauges named, and placing their rims 12 inches above the ground. It has been proved from carefully conducted experiments that rain-gauges with diameters varying from 3 inches upwards collect amounts, when in positions exactly similar, within about 3 per cent. of each other. Accordingly, gauges with diameters exceeding 8 inches insure no greater accuracy than smaller ones, being only really required in the case of continuously recording gauges to hold the self-registering apparatus. On the other hand, gauges of from 3 to 5 inches diameter, such as Fleming's and Jagga's, give good trustworthy results.

Special care should be taken that the gauge and its glass measure be kept clean; that it be firmly fixed and the rim kept in a horizontal position; and that it be made of a material which will stand exposure to the weather well. It should be placed in a situation as open as can be secured for it, particularly towards the directions from which the rain chiefly comes; and in each case it should be as distant from any neighbouring house, tree, or other object at least as far as the height of the object itself.

Rainier, MOUNT, or TACOMA, one of the highest peaks of the Cascade Range (q.v.).

Rainy Lake, forming a portion of the boundary line between Ontario and the United States, lies west, and 100 miles distant from the nearest point, of Lake Superior, and is about 50 miles long. It discharges by Rainy River into Lake of the Woods.

Raipur, a town in the Central Provinces of India, stands on a plateau (950 feet), 180 miles E. of Nagpur, has numerous tanks and groves of trees, a strong fort (1640), and a trade in grain, lac, cotton, &c. Pop. 23,759.—The *district* has an area of 11,885 sq. m. and a pop. (1881) of 1,405,171; (1891) 1,584,427.

Raised Beaches. See BEACHES (RAISED), UPHEAVAL AND SUBSIDENCE.

Raisins are dried grapes, used for cooking, for dessert, and in the manufacture of wines. They are produced in largest quantities in the south-eastern provinces of Spain—Malaga, Alicante, and Valencia—and in Asia Minor—the islands of Cos and Samos—and the adjacent districts on the mainland; smaller quantities are grown in Provence, Southern Italy, the islands of the Greek Archipelago, and Crete. Currants (q.v.) are a small and peculiar variety produced in Greece, in the Morea, and the Ionian Islands. The grapes intended for raisins are dried either on the vines, after the stalks of the bunches have been partly cut through, or spread out on the ground; it is only in case of continued bad weather or persistent want of sunshine that they are dried by artificial heat. The better qualities are left on the stalks and dried in bunches; these are exported for use as dessert. All less estimable qualities are intended for cooking purposes, and, to a less extent, for the preparation of artificial wines or the improvement of wines of inferior quality. Raisins are rich in sugar, and it is this property that makes them serviceable to the manufacturers of wine. The bunches intended for table use are sometimes dipped in water upon the surface of which swims a layer of olive-oil, or in a strong potash lye. The object is to make the skin soft and give it a glossy lustre. The raisins grown in Spain are large and blue, and are known in the market as 'Malaga raisins' and as 'lexias,' the former for dessert, the latter for cooking. The raisins of Asia Minor are shipped principally at Smyrna (q.v.), and embrace the Elemé and similar varieties, which are long and light brown in colour, and sultanas, small light-brown grapes, with a thin and delicate skin and no seeds or kernels. Britain imports in all annually from 493,600 cwt. (1886) to 653,100 cwt. (1887), valued at £813,000 (1886) to £1,022,400. From Spain Britain imports every year raisins to the average value (ten years ending 1889) of £808,370, and from Asia Minor to the value of £399,300 (1889). Of late years raisins have been successfully dried in California; but in 1890 the United States still imported raisins to the amount of 36,914,330 lbs., of the value of $1,997,103.

Rájah, or more correctly RÁJÁ (from the Sanskrit *rájan*, 'king,' cognate with the Lat. *reg-* of *rex*), originally a title which belonged to princes of Hindu race who, either as independent sovereigns or as feudatories, governed a territory. Now, however, the title has a much wider extension: it is used of independent sovereigns, of subject or 'protected' princes, of petty chiefs, of great landowners, and of some persons of eminence who are neither rulers nor landowners.

Rajamahendri (formerly often spelt *Rajahmundry*), a town of India, in the presidency of Madras, stands on the left bank of the Godavari, 30 miles from its mouth. It has a museum, a provincial school, two gaols, and some Christian churches. From 1753 to 1758 it was held by the French. Pop. 24,555.

Rajmahal, a decayed town of India, stands on a steep eminence on the right bank of the Ganges, 170 miles NNW. of Calcutta. It was long the chief town of the Bengal and Bahar provinces, but is now deserted and ruinous, being only noteworthy for the remains of its palaces, formerly belonging to Shah Shuja and Kasim Ali, and as a station in an important transit trade. Its commercial value has been lessened in consequence of the Ganges often shifting its bed at this point. In the beginning of the 19th century it had 25,000 inhabitants, and now only about 4000.

Rajon, Paul Adolphe, an etcher, was born at Dijon in 1842, and trained in Paris, partly at the School of Fine Arts. About 1865 he turned to etching, and gained immediate success with his first plate, ‘Rembrandt at Work,’ after Meissonier. Standing in the front rank of French etchers, he won several medals at the Salon exhibitions, and produced numerous beautiful etched portraits and plates for books. In 1872 he visited England, and published in London in 1873 a portrait of J. S. Mill after Watts, as well as in subsequent years many other plates. His greatest achievements were ‘The Emperor Claudius,’ a picture by Alma Tadema, the portrait of Darwin by Ouless, and those of Tennyson, Joachim, and Mrs Anderson Rose by Watts. He died at Auvers-sur-Oise on 8th June 1888. See *Twelve Etchings by P. A. Rajon*, with Memoir by F. G. Stephens (1889).

Rajputana, an administrative territory of India, embracing twenty native states and the British district (2711 sq. m.; pop. 460,722) of Ajmere-Merwara. It lies between Sind (on the W.), the Punjab (on the N.), the North-western Provinces (on the E.), and several native states of Central India (on the S.). Its total area is 132,461 sq. m., and its total pop. (1881) 10,268,392; (1891) 12,089,330. The most important of the native states are Jaipur, Jodhpur (or Marwar), and Udaipur (or Mewar); next follow Ulwar (Alwar), Bhartpur, Kotah, and Bikaner. This region is crossed by the Aravalli Mountains, and consists in great part of sandy, barren plains, though there are of course numerous fertile valleys and other tracts. It gets its name from the ruling race or predominant Aryan tribes, called Rajputs. They are a proud aristocracy, own the soil, and have furnished ruling dynasties to very many of the native states of India. Yet in 1881 they numbered only 479,554. At the time of the Mohammedan invasions in the 11th century the Rajputs ruled over half-a-dozen strong states—Kanauj, Ajmere, Anhilwara, Udaipur, and Jaipur. From the end of the 16th to the middle of the 18th century these states acknowledged the supremacy of the Mogul emperor of Delhi. Then they were made to recognise the Mahrattas as their masters: since the Mahrattas were crushed by the British the Rajput states have been independent, though in alliance with the government of British India.

Rakoczy March, a simple but grand military air by an unknown composer, dating from the end of the 17th century (see National Hymns), said to have been the favourite march of Francis Rakoczy II. of Transylvania. The Hungarians adopted it as their national march, and in 1848 and 1849 it is alleged to have had the same inspiriting effect on the revolutionary troops of Hungary as the *Marseillaise* had on the French. The air most generally known in Germany and elsewhere out of Hungary as the Rakoczy march is one by Berlioz in his *Damnation de Faust;* Liszt also wrote an orchestral version of the original.

Rakshas. See Demonology.

Raleigh, the capital of North Carolina, is near the Neuse River, 186 miles (by rail 271) SSW. of Richmond. The town is regularly built on an elevated site, with a central Union Square, from which four principal streets radiate, each 99 feet wide. In the square stands the capitol, a large domed building of granite, which cost over $500,000. The city contains also state institutions for the blind, deaf and dumb, and insane, a gaol, and has iron-foundries, machine and car shops, and manufactories of clothing, carriages, and farming implements. Pop. (1880) 9265; (1890) 12,678.

Raleigh, Sir Walter, the typical gallant and hero of England's heroic age, was born of an ancient but decayed family at the manor-house of Hayes, near Budleigh in East Devonshire, in 1552. He was the second son of his father's third wife, who herself had been married before, and had borne her husband the famous Humphrey and Adrian Gilbert. He entered Oriel College, Oxford, in 1566, but left without a degree, most probably in 1569, to volunteer into the Huguenot cause in France. Here he served his apprenticeship to arms, but, beyond the fact that he was present at Montcontour, we know little of this period of his life. In 1578 he joined Humphrey Gilbert's luckless expedition, having most probably already crossed the Atlantic; and early in 1580 he landed in Cork at the head of a troop of one hundred foot to act against the Irish rebels. He quickly attracted notice by his dash and daring, took part in the assault of the fort at Smerwick and subsequent massacre of the six hundred Italian and Spanish prisoners, and seems to have approved thoroughly of all the drastic measures taken by the government to stamp out rebellion. He saw some months of further hard and thankless service in Munster, but in December 1581 returned to England.

He now made his entry to the circle of the court as a protégé of the favourite Leicester, and in February 1582 accompanied him in his convoy of the Duc d'Alençon to the Netherlands. Almost immediately after his return he became prime favourite of the queen, whose heart was still susceptible despite the weight of almost fifty years. Fuller's well-known story of how he first caught her eye by flinging down on the ground his fine plush cloak to save her feet from the mire is most likely completely apocryphal, but well befits the romantic temper of the times and the manner of fantastic devotion with which the Virgin Queen loved to be wooed or worshipped by the fine gentlemen of her court. Raleigh was now in the prime of manly beauty; his tall and handsome figure, dark hair, high colour, lofty forehead, resolute and manly bearing, alert expression, and spirited wit combined to form an imposing personality, and all the advantage that nature had given him he heightened by a gorgeous splendour in dress and in jewels. But he was proud, haughty, and impatient, and everywhere, save in his native Devonshire, the broad accent of which he preserved all his life, he made himself a multitude of jealous and envious enemies. He was consulted confidentially on Irish affairs, but never to the last took a public place in the queen's counsels, perhaps because his royal mistress, with all her fondness, distrusted his ambition, and divined that he lacked that sagacity of the statesman which she recognised in the less splendid Burghley and Walsingham. The playful name of ‘Water’ by which she called him seems itself to imply a recognition of that instability of character which was his constant foible and, in the fullness of time, the occasion of his ruin. But meantime she heaped her favours lavishly upon him: in April 1583 he received two estates; next month the ‘farm of wines,’ a license duty of twenty shillings a year from every vintner in the kingdom, which at one time yielded £2000 a year; and in March 1584 a grant of license to export woollen broadcloths, which Burghley estimated had yielded him in the first year as much as £3950. About the close of 1584 he was knighted; in July 1585 he was appointed Lord Warden of the Stannaries, in September Lieutenant of Cornwall, in November Vice-admiral of Devonshire and Cornwall; and in the same year he was elected to parliament as one of the two county members for Devonshire. In 1587 he succeeded Sir Christopher Hatton as Captain of the Queen's Guard. During the summer of 1584 he leased of the queen the stately mansion of Durham House, spent much money on its repair, and kept it as his town-house from that time down to 1603. It was not till about the beginning of 1592 that he came into possession, on a ninety-nine years' lease, of the splendid park and castle of Sherborne alienated from the see of Salisbury.

In 1583 Raleigh risked £2000 in Sir Humphrey Gilbert's last ill-fated expedition, and on the news of his half-brother's loss took up a fresh charter of discovery and colonisation. In April 1584 he sent out a fleet under Amadas and Barlowe to explore the coast north of Florida. They made a prosperous voyage, and formally took possession of a district to which Elizabeth was pleased to give the name Virginia. Next year Raleigh fitted out a stronger expedition under Ralph Lane and Sir Richard Grenville, but the hundred men who lived a year under Lane's command on the island of Roanoke returned to England in Drake's fleet completely dispirited with their hardships. Soon after they set sail, Sir Richard Grenville arrived with three ships, and left on the island fifteen men well furnished with stores. One of the hundred colonists—the first citizens of America—Thomas Hariot, in his account of the colony and the causes of its failure, speaks of the herb, 'called by the inhabitants *Yppowoc*,' which was destined to become one of the closest comforts of life to half the world. Raleigh himself took to the new luxury, and would enjoy it in pipes of silver, the queen sitting by him while he smoked. In May 1587 he sent out three ships, under Captain Charles White, with 150 colonists, seventeen of whom were women. They found the fifteen men had perished, and ere long misfortune after misfortune overtook themselves. White returned to England for supplies, and at length, after many delays and difficulties, reached Virginia in August 1590 to find the settlement ruined and the colonists dispersed, never afterwards to be seen. It was the last direct attempt of Raleigh himself at the colonisation of Virginia. The undertaking, says Hakluyt, 'required a prince's purse to have it thoroughly followed out'—it is supposed that Raleigh himself had spent forty thousand pounds upon it.

Already in May 1587 the appearance of the handsome young Earl of Essex at court had endangered Raleigh's paramount place in the favour of the queen. Hatton and Leicester long ere now had shown their jealousy of him, but this impetuous and petulant boy openly flouted him, and at length drove him from the court to Ireland. He had already received in the spring of 1587 a grant of 42,000 acres in Munster, and with characteristic vigour he at once set about repeopling this tract with English settlers. He was in Ireland when the Invincible Armada appeared in English waters, but he hastened to the south of England to superintend the coast defence, and he was present with the fleet a trusted counsellor throughout that glorious week of toil and triumph. His vessels scoured the seas in privateering enterprises, which gratified at once his inborn hate of Spain and helped to provide the means for his vast expense and his Virginian ventures. His over-zealous seamen sometimes transgressed the forbidden limit of piracy, but the Treasury winked at such accidents or made itself a receiver by claiming a share of the plunder. Raleigh sailed with Drake on his Portugal expedition of 1589, but by the autumn of that year was again in Ireland, where he quickly became a warm friend of Spenser, with the endless fame of whose great poem his name is imperishably linked. The poet had settled on his estate at Kilcolman three years before, and here the 'Shepherd of the Ocean' [Raleigh] visited him, and read him his poem of *The Ocean's Love to Cynthia* [Elizabeth], which Mr Gosse thinks must have contained at least 10,000 lines, the extant 130 stanzas being a fragment. In *Colin Clout's Come Home Again* we read how Raleigh carried the poet into the presence of the queen, who took delight to hear his poem, and commanded it to be published. In his Youghal garden during this breathing-space Raleigh planted tobacco, as well as the first potatoes that grew on Irish soil. He quickly recovered all his influence at court, and busied himself with further schemes for reprisals on the Spaniards down to the moment of his fall. His famous tract, *A Report of the Truth of the Fight about the Iles of the Açores this last Sommer*, appeared anonymously in 1591. It is a splendid piece of heart-stirring prose, and three hundred years later it gave the inspiration to Tennyson's noblest ballad. Early in 1592 Raleigh prepared a new expedition to seize the Spanish treasure-ships, but again his doting mistress forbade him to sail with the fleet, which he had reluctantly to entrust to Frobisher and Sir John Borough. Hardly had he returned before she seems to have discovered his intrigue with Bessy Throckmorton, one of her own maids-of-honour—an infidelity to her own supremacy which her jealous temper could not brook. In July 1592 Raleigh was committed to the Tower, and it was more than four years before he was again admitted to his mistress' presence. He bore his imprisonment with characteristic impatience, and vexed the air with exaggerated complaints of his loss expressed in the fantastic fashion of the time. Meantime Borough had captured the *Madre de Dios*, a huge carrack, which he brought into Dartmouth in September. So great was the excitement and such the rapacity of the vultures that gathered to the spoil that none but Raleigh could control the tumult. He was sent down to Dartmouth with a keeper, and Sir Robert Cecil describes with astonishment his popularity and influence among his sailors and his countrymen. 'But his heart is broken,' he writes his father, 'for he is extremely pensive longer than he is busied, in which he can toil terribly.' Raleigh now married Bessy Throckmorton, and for the next two years lived with her in quiet happiness, building and gardening at Sherborne. About 1593 his imagination seems first to have been fired by the descriptions of Guiana, with its vast city of Manoa and its El Dorado, and in 1594 he sent out Captain Whiddon to Trinidad to make inquiries for him. In February 1595 he himself sailed with five ships, explored the coasts of Trinidad, sailed up the Orinoco, and had his imagination set aglow for life by the tropical splendours of vegetation that he saw, and still more by the auriferous quartz and glittering stones he found, and marvellous stories of stores of gold beyond brought to him by the native Indians. Six months after his return he sent Captain Lawrence Keymis to make further explorations, and later Captain Berry, but he himself failed to rouse any great public interest in England in his splendid dream of a new world and untold wealth from the mines of Guiana. Early in 1596 he published *The Discovery of the large, rich, and beautiful Empire of Guiana* (Hakluyt Society, edited by Sir R. Schomburgk, 1848), a splendid piece of vigorous prose. In June 1596 he sailed in the expedition under Howard and Essex to Cadiz, and it was his advice that governed the whole plan of action in that splendid triumph which a second time shattered the naval strength of Spain. His faults ever fell from him in the hour of action, but never before or again in life did he show such tact and temper as in the skilful persuasions by which he forced the Lord Admiral and Essex to agree to his plans. Yet he was mortified to the heart, as he lay in his ship suffering from a wound in the leg, when their lack of energy allowed the Spaniards, two days later, to burn the whole fleet of treasure-laden carracks before his eyes. His spirited *Relation of Cadiz Action* remains the best history of the exploit. Despite his heroic conduct, it was almost the midsummer of 1597 before Raleigh was again admitted to court and allowed to take up his place as Captain of the Guard. Cecil showed himself friendly to him, and Essex was glad of his support in his desire for a more active opposition to Spain. Raleigh at once set himself to prepare and victual ships for the projected expedition, which at length, in July 1597, was permitted by the queen to set sail from Plymouth. A desperate storm compelled many of the ships to put back for shelter, but at length Raleigh met Essex off the island of Flores. They agreed to attack together the Isle of Fayal, and Essex sailed off first, but Raleigh reached the harbour before him, and, after waiting three days, on the fourth landed his men and carried the town by storm. Next morning the squadron of Essex made the harbour, to find all the laurels of the 'Island Voyage' already reaped. Essex's mortification was great, and was made greater by his cold reception at home. His surly temper grew upon him, and soon his helpless failure in dealing with Tyrone's rebellion in Ireland and his insane attempt at an insurrection in the streets of London brought him to the block. His hatred of Raleigh had become so desperate that he charged him, together with Cecil and Cobham, with a plot to murder him in his house—an absurd accusation, which Sir Christopher Blount on the scaffold confessed was 'a word cast out to colour other matters.' In 1600 Raleigh succeeded Sir Anthony Paulet as governor of Jersey, and in his three years' rule did much to foster its trade and relieve its fiscal burdens. About this time also he was active in parliament, advocating freedom of tillage, and of church-going, and the repeal of the more vexatious monopolies. His Irish estates he sold in 1602 to Richard Boyle.

In the dark intrigues about the succession that filled the closing years of Elizabeth's reign Raleigh took little part, while the crafty Cecil and the faithless Lord Henry Howard got the ear of James, and for their own advantage poisoned his mind against Raleigh and Cobham. The king had long been an admirer of Essex, and no doubt knew from the beginning that Raleigh was indifferent to his cause. The cowardice, timid love of peace, and the whole personal habits of the royal pedant, as well as his overweening conceit of his own judgment in affairs of state, were all naturally repugnant to the bold, self-reliant hero who had so long been a trusted confidant of the great-hearted queen. He met James on his southward progress at Burghley in Lincolnshire, and was greeted with a wretched pun worthy of its source—'On my soul, man, I have heard but *rawly* of thee.' Ere long he was stripped of, or forced into resigning, all his offices, the captaincy of the Guard, the wardenship of the Stannaries, the wine-license monopoly, the governorship of Jersey. All this must have cut Raleigh to the heart, and as he was at no time guarded in his tongue it is possible enough he may have in his haste spoken, or at least listened to, words expressing a preference for Arabella Stuart to the rule of the Scottish king. But the only witness against him was the miserable Lord Cobham, and he made and unmade his eight several charges with such facility as to make them of no value at all. Neither in the 'Main' nor the 'Bye' Plot was there any really adequate evidence of Raleigh's complicity, and the refusal of the crown to allow him to be confronted with his accuser is of itself almost enough to justify belief in his innocence. 'But one thing,' says Kingsley, 'comes brightly out of the infinite confusion and mystery of this dark Cobham plot, and that is Raleigh's innocence.' Raleigh was arrested on the 17th July, and in his first despair tried to kill himself. The trial began at Winchester on November 17th, the prosecution conducted by the attorney-general, Sir Edward Coke, who disgraced his robe by a brutality almost beyond belief. Raleigh's defence was splendid, and for the first time in his life he made his way into the hearts of all Englishmen by the dauntlessness of his bearing and the burning eloquence of his words. Coke could call him 'a monster,' 'a viper,' 'the rankest traitor in all England,' 'damnable atheist,' and 'a spider of hell,' and Chief-justice Popham could jeer at him as an atheist as well as traitor; but it was too much for Englishmen to believe that the hero of Cadiz and of Fayal had 'a Spanish heart,' and all his unpopularity fell from him from that hour. Dudley Carleton, who heard the trial, wrote that when it began he would have gone a hundred miles to see Raleigh hanged, but ere it was closed he would have gone a thousand to save his life. Yet he was condemned to death, and only on the scaffold was his sentence commuted to perpetual imprisonment. Sherborne he had conveyed to trustees for his wife and eldest son, but an invalidity in the deed of conveyance was soon found, and the unhappy wife's application to the king was met with the words, 'I maun hae the lond, I maun hae it for Carr.' In January 1609 it was given to the favourite, a payment of £8000 being made as compensation. Within the Tower Raleigh employed himself with study and with chemical experiments, and was treated on the whole with fair indulgence. The young prince Henry came often to him, for he greatly admired the noble captive: 'No man but my father would keep such a bird in a cage,' said he. But he died in November 1612, and the promise he had wrung from his father to release Raleigh the next Christmas was only remembered to be forgotten. The chief fruit of Raleigh's imprisonment was his *History of the World*, the first and only volume of which, extending to over 1300 folio pages, although coming down but to the second Roman war with Macedon (170 B.C.), was published in 1614. It is written throughout in admirable English; but the preface is the most interesting portion, for the subject itself is dreary, though lightened by glimpses of autobiography and occasional flashes of fire—scorching satire wrapped in ambiguous phrase. Its sale was suppressed in January 1615 as 'too saucy in censuring the acts of kings.' Oliver Cromwell, writing to his son Richard, in 1650, says, 'Recreate yourself with Sir Walter Raleigh's *History*; it is a body of history, and will add much more to your understanding than fragments of story.' The book was written for the young prince, and his death took from the author all heart to complete his work. Other writings of Raleigh's captivity were *The Prerogative of Parliament* (written 1615, published in 1628), which must have goaded the king still further; *The Cabinet Council*, published by John Milton in 1658; *A Discourse of War*, one of his most perfect pieces of writing; and *Observations on Trade and Commerce*, an appeal for free trade, suppressed like the rest.

On January 30, 1616, Raleigh was released from the Tower through the influence of Sir Ralph Winwood and Villiers, expressly to make preparations for an expedition to the Orinoco in search of a gold-mine which he maintained existed there. He engaged not to molest the dominions of the king of Spain, but he had been brought up on the old Elizabethan theory of no peace beyond the line, and doubtless he thought he had everything to gain and nothing to lose by a desperate venture, and that the gold he would bring home would gild over any formal breach of his promise. It seems difficult to understand how James can have expected that such an expedition could be made without a collision with Spain, and we find that he was careful to give himself the cowardly safeguard of allowing Raleigh to go with his old sentence still hanging over his head, as well as communicating his route to Gondomar, the Spanish ambassador. And so in April 1617 the hero sailed to the doom which fate was weaving for him, while James even then was drawing into ever closer relations with Spain, and beginning his negotiations for the Spanish marriage. Before sailing Raleigh asked leave, but in vain, to make an attack on Genoa, an ally of Spain. His small fleet was manned, some forty gentlemen excepted, by 'the very scum of the world, drunkards, blasphemers.' Storms, desertion, disease, and death followed them from the first, and ere they reached the mouth of the river Raleigh was himself stricken down by sickness and compelled to stay behind with the ships, and entrust the command of the party who went to seek the mine to Keymis. He did not give his men distinct orders to avoid fighting with the Spaniards, and when they found in their way a new Spanish town, San Thomé, they attacked it and burned it down, but never reached the mine. In the fight young Walter Raleigh was struck down, as he shouted the words, 'Come on, my men! This is the only mine you will ever find.' Keymis lost control of his men, and came sadly back to his admiral, whose bitter reproaches made him drive a knife into his heart. The men now refused to return with Raleigh to the mine, whereupon he asked them if they would follow him in an attack on the Mexican fleet, telling them in his desperation that he had in his possession a commission from France. At length, on the 21st of June 1618, he arrived at Plymouth with his ship, the *Destiny*, alone and utterly cast down. His kinsman Sir Lewis [Judas] Stukely was sent to bring him up to London; at Salisbury on the way he feigned illness to gain four days' time to write his touching *Apology for the Voyage to Guiana.* Surrounded by a ring of spies, chiefest among whom was Stukely, he again intrigued for an escape to France, but was betrayed at every step. James dared not allow him to appear before the council of state, but had him formally examined before a commission of six, among them Coke, Archbishop Abbot, and Bacon, besides resorting to the infamy of sending a spy to gain his confidence and discover his secrets. In his perplexity Raleigh damaged his cause by contradictory statements and confessions, and his judges seem to have convinced themselves that he had never had any intention to find the mine at all, as appears from the *Declaration of the Demeanour and Carriage of Sir Walter Raleigh*, a feeble statement, though drawn up by the master-hand of Bacon. He was condemned to die the next morning (29th October 1618) on the old sentence, and neither the entreaties of the queen nor his own moving eloquence could save his life. 'You will come to-morrow morning,' he said to an old friend he met on his way back to prison; 'I do not know what you will do for a place. For my own part, I am sure of one.' One of his kinsmen warning him that his enemies would take exception at his high spirits, 'It is my last mirth in this world,' said he; 'do not grudge it to me. When I come to the sad parting, you shall see me grave enough.' His high courage never left him to the last. He wrote some verses the night before, and, says Dean Tounson, 'he ate his breakfast heartily, and took tobacco, and made no more of his death than if it had been to take a journey.' Of the cup of sack brought him he said, 'It is good drink, if a man might stay by it.' The speech he made on the scaffold was masterly in its persuasive eloquence—'as he stood there in the cold morning air,' says Mr Gosse, 'he foiled James and Philip at one thrust, and conquered the esteem of all posterity.' He asked to see the axe, and touched the edge with the words, 'This gives me no fear. It is a sharp and fair medicine to cure me of all my diseases.' To some one who objected that he ought to lay his head toward the east he answered, 'What matter how the head lie so the heart be right,' than which, as Mr Gardiner well says, no better epitaph could be found for Raleigh's tomb.

The best edition of Raleigh's works is that in 8 vols. published at Oxford in 1829, with the 18th-century Lives by Oldys and Birch prefixed. Sir Egerton Brydges edited the Poems in 1814. See Dr T. N. Brushfield's Bibliography (Plymouth, 1886). There are Lives by Cayley (1805), Tytler (1833), Mrs Thomson (1830), Edward Edwards (the fullest, vol. i., life; vol. ii., letters, 1868), J. A. St John (1868), Louise Creighton (1877), Edmund Gosse (1886), and William Stebbing (1892). Gibbon thought of treating the subject, but abandoned it. Kingsley's glowing essay in *Miscellanies* (vol. i. 1859) is excellent; so also, but in a different way, is the treatment in S. R. Gardiner's History (vols. i.–iii.).

Ralik. See Marshall Islands.

Rallidæ. See Rail.

Ralston, William Ralston Shedden, Russian scholar and folklorist, was born in 1828 of Scotch ancestry—his surname originally Shedden. He studied at Trinity College, Cambridge (1846–50); was called to the bar at the Inner Temple in 1862, but never practised; and from 1853 to 1875 held a post in the library of the British Museum. He four times visited Russia; in 1886 was elected a corresponding member of the St Petersburg Imperial Society of Sciences; and besides many review and magazine articles, and a translation of his friend Turguenieff's *Liza* (1869), published *Kriloff and his Fables* (1869), *Songs of the Russian People* (1872), *Russian Folk-tales* (1873), and *Early Russian History* (1874), the last his Ilchester lectures at Oxford. He was also a splendid *raconteur.* He died in London, 6th August 1889.

Ram, an ironclad ship intended to run into and sink an enemy's vessels. For this purpose it is provided with a heavily armoured stem projecting below the water-line in the form of a beak (see figs. 7 &c. in article Navy). In action the ram is propelled at full speed against her antagonist, and if she succeeds in striking her the blow is supposed to be sufficient to crush in her side and sink her immediately. Although at first rams had a separate rating in the British navy, all line-of-battle ships are now in effect rams, and the name is no longer used to denote a particular class of vessel, but is only applied to the part of the stem of the battle-ship used in striking. The ram was first employed during the American civil war in the action between the Federal fleet and the Confederate armour-clad ram *Virginia* in Norfolk Roads in 1862, when the Federal frigate *Cumberland* was rammed and sunk by the *Virginia.* In 1866 the Austrian ironclad *Ferdinand Max* rammed and sunk the Italian ironclad *Re d'Italia* at the battle of Lissa. In 1879 the Peruvian ironclad ram *Huascar* rammed and sunk the Chilian corvette *Esmeralda.* In 1875, while the Channel Fleet were off the Irish coast, the *Vanguard* was accidentally rammed by the *Iron Duke*, and sank in an hour. During the German naval manœuvres of 1878 the *Grosser Kurfürst* was rammed by the *König Wilhelm*, and sank immediately, 280 of her crew being drowned. It is but just to say that the *Cumberland*, the *Re d'Italia*, and the *Esmeralda* were not under control when they were rammed, and the result of all engagements fought since the introduction of rams has shown that when an attacked vessel is under control and properly handled ramming can easily be avoided; but at the same time it now plays an important part in naval tactics.

Ráma is, in Hindu mythology, the name common to three incarnations of Vishnu, of Parasuráma, Rámachandra, and Balaráma. See VISHNU.

Ram'adan, the ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep a strict fast throughout its entire course, from the dawn—when a white thread can be distinguished from a black thread—to sunset. Eating, drinking, smoking, bathing, smelling perfumes, and other bodily enjoyments, even swallowing one's spittle, are strictly prohibited during that period. Even when obliged to take medicine the Moslem must make some kind of amends for it, such as spending a certain sum of money upon the poor. During the night, however, the most necessary wants may be satisfied—a permission which, practically, is interpreted by a profuse indulgence in all sorts of enjoyments. The fast of Ramadan, now much less observed than in former times, is sometimes a very severe affliction upon the orthodox, particularly when the month—the year being lunar—happens to fall in the long and hot days of midsummer. The sick, travellers, and soldiers in time of war are temporarily released from this duty, but they have to fast an equal number of days at a subsequent period when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious are expressly exempt from fasting. The principal passages treating of the fast of Ramadan are found in the second Surah of the Koran, called 'The Cow.'

Rámáyana is the name of one of the two great epic poems of ancient India (for the other, see the article MAHÁBHÁRATA). Its subject-matter is the history of Ráma (q.v.), and its reputed author is *Valmíki*, who is said to have taught his poem to the two sons of Ráma. But though this latter account is open to doubt, it seems certain that Valmíki was a real personage, and, moreover, that the Rámáyana was the work of one single poet—not, like the Mahábhárata, the creation of various epochs and different minds. As a poetical composition the Rámáyana is therefore far superior to the Mahábhárata; and it may be called the best great poem of ancient India. Whereas the character of the Mahábhárata is cyclopædic, its main subject-matter overgrown by episodes of the most diversified nature, the Rámáyana has but one object in view, the history of Ráma. Its episodes are rare, and restricted to the early portion of the work, and its poetical diction betrays throughout the same finish and the same poetical genius. Whether we apply as a test the aspect of the religious life, or the geographical and other knowledge displayed in the two works, the Rámáyana appears the older. Since it is the chief source whence our information of the Ráma incarnation of Vishnu is derived, its contents may be gathered from the article VISHNU. The Rámáyana contains professedly 24,000 epic verses, or *Slokas*, in seven books—some 48,000 lines of sixteen syllables. The text which has come down to us exhibits, in different sets of manuscripts, such considerable discrepancies that there are practically two recensions. The one is more concise in its diction, and has less tendency than the other to that kind of descriptive enlargement of facts and sentiments which characterises the later poetry of India; it often also exhibits grammatical forms and peculiarities of an archaic stamp, where the other studiously avoids that which must have appeared to its editors in the light of a grammatical difficulty. There can be little doubt that the former is the older and more genuine text.

A complete edition of the older text, with two commentaries, was published at Madras in 1856, at Calcutta in 1860, and at Bombay in 1861. Of the later version Gorresio edited the first six books without a commentary, but with an Italian translation in poetical prose (1843–58). A complete translation of the *Rámáyan of Valmíki* in English verse, by R. T. H. Griffith, appeared in 1870–75 in five large volumes. See Williams, *Indian Epic Poetry* (1863); and Weber, *Ueber das Rámáyana* (1870).

Rambouillet, CATHERINE DE VIVONNE, MARQUISE DE, one of the most accomplished and illustrious women of the 17th century, was born at Rome in 1588. Her father was Jean de Vivonne, afterwards Marquis of Pisani; her mother, Julia Savelli, belonged to an old Italian family, and through her mother was connected with the Florentine banking house of Strozzi. At twelve Catherine was married to Charles d'Angennes, son of the Marquis de Rambouillet, who succeeded to the family estates and title on the death of his father in 1611. From the very beginning she disliked alike the morals and manners of the French court, and she early determined to gather round herself a select circle of friends. At once virtuous, spirituelle, sympathetic, and appreciative, she gathered together in the famous Hôtel Rambouillet for a long series of years all the talent and wit of France, and in her salon met for the first time on an equal footing the aristocracies of rank and of *esprit*. For fifty years she received the wits, critics, scholars, and poets of Paris: Malherbe, Racan, Balzac, Voiture, Corneille, Ménage, Chapelain, Scarron, Saint-Evremond, Benserade, La Rochefoucauld. But half of the glory of the Hôtel belonged to the brilliant women who frequented it, among them Mademoiselle de Scudéry, the beautiful Duchesse de Chevreuse, the Marquise de Sablé, who inspired the *Maximes* of La Rochefoucauld, Mademoiselle de la Vergne, afterwards Madame de La Fayette, the inimitable Madame de Sévigné; but conspicuous beyond all by her splendid beauty and faultless grace, the idol of both sexes, shone the sister of the great Condé, and the heroine of the Fronde—the Duchesse de Longueville. As the centre of this group reigned the Marquise de Rambouillet—'la grande Marquise,' 'the divine Arthénice'—and her beautiful daughter Julie (the Parthénie of *Clélie*), after fourteen years of suing, wife of the Duke of Montausier, who presented her with the famous *Garland of Julia*, a collection of love-verses, illustrated with exquisite paintings on vellum.

The frequenters of the Hôtel were celebrated for the elegance of their manners and the refinement of their language; but the latter, on the lips of imitators, degenerated into extravagant affectation and palpable pedantry—a mark for the comic satire of Molière in *Les Précieuses Ridicules* and *Les Femmes Savantes*. It must be remembered that the title *Précieuse* originally meant 'distinguished' in its best sense, and that the ladies of the coterie a generation before had been proud to wear it. Madame de Rambouillet's good taste in everything was conspicuous, and she led the fashion also in the decoration of houses. Her famous 'Chambre bleue,' furnished with blue velvet relieved by gold and silver, with large windows from floor to ceiling, and her alcove with its *ruelle*—at first adopted merely to save her from the heat of the fire, which she could not bear—were imitated in many a great house in France. Her importance declined under Louis XIV., who distrusted clever women, but she survived till December 1665.

See the *Historiettes* of Tallemant des Réaux and the *Dictionnaire des Précieuses* of Somaize; Röderer's *Mémoire pour servir à l'Histoire de la Société polie en France pendant le Dix-septième Siècle* (1834); Victor Cousin's *Jeunesse de Mde. de Longueville, Mde. de Sablé, &c.*; Livet's *Precieux et Précieuses* (1859); Brunetière's *Nouvelles Études Critiques* (2d ed. 1886).

Ramé, DE LA. See OUIDA.

Rameau, JEAN PHILIPPE, a French musician, was born at Dijon, 25th September 1683. At eighteen he went to Milan, but soon returned to France, to Paris, Lille, and Clermont in Auvergne. Here he acted as organist to the cathedral, and wrote his *Traité de l'Harmonie* (1722). Removing to Paris, he published *Nouveau Système* (1726), *Génération Harmonique* (1737), and *Nouvelles Réflexions* (1752). In 1733, at the mature age of fifty, he produced his first opera, *Hippolyte et Aricie*, the libretto of which was written by the Abbé Pellegrin. It created a great sensation, and Rameau was forthwith elevated to the rank of a rival to Lully (see OPERA). Rameau's best opera was *Castor et Pollux*, produced at the Académie Royale de Musique in 1737. Between 1733 and 1760 he composed twenty-one operas and ballets, as well as numerous harpsichord pieces. Louis XV. created for him the office of composer of chamber music, granted him letters of nobility, and named him a Chevalier de St. Michel. He died 12th September 1764. See A. Pougin's essay (Paris, 1876).—Rameau's nephew, well known as giving the title to a singular dialogue of Diderot's, which Goethe thought worthy of translation into German, had actual existence, being Louis Sébastien Mercier (1740–1814), author of the famous *Tableau de Paris*.

Ramée, PIERRE DE LA. See RAMUS.

Rameses, the name of several Egyptian monarchs, of whom two, the first and the second, were specially famous (see EGYPT, Vol. IV. p. 240). It is usual to identify the warrior king Rameses II. with the Pharaoh of the oppression, and Rameses III. with the Pharaoh of the Exodus, though there is some difficulty in the identification. The mummy of Rameses II. was found at Deir-el-Bahari in 1881, that of Rameses III. at Boulak in 1886. The story of Rhampsinitus (q.v.) seems to refer to Rameses III. For the treasure-city called Rameses, see PITHOM.

Ramie. See BŒHMERIA.

Ramillies, a village of Brabant, Belgium, 14 miles by rail N. of Namur, is memorable as the place near which, on May 23, 1706, the French forces under Marshal Villeroy and the Elector of Bavaria were defeated by Marlborough, with the loss of almost all their cannon and baggage, and thirteen thousand killed and wounded. This victory compelled the French to give up the whole of the Spanish Netherlands.

Rammohun Roy. Rájá Rám Mohán Rái, founder of the Brahmo Somaj (q.v.), was born at Radhanagar in Bengal, in May 1772, his ancestors being Brahmans of high birth. He studied Persian, Arabic, and Sanskrit, and soon began to doubt the foundations of the ancestral faith. He spent some time studying Buddhism in Tibet, and gave offence there by his frank criticisms. He incurred the enmity of his family for his religious views, and lived at Benares till 1803. For some years he was revenue collector in Rangpur. In 1811 he succeeded to affluence on the death of his brother. He published various works in Persian, Arabic, and Sanskrit, the object of the whole being the uprooting of idolatry. His influence was powerful in securing the abolition of suttee. He also issued in English an abridgment of the *Vedanta*, giving a digest of the Vedas, the ancient sacred books of the Hindus. In 1820 he published *The Precepts of Jesus, the Guide to Peace and Happiness*, accepting the morality preached by Christ, but rejecting belief in His deity or in the miracles, and wrote other pamphlets hostile both to Hinduism and to Christian Trinitarianism. In 1828 he began the association which grew into the Brahmo Somaj, and in 1831 visited England, where he was received with all but universal friendliness and respect. He took a lively interest in the Reform agitation, and gave valuable evidence before the Board of Control on the condition of India, but overtasked himself, and died at Bristol, 27th September 1833.

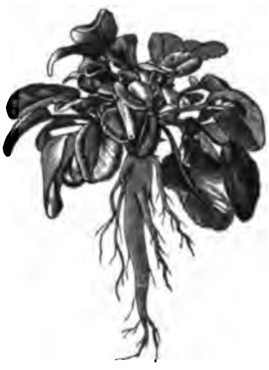
See Miss Carpenter's *Last Days of Rammohun Roy* (1866). There is also a full Bengali memoir (1881); and his English works have been edited by Jogendra Chunder Ghose (2 vols. 1888).

Ramnagar, two towns of India: (1) a town of the North-western Provinces, stands on the right bank of the Ganges, 2 miles above Benares. It contains a palace, the residence of the rajah of Benares, which rises from the banks of the sacred stream by a number of fine ghâts or flights of stairs. There is a fort, and whips and wicker-work chairs are manufactured. Pop. 11,859.—(2) A town of the Punjab, on the Chenab River, 28 miles NW. of Gujranwala. It was a place of great importance in the 18th century, being then known as Rasulnagar, but was stormed by the Sikhs under Ranjit Singh in 1795, and its name changed to Ramnagar. It is now a place of only 6830 inhabitants, who make leathern vessels. A large fair is held here every April.

Rampart forms the substratum of every permanent fortification; see FORTIFICATION.

Ramphastidæ. See TOUCANS.

Rampion (*Campanula rapunculus;* see CAMPANULA), a perennial plant, a native of Europe, rare in England, with a stem about two feet high, and a panicle of very pretty pale-blue bell-shaped flowers. The radical leaves are ovato-lanceolate and waved. The root is white and spindle-shaped, and was formerly much used for the table, under the name of *Rampion* or *Ramps*. The plant is now little cultivated in Britain, but is still commonly grown in France for the sake of its roots, which are used either boiled or as a salad, and of its young leaves, which are also used as a salad.



Rampion (*Campanula rapunculus*).

Rampur, the capital of a native state of India, in the North-western Provinces, stands on the river Kosila, 110 miles E. by N. of Delhi. It manufactures damask, pottery, sword-blades, and jewellery. Pop. (1891) 73,530.—The *state*, entirely surrounded by British territory, has an area of 899 (another authority says 945) sq. m. and a pop. of 541,914.

Rampur Beauleah, chief town of the Rajshahi district (area, 2361 sq. m.; pop. 1,338,638) of Bengal, stands on the north bank of the Ganges. Pop. 19,228.—The *division* of Rajshahi has an area of 17,428 sq. m. and a pop. of 7,733,775.

Ramsay, ALLAN, Scottish poet, was born in the parish of Crawford, Lanarkshire, October 15, 1686. His father was manager of Lord Hopetoun's mines at Leadhills, and his mother, Alice Bower, was the daughter of a Derbyshire miner. At fourteen he was put apprentice to a wigmaker in Edinburgh, and followed that calling till his thirtieth year, by which time he had become known as a poet, having issued several short humorous satires and realistic descriptions, which were printed as broadsides, and sold in his shop or on the street for a penny each. He had also written (1716–18) two additional cantos to the old Scots poem of *Christ's Kirk on the Green*, felicitous pictures of rustic life and broad humour. Ramsay now abandoned wig-making, and commenced business as a bookseller in the High Street, with a sign of Mercury over his door. Later he removed to the Luckenbooths, and there flourished under the heads of Drummond and Ben Jonson, adding to his business a circulating library—the first established in Scotland. Down to 1755, when he retired to a villa of his own erection, 'honest Allan's' career, worldly and literary, was eminently prosperous. Neither Puritan nor profligate, social in his instincts, yet careful and industrious, Ramsay never allowed his pride and vanity as a poet to withdraw him from business. One brief cloud overcast the poet's successful career. He built a theatre in Edinburgh at his own expense, which was almost immediately shut up by the magistrates, in virtue of the act passed in 1737 prohibiting all dramatic exhibitions without special license. Besides his loss he suffered much from the attacks of the churchmen of the day. His application to Lord Advocate Forbes for 'some canny post' was unsuccessful; yet his misfortunes had left him a decent competency, and he spent the last two or three years of his life in cheerful retirement in the quaint but picturesque octagonal house he had built on the north side of the Castle Hill, and here he died 7th January 1758. He had the gratification of seeing his only surviving son, Allan Ramsay (1713–84), fast rising into distinction as a portrait-painter; in 1767 he was appointed principal painter to the king. A complete edition of the elder Allan's poems with a biography was published by Chalmers (1800); a fine edition, with the music of the songs, and engravings by David Allan, in 1788. A good selection is that by J. Logie Robertson (1887). A monument to Ramsay by Steell was erected in Edinburgh in 1865.

The following are his principal works: *Tartana, or the Plaid* (1721); a collected edition of his *Poems*, published by subscription in 1721, by which it is said the poet realised 400 guineas; *Fables and Tales* (1722); *Fair Assembly* (1723); *Health, a Poem* (1724); *The Tea-table Miscellany*, a collection of the most choice songs, Scottish and English (1724), to which a second volume was published in 1725, a third in 1727, and a fourth in 1740; *The Evergreen*, 'being a collection of Scots Poems wrote by the Ingenious before 1600,' published in 1724; *The Gentle Shepherd, a Pastoral Comedy* (1725), to which songs were added in 1728; a second collection of *Poems* published by subscription (1728); *Thirty Fables* (1730).

Ramsay, EDWARD BANNERMAN BURNETT, Dean of Edinburgh, was born in Aberdeen, 31st January 1793, the grandson of Sir Thomas Burnett, Bart., of Leys. His father, Alexander Burnett, was sheriff of Kincardineshire. Edward was the fourth son, and when very young he was taken by his grand-uncle, Sir Alexander Ramsay, who sent him to school near his own house at Harlsey in Yorkshire. In 1806 Alexander Burnett succeeded to Sir Alexander's estates, assumed the surname of Ramsay, and soon after was created a baronet. Edward Burnett Ramsay took a poll degree at St John's College, Cambridge, in 1814, was ordained in 1816, and held a curacy in Somersetshire until 1824, when he removed to Edinburgh as curate of St George's. Two years later he was made incumbent of St Paul's, Carrubber's Close, but this he exchanged in 1827 for the curacy of St John's, of which Bishop Sandford was incumbent. On the bishop's death in 1830 Ramsay succeeded to the charge; and in 1846 he was appointed dean of the diocese, having already (1844) declined the bishopric of Fredericton, as he afterwards (1847 and 1862) did those of Glasgow and Edinburgh. In 1860 he received the degree of LL.D. from Edinburgh University. He died 27th December 1872. Ramsay did a very great service for the Scottish Episcopal Church by his work in connection with the Church Society, of which he was the first secretary and really the founder, and out of which grew the later Representative Church Council. But it is for the sake of his books—or rather of one of them—that his fame is secure.

Among his works, besides sermons, &c., are Memoirs of Sir J. E. Smith and Dr Chalmers, *Diversities of Christian Character* (1858), *Faults in Christian Believers* (1859), *Pulpit Table-talk* (1868), *The Christian Life* (1869), and a number of others. But the book with which his name will always be identified is the *Reminiscences of Scottish Life and Character*, which had its origin in two lectures ('On Recent Changes in Scottish Manners and Habits') delivered in Edinburgh in 1856–57, and published in a small octavo of 64 pp. in 1857; the third edition (1859), bearing the title of the *Reminiscences*, extended to 211 pages. A second series (pp. xxxviii., 221) appeared in 1861. See the Memoir, by Cosmo Innes, prefixed to the 22d ed. (1874).

Ramsbottom, a manufacturing town of Lancashire, on the Irwell, 4 miles N. of Bury. The first Sir Robert Peel established calico-printing here, and it now has manufactures of cottons, calicoes, ropes, machines, &c. Pop. (1861) 4134; (1881) 16,142; (1891) 16,726.

Ramsden, JESSE, a mathematical instrument-maker, was born at Salterhebble, near Halifax in Yorkshire, in 1735, and began life as a cloth-worker. About 1755 he moved to London, and shortly afterwards began to work as an engraver. His skill recommended him to the mathematical instrument-makers, the daughter of one of whom, Dollond, he married. Being of an inventive turn, he spent his best efforts in effecting improvements in the sextant, theodolite, equatorial, barometer, micrometer, mural quadrant, and the like. He so improved the sextant that its range of error was diminished from 5 minutes to 30 seconds. He made the theodolite for the ordnance survey of England. He devised the mural circle, and made the first for Palermo and Dublin. He spent several years over an instrument for graduating mathematical instruments (see GRADUATION), and published an account of it as *Description of an Engine for Dividing Mathematical Instruments* (1777). For this the Commissioners of Longitude awarded him £615. He was elected a Fellow of the Royal Society in 1786, and was voted the Copley medal in 1795. He died at Brighton on 5th November 1800. Descriptions of some of his improved instruments will be found in *Phil. Trans.* (1779 and 1783). See Life by Lalande in *Journal des Sçavans* (1788).

Ramsey, (1) a seaport and watering-place in the north of the Isle of Man, 14 miles NNE. of Douglas, and by rail (1879) 18 NE. of Peel. It stands on a spacious bay, with a good sandy beach and a background of wooded hills (1842 feet), and from the beauty of its surroundings and the salubrity of its climate has risen into a favourite resort of tourists and pleasure-seekers. It has two promenades, a park, salt-water lake, a pier 730 yards long, and steamboat communication with Liverpool, Fleetwood, Glasgow, Greenock, Whitehaven, and Douglas. Pop. (1851) 2701; (1871) 3861; (1881) 4625; (1891) 4803.—(2) A market-town of Huntingdonshire, 12 miles NNE. of Huntingdon. It has a branch-line (1863) and remains of a mitred Benedictine abbey (969). Pop. of parish (1851) 4645; (1891) 4684.

Ramsgate, a watering-place and seaport of Kent, in the south-east of the Isle of Thanet, 72 miles E. by S. of London, 4 SSE. of Margate, and 15 ENE. of Canterbury. From a small fishing-village it began to increase in importance during the 18th century through successful trade with 'Russia and the East country,' and through the formation here (1750–95) of a harbour of refuge for the Downs. That harbour, 51 acres in extent, with a sea-entrance 250 feet wide, is enclosed on the east and west by two piers 670 and 520 yards long. The aspect of the place, which George Eliot calls 'a strip of London come out for an airing,' is familiar through Frith's 'Ramsgate Sands' (1854); among its special features are an obelisk marking the spot where George IV. in 1821 embarked for Hanover, an iron promenade pier (1881), the fine Granville Hotel, a beautiful Roman Catholic church by the Pugins, a Benedictine monastery, college, and convent, and a Jewish synagogue and college, erected by Sir Moses Montefiore, who, like the elder Pugin, was a resident. To the north is Broadstairs (q.v.), beloved of Dickens; and to the west Pegwell Bay, with Ebbsfleet, the landing-place of St Augustine, and also, traditionally, of Hengist and Horsa. Here, too, is Osengall Hill, with an early Saxon cemetery. Ramsgate was incorporated in 1884. Pop. (1851) 11,838; (1881) 22,683; (1891) 24,676. See James Simson's *Historic Thanet* (1891).

Ramus, PETRUS. Pierre de la Ramée, an illustrious French 'humanist,' was the son of a poor labourer, and was born at the village of Cuth, in Vermandois, in 1515. In his twelfth year he got a situation as servant to a rich scholar at the Collége de Navarre, and, by devoting the day to his master, obtained the night for study, and made rapid progress. The method of teaching philosophy then prevalent dissatisfied him, and he was led to place a higher value on 'reason' than on 'authority;' when taking his degree in his twenty-first year he even maintained the extravagant thesis that 'all that Aristotle had said was false.' Immediately after he began lectures on the Greek and Latin authors, designed to combine the study of eloquence with that of philosophy. His audience was large, and his success as a teacher remarkable. He now turned his attention more particularly to the science of logic, which, in his usual adventurous spirit, he undertook to reform. His attempts excited much hostility among the Aristotelians, and when his treatise on the subject (*Dialecticæ Partitiones*) appeared in 1543 it was fiercely assailed by the doctors of the Sorbonne, who managed to get it suppressed by a royal edict, and his lectures for a time suspended. But Ramus had at this time two powerful friends, Cardinals Charles de Bourbon and Charles de Lorraine, through whose influence he was, in 1545, appointed principal of the Collége de Presles. In 1551 Cardinal Lorraine succeeded in instituting for him a chair of Eloquence and Philosophy at the Collége Royal. He mingled largely in the literary and scholastic disputes of the time, and ultimately embraced Protestantism. He had to flee from Paris; after 1568 he travelled in Germany and Switzerland; but on returning to France in 1571 he perished in the fatal massacre of St Bartholomew, 24th August 1572. It was believed that he was assassinated by the direct instigation of one of his most persistent enemies.

Ramus holds an honourable place in the list of intellectual reformers. His assault on scholasticism as a *method of thinking* is vigorous, and his exposure of its puerile and useless subtleties is thorough. His system of logic, by which his name is best known, is marked by its lucid definitions, its natural divisions, and its simplification of the rules of the syllogism; but it really adds little to logical science. What strikes one most, however, in Ramus is his universal intellectual activity. He wrote treatises on arithmetic, geometry, and algebra which were text-books for a hundred years; he was among the earliest adherents of the Copernican system of astronomy; Latin, Greek, and French grammar, rhetoric, morals, and theology all engaged his pen, and he seldom handled a subject which he did not to some degree elucidate. His followers were a widespread, and for long a powerful body of thinkers and teachers; France, England, the Low Countries, Germany, Switzerland, Denmark, and even Spain had their *Ramists*.

See monographs by Waddington (Paris, 1855), Desmaze (1864), and Lobstein (Strasb. 1878).

Rana. See FROG.

Rancé, ARMAND DE (1626–1700), the founder of the Trappists. See TRAPPISTS.

Ranching, the business of cattle-breeding as pursued on a large scale in the unsettled districts of the United States from the Mississippi to the Pacific coasts, and from the Bad Lands of the Upper Missouri to the Gulf of Mexico. The name is derived from the Spanish *rancho*, properly 'mess' or 'mess-room,' but used in Mexico also for a herdsman's hut, and finally for a grazing-farm, as distinguished from a *hacienda*, a plantation or cultivated farm. The speciality of ranching is that the cattle are raised and kept in a half-wild condition, with little or no house shelter provided and no artificial feeding. The life of the 'cowboys' and ranchmen, if no longer so wild and adventurous as it once was, is still sufficiently free, open, and exciting to have great charms for enterprising youths; and amongst rancheros are to be found not merely hereditary cattle-breeders and rough frontiersmen, but accomplished university-bred men, who in their scanty leisure cherish their Old-World tastes for literature and music. To these are added not a few men whose past history would hardly bear looking into—helping to provide the materials of a strangely mixed society.

Large fortunes were made in the wild old days, but the gradual settlement of the ranching country has seriously embarrassed the business of the ranchman. The old cattle-kings of the south often had ranges, under Spanish land-grants, extending over several hundred square miles, and would brand many thousand calves each year. Herds would be 'on the trail' for from two to four months, the cattle from Texas crossing Red River, and passing through Indian Territory and southern Kansas to the railway; but the gradual settlement of the country and the extension of railways render these long trails impracticable and needless. The great events of the ranchman's year are the 'round-up,' when stock is taken, the cattle are branded, and such full-grown cattle gathered into a herd as are suitable for market; and the departure of the herds for market or port—times of hard work and severe strain for all concerned. In the south there is but one annual round-up; on the more civilised ranges of Wyoming, the Dakotas, Colorado, and Montana there are two round-ups in the year—one early in spring, to brand the calves and ascertain the losses during winter, another in autumn, when the steers over three years old are separated from the main herd and sent for sale. Besides the branding of ownership there is a special 'road-branding' of cattle for identification 'on the trail.' The cattle in the south are still mainly the coarse, long-horned Texan breed; in the north-west the original long-horns have been crossed with fine-grade northern cattle and much improved in quality, producing larger and less wild cattle, and finer beef.

See Brinson, *The Beef Bonanza* (1880); Roosevelt, *Ranch Life and the Hunting Trail* (1889).

Rancidity, the partial decomposition of such substances as butter, oil, and fats. See PUTREFACTION.

Randall, JAMES RYDER, the author of 'Maryland, my Maryland,' was born in Baltimore, 1st

January 1839, taught for a while in a Louisiana college, and then turned to journalism. Shut out from the army by a delicate constitution, he still gave powerful aid to the southern cause by his lyrics. These include, besides 'Maryland' (1861; called forth by news of the passage of the first Massachusetts troops through the streets of Baltimore, and the consequent bloodshed), 'Stonewall Jackson,' 'There's Life in the Old Land Yet,' and others. Since 1866 he has edited a paper in Augusta, Georgia.

Randazzo, a town of Sicily, at the northern foot of Mount Etna, with some old Norman churches. Pop. 9908.

Randers, a town in Jutland, on the Randers-Fiorde, 20 miles from its mouth in the Cattegat. Pop. (1870) 11,354; (1890) 16,617.

Randolph, EDMUND JENNINGS, an American statesman, was born at Williamsburg, Virginia, 10th August 1753, studied at William and Mary College, and was admitted to the bar. In 1776 he helped to frame the constitution of Virginia, and became the state's first attorney-general. In 1786-88 he was governor of Virginia, and in 1787 he was a member of the convention which framed the constitution of the United States. He was working hard at a codification of the state-laws of Virginia when, in 1789, he was appointed by Washington attorney-general of the United States. In 1794 he was made secretary of state, but after the president's signing of the Jay Treaty (1795) with England he resigned in order to be free to vindicate his own conduct. Meanwhile he was practically ruined by the responsibility which he had incurred, as part of the duties of his office, for certain funds provided for foreign service; and, though he returned to the bar, he had to assign his lands and slaves. He died 13th September 1813. See Moncure D. Conway, *Omitted Chapters of History, disclosed in the Life and Papers of Edmund Randolph* (1888).

Randolph, JOHN, 'of Roanoke,' was born at Cawsons, in Virginia, June 2, 1773. He was a second cousin of Edmund Randolph, and boasted the Indian princess Pocahontas among his ancestors. In 1799 he was elected to congress, where he became distinguished for his eloquence, wit, sarcasm, invective, and eccentricity, and for thirty years was more talked and written about than any American politician. Tall and meagre, peculiar in dress and manners, he was described as a strange mixture of the aristocrat and the Jacobin. He was the Democratic leader of the House of Representatives, but quarrelled with Jefferson, and opposed the war of 1812; he opposed also the Missouri Compromise, and stigmatised its northern supporters as 'Doughfaces;' and he sided against Jackson on the nullification question. From 1825 to 1827 he sat in the senate, and in 1830 he was appointed minister to Russia. By his will he manumitted his numerous slaves, and provided for their settlement in a free colony. He died in Philadelphia, June 24, 1833. See Lives by Garland (2 vols. 1850) and Henry Adams ('American Statesmen' series, 1882).

Randolph, SIR THOMAS, a trusted agent of Queen Elizabeth, was born in 1523, lived abroad for safety's sake during Mary's reign, and after Elizabeth's accession was frequently employed in diplomatic missions to France, to Russia, and especially to Scotland. He was first sent thither in 1559, and at many a critical juncture for more than twenty years thereafter he played his mistress' cards in the perplexed and corrupt game of Scottish politics. He was twice shot at, in 1566 was ordered by Mary to leave the court, and in 1581 had to flee from Scotland for his life. He died in 1590.

Randolph, THOMAS, poet and dramatist, belonged to a good Sussex family, but was born at his maternal grandfather's house in Northamptonshire in 1605. He had his education at Westminster and Trinity College, Cambridge, and was admitted to a fellowship. He early began to write, and gained the friendship of Sir Aston Cokain, Shirley, and Ben Jonson, who adopted him among his poetic *sons*. He seems to have lived a boisterous life, and two copies of verses of his own tell how he lost a finger in a brawl. He died before his powers had reached their maturity, in March 1635. He left a number of bright, fanciful, and occasionally too glowing poems, and six plays: *Aristippus, or the Jovial Philosopher; The Conceited Peddler; The Jealous Lovers; The Muses' Looking-glass; Amyntas, or the Impossible Dowry;* and *Hey for Honesty.* His works were edited by W. Carew Hazlitt in 1875.

Ranelagh. This building was erected in 1742 on the site of the gardens of a villa of the last Earl of Ranelagh at Chelsea. Its rotunda was 150 feet in diameter, with an orchestra in the centre and tiers of boxes all round. The chief amusement, promenading, as it was called, round and round the area below, and taking refreshments in the boxes, the orchestra performing meanwhile, is thus described by Smollett: 'One half of the company are following one another's tails in an eternal circle, like asses in an olive-mill, . . . and the other half are drinking hot water, under the denomination of tea, till nine or ten o'clock at night to keep themselves awake.' But Johnson thought 'the coup d'œil was the finest he had ever seen;' and Walpole, whose letters contain many allusions to Ranelagh, writes, 29th June 1744: 'Every night I go to Ranelagh, which has totally beat Vauxhall. Nobody goes anywhere else; everybody goes there.' The last appearance of Ranelagh was when the installation ball of the Knights of the Bath was given there in 1802. It was closed on 9th September 1803, and built upon next year. Its site is now part of the Chelsea Hospital garden.

Ranelagh, NORTH and SOUTH, two suburbs of Dublin, lying south of the city.

Range. See CANNON, GUNNERY.

Rangoon, the capital of Lower Burma, stands on the Hlaing or Rangoon River, about 20 miles from its entrance into the Gulf of Martaban. The existing city is almost entirely of modern construction, built since the British took possession of the place in 1852. The town extends along the left bank of the Hlaing, the docks being opposite to it at the suburb of Da-la, on the other side of the river. Behind the town is the large military cantonment, grouped round the fortified hill (166 feet) on which stands the Shway-Dagôn pagoda, 'the most venerated object of worship in all the Indo-Chinese countries.' It is built of brick, is lavishly gilded, and tapers up to a cone 321 feet above the ground (see illustration under BURMA). According to the tradition, it was erected in the 6th century B.C. to serve as a refuge to eight hairs from the head of Gautama Buddha. The streets are laid out regularly; the river is carefully embanked; there are five markets and an excellent water-supply; the thoroughfares are systematically lighted and traversed by tramway cars; and there has been an elective municipality since 1883. Forts and batteries protect the town. The principal buildings are the public and governmental offices, the Anglican cathedral (whose foundation-stone was laid by Lord Dufferin in 1886) and the other European churches, the native pagodas, a lunatic asylum, the chief gaol of Lower

Burma, the Phayre Museum in the horticultural gardens, St John's College, the high school, a hospital, &c. Along the river-side are numerous rice-husking-mills and sawmills. Pop. (1852) 25,000; (1872) 89,897; (1881) 134,176; (1891) 181,210. A little less than one-half are Burmese, and the natives of India are nearly as many. Rangoon is the principal port in all Burma, about 86 per cent. of the total trade of that country passing in and out at this port. Its trade has grown at a wonderfully rapid rate since the British took possession of Lower Burma. In 1852 the port was entered by not more than 125 small vessels, and even in 1859 the total imports and exports together had only risen to £2,131,000. By 1878 the statistics of the port stood at 559,000 tonnage of vessels entering; value of imports £3,777,700, and of exports £4,414,300. In 1889–90 the port was entered by 1188 vessels of 1,029,323 tons; the total imports (excluding coasting trade) were valued at £5,686,244, and the total exports at £5,047,268. The total imports of all kinds for all Burma were in the same year £7,352,822, and the corresponding exports £7,344,774, an increase of £2,405,521 and £1,561,188 respectively since 1880–81. The more important articles of merchandise imported and exported are quoted under BURMA. A town has existed on the site of Rangoon since the 6th century B.C. It was always called Dagon down to the capture of the place by the Burmese sovereign Alompra towards the end of the 18th century. That prince rebuilt the place and called it Rangoon. It was taken by the British in 1825 and held until 1827; they captured it again in 1852, and have kept possession of it ever since.

Rangpur, a town of Bengal, on the Ghaghat, an arm of the Brahmaputra, and 110 miles SE. of Darjiling. Pop. 13,320.—The *district* has an area of 3486 sq. m. and a pop. of about 2,500,000.

Ranjit Singh, the founder of the Sikh kingdom in the Punjab of India, was born at Gujranwala on 2d November 1780, the son of a Sikh chief. His father died when he was twelve and his mother when he was seventeen years old. He at once began to show his ambition and capability for rule, and after the shah of Afghanistan had given him the province of Lahore he directed all his energies to the founding of a kingdom which should unite all the Sikh provinces under his own personal rule (see SIKHS). He died on 27th June 1839. He procured from an Afghan prince, as the price of his assistance in war, the famous Koh-i-nur diamond (see DIAMOND). See Sir L. Griffin, *Ranjit Singh* (Oxford, 1892).

Rank in the military forces of the British empire is not confined to the commissioned classes; the various grades of non-commissioned officers, and even the titles gunner, driver, sapper, or private are officially styled ranks. *Lance* or *acting* rank is a temporary advancement. Thus, a private or sapper is first made a lance-corporal, and a gunner or driver an acting-bombardier, before being permanently promoted. Until so promoted they rank only as private soldiers. Similarly a lance-sergeant is a corporal acting as sergeant, and holds only the lower rank.

Officers of the army and royal marines may hold either regimental or army rank or both. Up to captain inclusive, rank is purely regimental. Afterwards a captain may be promoted in his regiment to the successive ranks of major and lieutenant-colonel, or while still remaining a captain in his regiment he may become a major or lieutenant-colonel in the army by Brevet (q.v.). The rank of colonel is purely an army rank, obtainable only by brevet or on receiving an appointment, such as assistant-adjutant-general, which carries that rank. The several grades of General (q.v.) are also army ranks only. *Local rank* is sometimes conferred on an officer to enable him to exercise command over others senior to him in a certain locality (South Africa, Egypt, &c.). *Temporary rank* is often similarly granted, and some appointments carry such rank; for instance, a colonel appointed quartermaster-general in India becomes a temporary major-general while so employed, and reverts to the lower rank at the end of his five years' term of office unless promoted in the meantime. *Honorary rank* is held by officers of the ordnance-store and army-pay departments and by Quartermasters (q.v.) and riding-masters. Officers of the militia, yeomanry, and volunteers also, after a certain number of years' service, receive a step of honorary rank. *Substantive rank* includes all rank other than army, brevet, honorary, local, and temporary rank, held by officers unless they are on the unemployed half-pay list. *Half-pay rank* as lieutenant-colonel (£200 a year) may be taken by an officer after seven years' service as major. *Relative rank* is held by army chaplains and veterinary surgeons. It carries with it all precedence and advantages attaching to the military rank with which it corresponds, and regulates rates of lodging-money, number of servants and horses, rations of fuel and light (or allowances in their stead), detention and prize-money. It does not entitle the holder to salutes from ships or fortresses, nor to the turning out of guards, and, of course, it does not confer any right to command. The *corresponding ranks* in the army and navy are shown in the following table, where the asterisks denote 'according to date of commission,' and the dagger 'junior of the rank.'

Navy.			Army.
Admiral of the Fleet	ranks	with	Field-marshal.*
Admirals	rank	,,	Generals.*
Vice-admirals	,,	,,	Lieut.-generals.*
Rear-admirals	,,	,,	Major-generals.*
Captains of the Fleet	,,	,,	Brig.-generals.*
Commodores, 1st and 2d class	,,	,,	
Captains over 8 years' service	,,	,,	Colonels.*
Captains under 8 years' service	,,	,,	Lieut.-colonels.*
Commanders	,,	,,	Lieut.-colonels.†
Lieutenants of 8 years' standing	,,	,,	Majors.*
Lieutenants under 8 years' standing	,,	,,	Captains.*
Sub-lieutenants	,,	,,	Lieutenants.*
Chief Gunner, Boatswain, or Carpenter	,,	,,	2d Lieutenants.*

Ranke, LEOPOLD VON, the greatest of German historians, was born on 21st December 1795, at Wiehe, about half-way between Gotha and Halle. Although he studied theology and philology at Halle and Berlin, and in 1818 began to teach at the gymnasium of Frankfort-on-Oder, his chiefest thoughts were given to the study of history, to which they were directed principally by his Luther studies and the reading of Scott's romances. The two works, *Geschichte der romanischen und germanischen Völker von 1494 bis 1535* (1824) and *Zur Kritik neuerer Geschichtschreiber* (1824), procured him a call to Berlin as professor of History in 1825. The latter of these works, and *Analecta* to his subsequent books, expound his views of the functions of history, and the methods of the ideal historian. History is the record of *facts*. It should know nothing of the political party, or church politics, or subjective views of the writer. It should be based upon sound documentary evidence, critically examined and sifted. In 1827 he was sent by the Prussian government to consult the archives of Vienna, Venice, Rome, and Florence; four years he spent in this work, and returned with a mass of the most valuable historical materials. The results of his labours were seen in *Fürsten und Völker von Süd-Europa im 16 und 17 Jahrhundert* (1827) and other books dealing with Servia, Turkey, and Venice; and *Die römischen Päpste im 16 und 17 Jahrhundert* (1834–37; 9th ed.

1889), perhaps the most finished of his books, certainly one of his great masterpieces of historical writing. Then he turned his attention to central and northern Europe, and wrote in quick succession *Deutsche Geschichte im Zeitalter der Reformation* (1839–47); *Zwölf Bücher preussischer Geschichte* (1847–48; new ed. 1871–74); *Französische Geschichte* (1852–61); *Englische Geschichte* (1859–67; 4th ed. 9 vols. 1877–79), the last two treating chiefly of the same two centuries as the books on south Europe; and *Zur deutschen Geschichte, vom Religionsfrieden bis zum Dreissigjährigen Krieg* (1869). Later periods and special periods of German history are treated of in books on the Origin of the Seven Years' War (2d ed. 1874), the German Powers and the Confederation (1871), *Zur Geschichte von Oesterreich und Preussen zwischen den Friedensschlüssen zu Aachen und Hubertsburg* (1876); the history of Germany and France in the 19th century (1887), and monographs on Wallenstein (1869), Hardenberg (5 vols. 1877–78), and Frederick the Great and Frederick William IV. (1878). To the above must be added a book on the revolutionary wars of 1791 and 1792 (1875), another on Venetian History (1878), and *Die Weltgeschichte*, of whose nine volumes (1881–88) he lived to see only seven published. This last work, which is the copestone of Ranke's historical labours, was begun when he was an old man of eighty-two; yet at that great age he kept two schooled historical assistants busy, studied critically the Greek and other sources, dictated and worked eight to ten hours a day, and published one volume a year regularly, until he died, on 23d May 1886, having rested from his beloved work only a few short days. Even his long life—he was over ninety when he died—would hardly have sufficed for the thorough works he accomplished had he not been a man of unwearied industry, with a marvellous memory, and a swift and intuitive judgment as to the value of historical material. His style is not brilliant, yet sufficiently clear and interesting. He always wrote from the standpoint of one who had the whole history of the world before his mind's eye. This and his skill in the portraiture of historical personages often lend the deepest interest to his narratives. His point of view was, however, that of the statesman; and he fails to give due prominence to the social and popular sides of national development. Ranke married an Irish lady in 1843, and was ennobled in 1865. He continued to lecture until 1872. His lectures exercised a great influence upon those who sat at his feet to learn, as is seen in the works of the great school of historical writers, Waitz, Von Sybel, Giesebrecht, and others. A collected edition of his *Werke* was published at Leipzig in 47 vols. in 1868; several of them have been translated into English.

See his autobiographical *Zur eigenen Lebensgeschichte* (ed. by A. Dove, 1890) and monographs by Winckler (1885) and Von Giesebrecht (1887).

Rankine, WILLIAM JOHN MACQUORN, was born of good Ayrshire family at Edinburgh in 1820, and had his education at the university there. He learned engineering under Sir J. Macneill, and was appointed in 1855 to the chair at Glasgow. He died 24th December 1872. Rankine was an incessant worker, and his books on *Civil Engineering*, *The Steam-engine and other Prime Movers*, *Machinery and Millwork*, *Shipbuilding: Theoretical and Practical*, and *Applied Mechanics* were quickly accepted everywhere as standard text-books; and no modern work in the region of mathematical physics has higher value than his contributions to the new science of Thermodynamics, and to the theories of Elasticity and of Waves. His more important papers were collected, with a Life by Professor Tait (1881). Another side of his nature was seen in his capital humorous and patriotic songs, collected as *Songs and Fables* (1874).

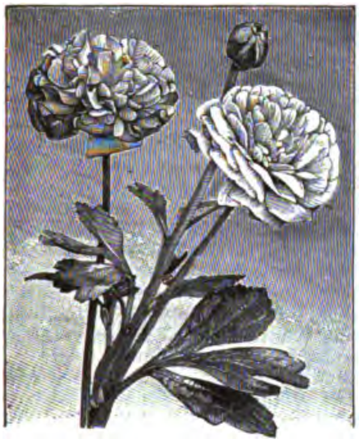
Rannoch, a bleak, desolate moorland of north-west Perthshire, with a mean elevation of 1000 feet above sea-level, and measuring 28 miles by 15. Its surface is mostly a broad, silent, featureless tract of bog, heath, and moss, girdled by dark, distant mountains. In its western part is Loch Lydoch (5¼ miles × ½ mile; 924 feet above sea-level), which winds amid flat and dismal scenery. Stretching eastward from the moor is Loch Rannoch (9⅝ miles × 1⅛ mile; 668 feet), which is overhung by Schiehallion, contains a crannog with a later fortress, and sends off the Tummel 29 miles eastward and south-south-eastward to the Tay. Loch Tummel (2¾ miles × ½ mile; 480 feet) is an expansion of this river, on which are also the Falls of Tummel, 20 feet high.

Ransom—corrupted from the Latin *redemptio*—is the price paid by a prisoner-of-war, or paid on his behalf, in consideration of his being granted liberty to return to his own country. In early times, when armies received little or no regular pay, the soldier looked for his reward in the booty he might capture, and this booty included the bodies as well as the chattels of the vanquished. The conqueror had the option of slaying his prisoner; but for his profit, he would make him his slave, or sell him into slavery. The transition would be natural to accepting compensation from the prisoner himself, and setting him at liberty. In feudal warfare the ransoms formed a large portion of a soldier's gains; those for persons of low degree belonging to the individual captors, but those for princes or great nobles to the king. Ransoms were sometimes of large amount, more than the immediate family of the captive could pay. His retainers were then required by feudal usage to contribute; as in the case of redeeming King Richard I. for £100,000, when twenty shillings was assessed on every knight's fee, and the clergy subscribed liberally. David Bruce of Scotland was ransomed for 100,000 marks, and King John of France for £500,000, payable in instalments. After the battles of St Quentin and Gravelines, in the war between France and Philip of Spain, the ransoms due by French prisoners to the Prince of Orange, Counts Egmont and Horn, and a few other superior commanders were estimated at 2 million crowns; the Duc de Longueville paid Count Horn 80,000 crowns as his ransom.—In modern warfare, where the fighting is performed by professional soldiers, pecuniary ransoms are never resorted to, freedom being granted to prisoners in exchange for others of corresponding rank captured on the opposite side.

Ranters. See METHODISTS.

Ranunculaceæ, a natural order of exogenous plants, mostly herbaceous, rarely shrubs, and generally natives of cold, damp climates. Some are found within the tropics, but almost exclusively in very elevated situations. The number of known species exceeds 1000. They occur in all quarters of the globe, but most abundantly in Europe. The leaves are generally much divided, and have dilated sheathing stalks. The calyx is of 3–6 deciduous hypogynous sepals; the corolla of 3–15 hypogynous petals, in one or more rows, sometimes assuming very remarkable forms, as in larkspur, aconite, and columbine; rarely absent, in which case the sepals are gaily coloured. The stamens are usually numerous; the carpels are numerous, one-celled, sometimes united into a single many-celled pistil; the ovary with one or more ovules. The fruit either consists of dry achenia, or is berry-like or follicular. Acridity is the prevailing character of the order, and the leaves of some species readily produce blisters; but this property disappears when they are dried or heated. Many are narcotic and poisonous; some are used in medicine, as aconite and hellebore. The seeds of *Nigella sativa* were formerly used instead of pepper. The fruit of the May Apple or Wild Lemon (*Podophyllum peltatum*) of North America may be eaten, but is very acid. Many of the order produce flowers of great beauty, as some species of Ranunculus (q.v.), Anemone (q.v.), Larkspur (q.v.), Peony (q.v.), Columbine (q.v.), Clematis (q.v.), &c.

Ranunculus, a genus of plants of the natural order Ranunculaceæ; having five sepals; five petals, with a nectariferous pore at the base of each petal, often covered with a scale; many stamens situated on a receptacle, and ovaries accumulated into a head. The species are numerous, herbaceous plants, mostly perennial. Some of them adorn meadows with their yellow flowers, familiarly known as *Buttercups;* others, known by the name of *Crowfoot,* are troublesome weeds in gardens and pastures. Many, as the Spearworts, are found chiefly in moist places, and some are altogether aquatic, covering the surface of ditches, ponds, and rivers, where the water is shallow, with a carpet of verdure exquisitely studded with beautiful white flowers. One species, the Asiatic Ranunculus, or Garden Ranunculus, exclusively the ranunculus of florists, a native of the Levant, has been cultivated in Europe for almost 300 years. The cultivated varieties are extremely numerous, brilliantly coloured, and very symmetrical in form. The ranunculus is propagated by seed, by offset tubers, or by dividing the clusters of tubers. The roots are often taken up in summer, after the leaves die, and kept in a dry place till the beginning of the ensuing winter or spring. The ranunculus loves a free and rich soil. Double-flowered varieties of some other species, with taller stems and smaller white or yellow flowers, are cultivated in flower-gardens, sometimes under the name of *Bachelors' Buttons.* The acridity of many species of ranunculus is such that the leaves, bruised and applied to the skin, produce blisters; and those of *R. sceleratus,* a pretty common British species, are said to be used by beggars to cause sores, in order to move compassion. *R. Thora,* a Swiss species, is of extreme acridity, and hunters were accustomed in former times to poison darts and arrows with its juice. Water distilled from the leaves of *R. flammula,* a British species, with rather tall stem and ovato-lanceolate leaves, common by the sides of ditches, &c., is an active and powerful emetic, producing almost immediate vomiting, and capable of being used with great advantage in cases of poisoning. Yet the leaves of *R. ficaria*—sometimes called *Pilewort* and *Lesser Celandine,* a very common British species, adorning hedge-banks with bright yellow flowers in spring—are capable of being used as a pot-herb. Pastures in which *R. acris, R. repens,* &c. are very abundant are injured by them, and they ought to be diligently grubbed out; they are particularly supposed to give an unpleasant taste to milk and butter; but it is thought not improbable that a moderate mixture of these plants with the other herbage is even advantageous, and that they may act as a condiment. Their acridity is lost in drying, and they are not injurious to hay. The small tubers of Pilewort, or Lesser Celandine, are used for the cure of hæmorrhoids; but their acridity also disappears when they are boiled, and they are then a pleasant article of food. *R. aquatilis,* a British species, very abundant in streams in many parts of Britain, is eaten with avidity by cattle, the acridity so general in the other species being wanting in it.

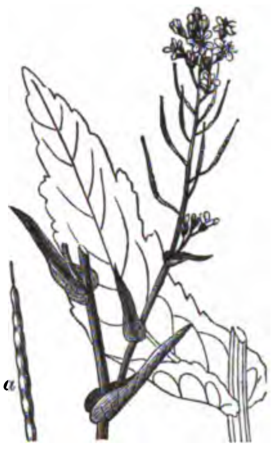


Ranunculus asiaticus, garden varieties.

Ranz des Vaches (in German, *Kuhreigen*), a name applied to certain simple native melodies of the Swiss Alps, which are usually sung by the herdsmen, and played by them when driving their herds to and from the pasture, on the Alphorn or Kuh-horn (q.v.). The associations of pastoral life recalled by these airs to the Swiss in foreign countries have been said to produce an almost irresistible longing for home, or *nostalgia.*

Rap (contracted from *rapparee,* 'an Irish plunderer'), familiar in the phrase 'not a rap,' was a counterfeit Irish coin of the time of George I., which passed for a halfpenny, though not really worth a fourth of that value. There was also a small Swiss coin called *rappen,* worth a centime.

Rapallo, a winter health-resort of Northern Italy, 17 miles by rail ESE. of Genoa, with a castle and the pilgrimage church of the Madonna (1557) on the Monte Allegro. Off here the Venetian fleet defeated the Genoese in 1431. Pop. 2625.



Rape (*Brassica napus*): *a,* silique.

Rape, or COLESEED (*Brassica napus;* see BRASSICA), an annual plant much cultivated on account both of its herbage and of its oil-producing seeds. It is a native of Europe and perhaps of England; but it is hard to say where it is truly indigenous and where naturalised. It is so nearly allied to *Brassica rapa* (Turnip), *B. campestris* (Swedish Turnip, Colza, &c.), *B. oleracea* (Kale, Cabbage, &c.), and *B. præcox* (Summer Rape) that botanical distinction is difficult, particularly as to some of the cultivated varieties. The root of rape is slender, or in cultivation sometimes becomes carrot-shaped (see NAVEW), but it never becomes turnip-shaped. The cultivation of rape is very general in many parts of the continent of Europe, from which it seems to have been introduced into England at least as early as the 16th century; and in the 17th century, if not sooner, large quantities of oil were made from its seeds, chiefly in the fenny and other alluvial districts of the east of England, where also it has long been most extensively employed for feeding sheep. On the Continent it is not unusual to sow rape in order to *green-manuring*, ploughing its herbage into the soil, a mode of enriching land much more common in some parts of Europe than it is in Britain. Rape delights in a rich alluvial soil, and is particularly suitable for newly-reclaimed bogs and fens, in which the turnip does not succeed well; and it is also extensively cultivated in the chalk and oolite districts of the south of England. When cultivated for green-manuring rape is usually sown broadcast, but when intended to produce seed it is generally sown in drills, and receives manure and culture the same as the turnip. In rich soils rape sometimes attains a height of three or even four feet, so that the sheep turned in are hidden beneath the leaves, and seem to eat their way into the field. They eat the stalks even more greedily than the leaves. A too exclusive feeding on rape is, however, apt to produce diseases, which a sprinkling of salt, a supply of hay, &c. are found useful in preventing. When the seed is ripe rape is cut with the sickle; and, after a short time allowed for drying, the seed is thrashed out, when the haulm is often burned, a wasteful practice, as its decay affords more abundant and useful manure, and indeed cattle are fond of it as food. *Rape-cake*, the mass of seeds from which oil has been obtained by crushing, is used for feeding oxen and sheep, but is very inferior to linseed-cake and some other kinds of oil-cake. Ground into dust, it is a very valuable manure. *Rape-oil* is extensively used for machinery and for lamps; but the oil and cake so called are not exclusively obtained from this plant, nor are the names *Colza-oil* and *Rape-oil* used to discriminate the produce of different plants, although in some parts of Europe the name Colza is given to varieties of *Brassica campestris* and *B. oleracea*, which are cultivated in the same way as rape. *B. præcox* is also cultivated in some places, being sown in spring and reaped in autumn. The seeds of other cruciferous plants are also crushed indiscriminately with these, and the oil and cake sold by the same names (see Oils, Oil-cake).—The name *Rape* is from Lat. *rapa*, 'a turnip;' *Colza* is through the French from the Dutch *koolzaad*, 'cole-seed.'

Rape is having carnal knowledge of a woman without her conscious consent, and such consent must not be extorted by violence or threats of violence. The Criminal Law Amendment Act, 1885, provides that a man is guilty of rape if by personating a woman's husband he succeeds in having connection with her. Previously the point was doubtful. A husband cannot under any circumstances commit rape on his own wife, her consent at marriage being irrevocable; but Mr Justice Stephen is of opinion that under certain circumstances he may be convicted at least of an indecent assault. Nor can a boy under fourteen be guilty of this crime, for in law (whatever be the physical fact) he is absolutely presumed incapable; but both husband and boy may be charged with assisting others in committing it. Rape is a felony punishable with penal servitude for life. To this every one who unlawfully and carnally knows any girl under the age of thirteen years is also liable. The attempt to have unlawful carnal knowledge of any girl under thirteen, and the act or attempt in the case of a girl between thirteen and sixteen (save when the accused reasonably believes her to be over sixteen), or in the case of any female idiot 'under circumstances which do not amount to rape,' are misdemeanours, punishable by two years' imprisonment with hard labour. The merest penetration suffices to constitute the crime. As regards evidence in cases of this sort, the most important question will usually be, How far is the supposed injured person to be believed? That depends on many things, of which the chief are (1) her character—for though as a matter of law rape may be committed on a prostitute, since even she cannot be compelled to submit to outrage, yet in fact if the chief witness is shown to be unchaste the charge almost invariably breaks down; (2) the time within which and the person to whom she made the first complaint; (3) any marks of violence on her dress or person, and her agitated or calm demeanour; (4) the scene of the alleged crime, and the probability of strenuous resistance attracting public notice; (5) whether the prisoner fled or not; (6) any marks of violence on his dress or person. (7) If apprehended soon after the alleged act the accused is usually asked to submit to medical examination. Refusal to do so is a strong presumption of at least intercourse. The thing to be guarded against is either a false charge made by a woman to extort money or, on failure of this attempt, persisted in from spiteful motives, or an accusation made by one who after consenting resists too late, or who tries when by any accident the fact of connection becomes known to whitewash her character.

The law which protects women against the class of crime of which rape is the chief has been made much wider of late years, chiefly by the Criminal Law Amendment Act of 1885, which contains provision against various kinds of procuration. As regards the abduction (1) of a woman on account of her fortune; (2) by force with intent to marry; (3) of an unmarried girl under the age of eighteen with intent to have carnal knowledge of her, it need only be remarked that the first two are felonies punishable by fourteen years' penal servitude, and the third a misdemeanour punishable by two years' imprisonment with hard labour.

In the United States the crime is everywhere treated as a felony, and punished with imprisonment for life or for a number of years; but the punishment is somewhat different in the different states of the Union. See also Abduction.

Raphael Santi, born at Urbino in 1483, died at Rome 1520, was the son and pupil of Giovanni Santi, a painter, whose death took place in 1494. Apprenticed about 1495 at Perugia, Raphael learned his profession from Perugino, and became such a clever imitator of his style that to this day the early pictures of the disciple are confounded with those of his teacher. Raphael, in fact, copied Perugino's drawings (Academy of Venice), helped to work at Perugino's pictures, and finished altarpieces from Perugino's designs. Examples are the Resurrection of the Vatican and the Virgin and Child, with and without attendant saints, at Berlin. The presence of Raphael during these years at Perugia, Urbino, and Città di Castello may be traced by his sketches at each of these places. His first patrons were the Duke and princesses of Urbino, ecclesiastical corporations at Città di Castello, and ladies of the high families of Baglione and Oddi at Perugia. His earliest commissions were those of Città di Castello, where (1502–3) the most important of his early works, the Crucifixion in the Dudley collection, was painted. An Assumption of the Virgin, now at the Vatican, was executed shortly after for Maddalena degli Oddi. Distinct features in these pieces are dependence as to form on Perugino and Pinturicchio, combined with a feeling for grace and pure colour essentially original. In a Marriage of the Virgin of 1504 (Milan gallery), these qualities are found in conjunction with exact repetitions of Perugino's figures. It is probable that about 1504 Raphael began to discern the advantage of greater independence. His predellas of the Vatican Coronation, and especially the Epiphany of that series, already display some acquaintance with the more advanced methods of the Florentines. Yet for some time longer the paramount influence of Perugino remained manifest, and Raphael showed Peruginesque influence in such pictures as the Connestabile Madonna, now at St Petersburg, the Vision of the Knight in the National Gallery, the little St Michael and St George, or the Marsyas of the Louvre, and the Graces belonging to the Duc d'Aumale at Chantilly. The painting of the Graces is obviously connected with a journey which Raphael made to Sienna in 1505, when he gave assistance to Pinturicchio in drafting the preliminary design for frescoes in the Piccolomini library. It was there that he copied the Graces, of which the sketch is preserved at the Venice Academy. At Sienna Raphael probably heard of the competition between Leonardo and Michelangelo, who were rivals in 1505 for the decoration of the town-hall of Florence, and there is good cause for thinking that he accompanied Perugino to that capital to be near the lists of this artistic tournament. But before starting he probably took commissions, which gave as a final result the Virgin, Child, and Saints, in full length, called the Madonna Ansidei, now at the National Gallery, and the Virgin and Child with four saints, called the Madonna of Sant' Antonio, belonging to the Ripalda family, both of which were delivered at Perugia. The Madonna of Terranuova, a group of half-lengths at the Berlin Museum, was completed at Florence. Raphael was now on the path which Perugino had trod before him, had a painting-room at Florence and a painting-room at Perugia, but was not satisfied as his master had been with that finality which caused Perugino to remain stationary in the rut of an old style. He determined to acquire and assimilate some of the boldness of Michelangelo, and the principles which Leonardo had been teaching to the students of his academy at Milan. When, after a short absence at Florence, he resumed work on the Ansidei and Sant' Antonio Madonnas at Perugia, Raphael gave as much as he could of the new spirit which was in him to those compositions, without being able to alter their archaic character. In the second of these pictures some heads, recast in a new mould, reveal the influence of Da Vinci; for it is characteristic of Raphael that, after witnessing the struggle of that master with Michelangelo, he came for a time to the conclusion that Leonardo was the better man so far as grace and expression were in question, though for action the spirit of Michelangelo might be preferable. The Terranuova Madonna shows the struggle in which Raphael was engaged. It has the brightness and sweetness of the Umbrian with the breadth of execution of the Florentine. But similar characteristics distinguish the five small predellas which once formed part of the Madonna of Sant' Antonio, whilst the 'Sermon on the Mount,' in Lord Lansdowne's collection at Bowood, and part of the predella of the Ansidei Madonna, display the influence of the works of Masaccio, Filippino, and Ghirlandajo.

It is not historically proved that Raphael and Da Vinci were intimate, but all the pictures which left Raphael's easel at Florence in 1505–6 recall Leonardo in expression, concentration of lines and light, tempered atmosphere, and subtle combinations of movement and tints. Examples are Madonnas and Holy Families, of which the most conspicuous are that of the Gran Duca, the small Cowper, the Cardellino, and Casa Tempi, at Florence, and the Virgin in Green at Vienna. But in portrait more than elsewhere the lessons of Da Vinci are visible, and the likeness of Maddalena Doni at Florence is inspired by the Mona Lisa of the Louvre. Of special interest to Englishmen as a creation of this time is the St George, which was sent by the Duke of Urbino to Henry VII. of England, in return for the garter given by that prince to Guidubaldo of Montefeltro. Attractions in other ways are the painter's own likeness at the Uffizi, in which we discern that the grace of his art was also displayed in Raphael's person, the Madonnas of Orleans, of the Palm, of St Petersburg, and Canigiani, in which Raphael finally appears as a pure Tuscan familiar with the arts of all his Florentine contemporaries.

The Entombment to which Raphael now turned his attention was finished for Atalanta Baglioni, and recalls in many ways the misfortunes which attended the worthless family of that name, which had so long governed Perugia. The sketches for the picture contain incidents that remind us of a massacre in which Atalanta lost her son. The picture in the Borghese palace is an embodiment of all the new principles which Raphael acquired at Florence, realising the perfect drawing of Da Vinci and the sculptural shape of Michelangelo, allied to Peruginesque softness, and colour such as only Raphael could give. The result is perhaps a little stiffness, which is happily avoided in a graceful predella representing Hope, Faith, and Charity. As this fine work advanced to completion Raphael became very evidently attracted by the style of Fra Bartolommeo; and, under the influence of that master of monumental painting, he brought in part to perfection the Apostles attendant on the Eternal, in a fresco at San Severo of Perugia, whilst he composed and finished the Madonna del Baldacchino at Florence. During the progress of these works Raphael got into a large practice at Florence, where he reigned supreme in the absence of Perugino, Leonardo, and Michelangelo. Some of the best work of his Florentine period was now produced—the small Holy Family with the Lamb at Madrid, much in the spirit of Da Vinci; the St Catharine of the Louvre; the Bridgewater and Colonna Madonnas; the Virgin and Sleeping Infant of Milan; the large Cowper Madonna; the Bella Giardiniera, and the Esterhazy Madonna.

From the days of Giotto and Masaccio to those of Raphael Rome had always attracted to its centre painters and sculptors of acknowledged skill in other cities of Italy. Michelangelo had left Florence for the Vatican, and Raphael in 1508 did the same at the instigation of his relative Bramante, who was in great favour with Julius II., and not without support from Michelangelo. The plans of this pope were gigantic. He laid the foundation of the new cathedral of St Peter because old St Peter's was tottering to its fall, and he caused the papal chambers to be decorated afresh because he disliked the frescoes of the old masters at that time covering their walls. He employed Raphael because Perugino, Sodoma, and others had failed to satisfy his taste. The date of Raphael's engagement to paint the 'Camere' of the Vatican is now fixed with certainty as 1509. In the ceiling of the chamber 'of the Signature' the space is divided into fields, in which the Temptation, the Judgment of Solomon, the Creation of the Planets, and Marsyas and Apollo were inserted side by side with medallions enclosing allegories of Theology, Philosophy, Justice, and Poetry. All these pictures exhibit an expanded style, in which the spirit of Perugino, quickened by the subtler spirit of Leonardo and Fra Bartolommeo, becomes associated with the antique. Never before had the artist had such an opportunity of study as now. When at Rome he was enabled to visit the treasures of old sculpture and gems at the Vatican, and the collections of the cardinals Rovere and Medici. On the walls of the camera Raphael began the Disputa, in which he represented the Eternal, Christ, Mary, and the apostles and angels presiding in heaven over the sages of the Trinitarian controversy. Here Raphael practically entered on a method of painting with which he had not been very familiar; but he gained confidence as he proceeded, and, gradually descending from the higher parts to the lower, he equally applied the models and precepts of Leonardo and Fra Bartolommeo, became bolder and more energetic in the conception and rendering of form, and nearly succeeded in equalling the power of Michaelangelo himself. It was a happy time during which the youthful master laboured at this composition, the time when he longed to add to the art which he knew so well that of poetry, in which Michelangelo excelled. His sketches for the Disputa are filled with snatches of sonnets, which, as he soon saw, were entirely beneath the mark. But if his friends should reject his verses, they could praise his picture, which is indeed the noblest work that had then been completed at Rome. The School of Athens immediately followed the Disputa, taking Raphael into the pre-Christian period of Plato and Aristotle. The picture embodied old philosophy and sciences. It was laid out in a temple planned for Raphael by Bramante, in which the philosophers met, appropriately clad in the dress of the ancient Greeks, surrounded by statues and bas-reliefs, which all gave occasion to the painter to transport his spectators into an almost forgotten realm. The manner in which he reproduced antique character and costume, in action, movement, and expression, is acknowledged to have been worthy of the man who succeeded in displaying with a single effort the progress made by Italian painters from the days of Giotto to those of Ghirlandajo. The Parnassus which came after the School of Athens takes us back to the age of Greek verse, showing us Apollo and the Muses attended by the poets from Homer to Ovid, and escorted by Dante. Raphael admirably transformed the antique into something living and present to the moderns, infusing into groups and figures the life of a scenic actuality. The allegory of Prudence, which came next, is less natural than the Parnassus, but rescued from affectedness by grace of lines and skill in pictorial treatment. The subordinate pictures of the Pope accepting the Decretals, Justinian receiving the Pandects, and Augustus saving the manuscripts of Virgil are worthy adjuncts to the principal themes. Julius II. asked Raphael to introduce his portrait into the Decretals, and the likeness of the pontiff with a beard enables us to fix the date of the completion of the Chamber of the Signature in the middle of August 1511. On the same day that Julius II. was privileged to witness the completion of Raphael's first cycle of wall-paintings he officiated at mass in the Sixtine Chapel, where the first half of Michelangelo's ceiling was uncovered.

During the progress of the works in which he employed and formed the talents of his disciples, Giovanni da Udine, Penni, and Giulio Romano, Raphael divided his time between the labours of the Vatican and easel-pictures. The portraits of Julius II. and the Virgin of the Popolo, of which copies have come down to us, were executed; drawings were furnished to the copperplate-engraver Marcantonio for the Massacre of the Innocents; and Madonnas and Holy Families were composed, of which it is only possible here to give the names—Madonnas of Alba at St Petersburg, of Garvagh at the National Gallery, of Mr Rogers, of the Diadem at the Louvre. Nothing could exceed the impatience of Julius to get the chambers of the Vatican properly decorated. He urged Raphael not in vain to begin the chamber of Heliodorus, and in a comparatively short time the master produced, with clever help from his disciples, the ceiling, in which the Eternal appears to Noah, Abraham's Sacrifice, Jacob's Dream, and the Burning Bush. In all these compositions Raphael's mastery is great, and his figures of the Eternal are majestic. The Expulsion of Heliodorus and the Mass of Bolsena are planned so that by a pictorial license the pontiff is present as the scenes are enacted. The death of Julius early in 1513 but slightly interrupted the labours of the painter, who gave a noble rendering of Leo X. and his suite in the picture of the Defeat of Attila. The Deliverance of Peter, which closed the decorations, was an effective piece of composition, in which Raphael for once indulged in contrasts of torch and moonlight and glare balanced by powerful gloom. The constant employment of disciples enabled Raphael, in the three years which elapsed between the completion of the two chambers—i.e. between 1511 and 1514—to finish the Madonna di Foligno at Rome, the Isaiah of St Agostino at Rome, the Galatea of the Farnesina, and the Sibyls of the Pace, not to speak of the mosaics of the Popolo ordered by Agostino Chigi. In many of these works Raphael's style is equal to that of Michelangelo at the Sixtine, with the additional charm of a grace which was his own. He also laid the antique under contribution with great skill and success, and his art was that of a master who works without hesitation because ready for every form of effort that can be required of him. In a graver mood he also painted at this time the severe Madonna of the Fish at Madrid, in a playfully sweet mood the Madonna della Sedia at Florence; whilst in portraits such as Altoviti at Munich, and Inghirami at Florence, he rises to the perfect rendering of features and expression which finds its greatest triumph in the Leo X. of Florence.

Raphael, who had been greatly favoured by Julius, became a personal favourite of Leo, who selected him to succeed Bramante as architect of St Peter's in 1514, and afterwards made him inspector of Roman ruins. But he was as impatient as his predecessor to get the Vatican chambers finished, and he successfully obtained from the masters the frescoes of the Camera dell' Incendio, which all illustrate scenes from the lives of Leonine popes: the Fire of Borgo, in which all the remnants of Roman buildings known to Raphael are introduced, the Battle of Ostia against the Saracens, the Coronation of Charlemagne, and the Oath of Leo III. But Raphael was now too busy to attend personally to wall-painting, and much of his attention was taken up with the composition of the cartoons which he executed, with help from assistants, for the tapestries of the Sixtine Chapel. It would be impossible to describe these masterpieces or the tapestries made from them in the space here at our command. The cartoons may be seen at the Kensington Museum, the tapestries at the Vatican. They are masterpieces worthy of a pilgrimage; the first completed in December 1516, the second woven at Brussels in 1519. At this period of his career Raphael was a welcome guest in the best circles of Rome, painted the likenesses of the pope's relatives, Giuliano and Lorenzo de' Medici, and was asked in vain for pictures by the Duke of Ferrara. His portraits of the Duke of Urbino, Castiglione, Bembo, Navagero, and his decoration of Cardinal Bibiena's rooms at the Vatican tell of the company which he frequented. When Leo X. succumbed to Francis I. after Marignano Raphael followed the pontiff to Florence and Bologna, and found there the new patrons for whom he executed the Sixtine Madonna, the St Cecilia of Bologna, and the Ezechiel of the Pitti. The labours subsequently completed were immense, including the Spasimo at Madrid, the Holy Family and St Michael, which the pope sent to the king of France in 1518, and the likeness of the vice-queen of Aragon, followed by the celebrated portrait of the Violin-player of the Sciarra collection at Rome. Wall-painting, with help from the assistants, was diligently carried on, and produced the cycle of the Psyche legend at the Farnesina, the gospel-scenes of the Loggie of the Vatican, and the frescoes of the Hall of Constantine. The last work done in the master's painting-room was the Transfiguration, which was nearly finished when Raphael died of a pernicious fever caught in the excavations of Rome. He expired on the 6th of April 1520, after a week's illness.

See Castiglione, *Cortigiano* (Padua, 1766); Pungileoni, *Elogio Storico di Raffaello Santi* (Urbino, 1822); Rumohr, *Forschungen* (Berlin, 1827); Passavant, *Raphael* (Paris, 1860); Campori, *Notizie e Documenti* (Modena, 1870); Vasari, *Vite* (ed. Lemonnier, Florence, 1846); Müntz, *Raphael* (Paris, 1881); Cugnoni's *Life of Chigi* (Rome, 1881); Grimm, *Das Leben Raphaels* (Berlin, 1886; Eng. trans. 1889); Springer, *Raffael und Michelangelo* (2d ed. Leip. 1883); Lübke, *Rafaels Leben und Werke* (Dresden, 1881); Von Lützow, *Raffaels Bildungs- und Entwickelungsgang* (Vienna, 1890); Malvasia, *Felsina Pittrice* (Bologna, 1678); Paris de Grassi's Diaries (MS. in the Vatican); and *Raphael, his Life and Work*, by the present writer and G. B. Cavalcaselle (1882).

Raphania, or ERGOTISM, is a disease which was much more prevalent some centuries ago than it is at present. The name *raphania* was first given to it by Linnæus, who thought the morbid symptoms were dependent upon the mixture of *Raphanus Raphanistrum*, or jointed charlock, with the wheat used as food. It was suspected, as early as the end of the 16th century, that the disease was due to the development of a fungus in the grain, and this fact is now established beyond doubt, although some writers hold (as Linnæus did) that this morbid state is also produced by the presence of poisonous plants, especially *Lolium temulentum*, or darnel, among the grain. Deficiency of proper food probably contributes to cause the disease, for it rarely occurs when ergot is used medicinally. Although rye is the ordinary seat of the poisonous fungus, wheat, rice, and other grains are liable to be similarly affected, and to produce similar results. See ERGOT.

There are two forms of the disease—the spasmodic and the gangrenous. In both, symptoms of irritation of the digestive organs are the first to appear. In the spasmodic form tingling or itching of various parts of the body, with loss of sensation in the feet and hands, are the most constant symptoms. Violent contractions of the muscles may occur, giving rise to intense pain, and sometimes epileptic convulsions supervene. In the gangrenous form the extremities are painful, red but cold, and not easily moved; and after a varying time gangrene supervenes. With regard to treatment, the main thing is to replace the poisonous flour by easily digested, wholesome food. Whatever be the form of treatment adopted, the mortality in the gangrenous form is usually 90 per cent. The spasmodic form is much less destructive to life.

Raphia, the name of a group of palms (see Vol. VII. p. 722), the leaves, bark, and pith of which are used for various purposes. The bast of one South American species, *R. tædigera* or Jupati-palm, is largely used by gardeners everywhere for tying up plants, in fastening grafts, &c. And the midribs of the leaves of another species, found in Madagascar, &c., are supposed to be what was taken for 'roc's quills,' the feathers of the fabled Roc (q.v.).

Raphoe, a market-town of Donegal, 15 miles SSW. of Londonderry. Its former see was united to Derry in 1835. Pop. 986.

Rapidan, a river of Virginia, and tributary of the Rappahannock (q.v.).

Rapids. See WATERFALLS, RIVER, NIAGARA, NILE, PARANÁ, &c.

Rapier, a light, highly-tempered, edgeless, thrusting weapon, finely pointed, and about 3 feet in length. It was for long the favourite weapon in duelling, and was worn by every gentleman. At present it is worn only on occasions of court ceremonial, and answers no other purpose than to incommode the wearer. Instructions for Fencing (q.v.) are for fencing with the rapier or foil. See SWORD.

Rapin de Thoyras, PAUL DE, a French historian of England, was descended from a Protestant Savoyard family, which settled in France in the 16th century, and was born at Castres, in Languedoc, March 25, 1661. He studied at the Protestant college at Saumur, and passed as advocate in 1679, but had no liking for the profession; and when the revocation of the Edict of Nantes (1685) forced him to leave France he sought employment without success in England, and afterwards in Holland, where he enlisted in a corps of volunteers at Utrecht, formed by his cousin-german, Daniel de Rapin. With his company he followed the Prince of Orange to England in 1688, was made ensign in the following year, and distinguished himself by his bravery at the siege of Carrickfergus, the battle of the Boyne, and the siege of Limerick, where he was shot through the shoulder by a musket-ball. In 1693 he was appointed tutor to the Earl of Portland's son, with whom he travelled in Holland, Germany, and Italy, after which he took up his residence at the Hague, but in 1707 withdrew with his family to Wesel, where he devoted the remaining seventeen years of his life to the composition of his great work. The severity of his labours is believed to have shortened his days. He died May 16, 1725. Rapin's *Histoire d'Angleterre* was published at the Hague in 8 vols. the year before his death. It was undoubtedly, as Voltaire has said, the best work on English history that had until then appeared; full, minute, careful in the citation of authorities, clear, rapid, and accurate in narration, methodical in the arrangement of its materials, comparatively impartial in spirit, and yet betraying on the part of the author an honourable reverence for law and liberty.

Rapin begins with the invasion of Britain by the Romans, and ends with the death of Charles I. The work was continued to the death of William III. by David Durant (Hague, 2 vols. 1734). The best edition of the *Histoire* in its augmented form is by Lefebvre de Saint-Marc (Hague, 16 vols. 1749 *et seq.*). The original was translated into English by the Rev. Nicholas Tindal (Lond. 15 vols. 1725–31), and subsequently by John Kelly (in 2 vols. fol.).

Rapp, GEORGE, founder of the Harmony Society, known as the sect of Economites, was born at Würtemberg in 1770, and, after an attempt to restore the church of New Testament days in Germany, emigrated with his followers to America in 1803 and settled in Butler county, Pennsylvania. There he established a settlement which he named Harmony. In 1815 the community removed to Indiana and founded New Harmony (q.v.); but this was sold in 1824 to Robert Owen, and Rapp and his followers returned to Pennsylvania, where, on a tract of 2400 acres forming Harmony township, in Beaver county, they built the village of Economy, on the right bank of the Ohio, 17 miles N.W. of Pittsburg. There they engaged in manufactures and agriculture, and there Rapp died 7th August,

1847. The Economites practise rigid economy, live lives of celibacy, and have acquired great wealth, consisting of oil territory and other real estate, railway stock, bank shares, &c. The Harmony Society is a voluntary association living under certain rules of their own adoption, to which every one who is admitted must subscribe, and, while the property of the association is held in common, any person on becoming a member renounces all right to claim any of the common estate should he afterwards desire to withdraw. At one time the membership numbered 600, but at present there are less than 100.

Rapp, Jean, Count, a French general, was born at Colmar, in the French department of Haut-Rhin, 27th April 1772. He was intended for the church, but his taste for a military life led him to enrol himself (1788) in the mounted 'chasseurs' of the French army. Rapp distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix at Marengo he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz upon the Russian Imperial Guard was rewarded with the grade of general of division (1805). . For his services at Lobau he was named a Count of the Empire (1809). He opposed the Russian expedition, but accompanied the Emperor throughout the whole of it. His obstinate defence of Danzig for nearly a year against a powerful Russian army gained for him greater renown, and his chivalrous and considerate treatment of the unfortunate inhabitants during the siege was warmly appreciated by them. The Russians, contrary to the articles of capitulation, sent Rapp and his garrison prisoners to Russia, and he did not return to France till July 1814. On reaching Paris he was well received by Louis XVIII.; but in 1815 he went over to his old master, and was appointed commander-in-chief of the army of the Rhine, and peer of France. After Waterloo Rapp again submitted to Louis. Re-created a peer of France (1819), he held various offices about the court, and died at Paris, 8th November 1821. See his Memoirs (1823), and Spach's *Biographies Alsaciennes* (1871).

Rappahannock, a river of Virginia, rises in the Blue Ridge of the Alleghany Mountains, receives the Rapidan (above this point it is sometimes called the North Fork), and flows about 125 miles south-east to Chesapeake Bay. It is tidal and navigable to Fredericksburg. The Rappahannock and the Rapidan were the scenes of some of the most sanguinary battles of the War of Secession, at Fredericksburg, Chancellorsville, and the Wilderness.

Rappee′ (Fr. *râpé*, 'rasped'), a coarse-grained species of Snuff (q.v.).

Rappen. See Rap.

Raptores. See Birds of Prey.

Raratonga. See Cook Islands.

Rarey. See Horse, Vol. V. p. 795.

Ras (= Heb. *rosh*), an Arabic word, signifying 'head,' 'promontory,' occurs in the names of many capes on the Arabian and north African coasts, and also in Sicily and Malta, as in Ras-el-Had, the eastern point of Arabia.

Rashes, affections of the skin, characterised by a red superficial efflorescence, diffused or in patches, disappearing under pressure, and usually ending in desquamation. To this division of cutaneous disorders belong Measles, Scarlatina (or Scarlet Fever), Erysipelas, Erythema, Roseola (or Scarlet Rash), and Nettle Rash. Of these rashes Measles, Scarlatina, and Erysipelas are rather to be regarded as fevers or blood diseases than as cutaneous diseases in the true sense of the phrase.

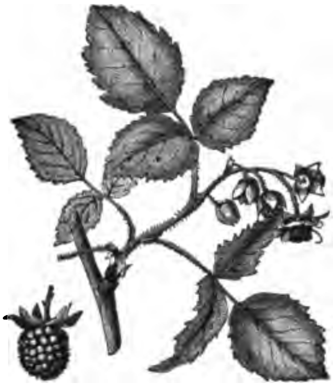
Rashi (from the initials of Rabbi Shelomo Izaaki, often erroneously called Jarchi), the greatest Jewish commentator and exegete, was born about 1040, at Troyes, in France. Philology, philosophy, medicine, astronomy, civil and ecclesiastical law, and exegesis were the chief branches of his learning; and to a rare proficiency in them he united a complete mastery over the whole range of Scripture and the Talmudical sources. In order further to perfect himself for his gigantic task he travelled for seven years, visiting the schools of Italy, Greece, Germany, Palestine, Egypt. His chief work is his Commentary on the whole of the Old Testament. Rashi's style is extremely brief and concise, yet clear and pregnant; obscure and abstruse only to those who lack the necessary preliminary knowledge. According to the fashion of its day, it is replete with allegorical or rather poetical illustrations, gathered from the wide fields of the Midrash within and without the Talmud. This Commentary—entirely translated into Latin by Breithaupt, and partly also into German—was the first book ever printed in Hebrew (Reggio, 1474). Of his numerous other works may be mentioned his Commentary on the Babylonian Talmud; a Commentary to the *Pirke Aboth;* the *Pardes*, treating of Laws and Ceremonies; a Collection of Legal Votes and Decisions; a Commentary on Midrash Rabbah; a Book of Medicine; and a Poem on the Unity of God. He died 13th July 1105; and such was his piety and his surpassing eminence that later generations wove a shining garland of legends around his head.

Rask, Rasmus Christian, philologist, was born at Brändekilde, near Odense, in the island of Fünen, 22d November 1787, studied at Copenhagen, and in 1808 published his first work on the rules of the Icelandic language. During the years 1807–12 he occupied himself with drawing up grammatical systems for most of the Germanic, Slavonic, and Romance tongues, and in comparing them with those of India. He then visited Sweden, and in 1813 proceeded to Iceland, where he lived for three years. On his return to Copenhagen he was appointed sub-librarian to the university, and in 1818 published his splendid researches concerning the origin of the Icelandic language. After spending a year (1817) in Stockholm, where he published his admirable Anglo-Saxon grammar and the first critical edition of the *Snorra Edda* and the *Edda Saemundar*, he went to St Petersburg, and there devoted himself for two years to the study of the oriental languages, principally Sanskrit, Persian, and Arabic, while at the same time he also acquired a competent knowledge of Russian and Finnish. Thus equipped, he proceeded to Astrakhan, and then commenced a journey through the country of the Turkomans, the Caucasus, Persia (adding meanwhile the Mongol and Manchu dialects to his already enormous linguistic acquisitions), and finally Ceylon, where he made himself acquainted with Singhalese and Pali, and wrote his *Singalesisk Skriftlaere* (1822). In 1823 Rask returned to Copenhagen, laden with learning and rare manuscript treasures, of which the greatest part was presented to the university. In 1825 he was appointed professor of Literary History, in 1828 of Oriental Languages, and in 1831 of Icelandic. But his immense labours had exhausted his energies, and he died, 14th November 1832, at the early age of forty-five, a victim of hard work. Rask also wrote on Frisian grammar (1825), on ancient Egyptian chronology (1827), on Hebrew chronology (1828), grammars of several languages, and a great number of miscellaneous articles in the learned journals of the North, which were collected after his death, and published (3 vols. 1834–38). There are English editions of his Anglo-Saxon, Danish, and Icelandic grammars. See the Lives by Petersen (1870) and Rönning (1887).

Raskolniks, the name of a variety of sects in the Russian Church. See Russia.

Raspail, François Vincent (1794–1878), a French chemist, doctor, and revolutionist, whose camphor-system (1845) was a forerunner of antiseptic surgery. See a monograph on him by Saint-Martin (Paris, 1877).

Raspberry (*Rubus Idæus*), the most valued of all the species of Rubus (q.v.). The characters of the leaves, flowers, and fruit of raspberry are well illustrated in the accompanying figure. The wild raspberry has scarlet fruit, and is found in thickets and woods throughout the whole of Europe and the north of Asia. It is common in Britain. The raspberry has long been in cultivation for its fruit. There are many cultivated varieties, with red, yellow, and white fruit, much exceeding the wild kind in size. The root is creeping, perennial; the stems only biennial, bearing fruit in the second year, woody, but with very large pith. Plantations of raspberries are most easily made by means of suckers. The raspberry loves a light rich soil, and is rather partial to a shady situation. The tall kinds are unsuitable in situations much exposed to winds, as the stems are easily broken. The rows are generally about 4 feet apart, the plants 3 to 4 feet apart in the rows. The young stems are thinned out to allow free access of air to those which are left. Stakes are often used to support the stems, or they are variously tied together. The fruit is used for dessert; for jams, jellies, &c.; for making or flavouring many kinds of sweetmeats; and, mixed with brandy, wine, or vinegar, for the preparation of *Raspberry Syrup*, *Raspberry Vinegar*, &c. Different preparations of it are used in medicine in cases of fever, inflammation, &c. Raspberry vinegar is a particularly grateful and cooling drink in fevers. Raspberries, fermented either alone or along with currants and cherries, yield a strong and very agreeable wine, from which a very powerful spirit can be made. Some of the other species of Rubus most nearly resembling the raspberry produce also agreeable fruits. *R. odoratus* is a highly ornamental shrub, a native of Canada and the northern states of America, is frequent in gardens both in Europe and America, but rarely produces its fruit in Britain.



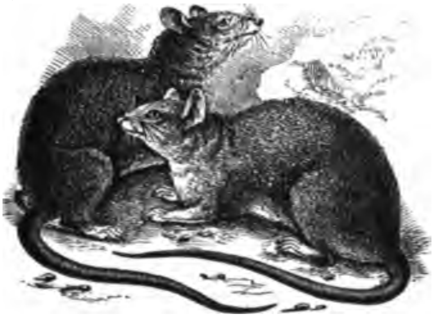
Raspberry (*Rubus Idæus*).

Rassam, Hormuzd, Assyriologist, was born, the son of Chaldean Christian parents, at Mosul in Mesopotamia in 1826. He gained the friendship of Layard, and assisted him in his excavations at Nineveh in 1845–47 and 1849–51, and then succeeded him, until 1854, as British agent for conducting Assyrian explorations. His grandest success was the finding of the palace of Assur-bani-Pal (Sardanapalus). After holding in the following years political offices at Aden and Muscat, he was sent (1864) by the British government to Abyssinia, to demand the release of the Europeans kept in prison by King Theodore; but that potentate cast him also into prison, and only released him with the rest of his captives after his army had been defeated by Sir R. Napier in 1868. From 1876 to 1882 Rassam was employed by the trustees of the British Museum in making explorations in Mesopotamia, and discovered Sepharvaim (Sippara) and Kuthah. He published *The British Mission to Theodore, King of Abyssinia* (1869).

Rastatt, or Rastadt, a town and first-class fortress in Baden, stands on the Murg, 3 miles from its junction with the Rhine, and 15 miles SW. of Carlsruhe. Steel wares, beer, and tobacco are manufactured. From 1725 to 1771 the town was the residence of the Margraves of Baden-Baden. The present fortifications were erected in 1840–48 by Austrian engineers to protect the northern entrance to the Black Forest. Rastatt is memorable for two congresses—the first in 1714, when a treaty of peace, which brought the war of the Spanish Succession to a close, was signed between Marshal Villars and Prince Eugene; and the second in 1797–99. On the breaking up of this latter congress without any definite result the three French plenipotentiaries set out for Strasburg; but they had scarcely got beyond the gates of Rastatt when they were attacked by Austrian hussars, and two of the three slain, whilst the third was left for dead in a ditch. Their papers were carried off, but no further spoil was taken. It seems that the Archduke Charles gave orders to the hussars to drive the French representatives out of Rastatt and take away their papers; the killing was the work of the officers, misunderstanding their orders. The town played a prominent part in 1849 as the stronghold of the revolutionists in Baden. Pop. (1890) 11,570.

Rat, a name applied to the larger species of the rodent genus Mus, but especially to the Brown Rat (*M. decumanus*) and the Black Rat (*M. rattus*). Like the mice, which are included in the same genus, rats are agile and graceful animals, skilful in burrowing, predominantly nocturnal. The bright eyes, large ears, naked muzzle, soft fur, and long scaly tail are familiar external characteristics. The brown or Norway rat measures about eight inches in length, not including the tail, which is usually shorter than the body. It is grayish-brown in colour, with flesh-coloured ears, feet, and tail. Black varieties sometimes occur. It is believed to have travelled gradually westwards, perhaps from China, and did not reach France or Britain till towards the middle of the last century. In 1727 swarms swam across the Volga, and rapidly spread over Europe, dispossessing the black rat which had arrived some centuries before. According to some, the black rat was brought to Britain in 1732 in ships from the East Indies. As a common stowaway in ships, it has been distributed over the world, reaching America about 1775. The black rat is smaller and slimmer than the brown rat. The head and body measure six or seven inches in length; the tail is an inch or two longer. The head is more slender than in the brown rat, and the ears are rather larger. In most the colour is glossy black, but white and piebald varieties may occur. It is less fierce than the brown rat, and seems to be less distinctively a burrowing rodent, preferring the upper parts of houses to the cellars. Its original home seems to have been in the East, perhaps in Persia, but it must have reached northern Europe by the 13th century at least, for its troublesome presence is noticed by Albertus Magnus.

These species of rat have similar habits, and the stronger, larger, and fiercer form sometimes tends to exterminate the other, this being one of the few instances which Darwin gives of his conclusion that the struggle for existence is keenest between closely allied species. As to the habits of rats, it is well known that they find their way everywhere; no door is shut to them; they gnaw and burrow through almost all obstacles. They run and leap, they climb and swim. They are fond of animal food, but will eat almost anything; corn, fodder, all kinds of human food, eggs, young birds, small mammals, all is grist to their mill. In illustration of their voracity it is often related that in a slaughter-house near Paris thirty-five dead horses were picked to the bones in a single night. When pressed by hunger they display much boldness, and their skill in stealing even such unmanageable goods as eggs is well known. Their senses, especially of smell and hearing, are acute, and their intelligence is well developed. The mothers are careful of their tender offspring, but the males display the reverse of parental affection. The albinos are delightful pets. Brehm cites several strange observations in regard to the so called 'rat-kings,' which consist apparently of a number of diseased rats with entangled tails. It is said that over two dozen individuals have been found thus entangled. Rats are very prolific, breeding four or five times a year. Four to ten young are brought forth at a birth, after a very short gestation of about three weeks. Moreover, the young become sexually mature in about six months. All the conditions favour rapid increase, and plagues of rats by no means easy to cope with not unfrequently occur. Rats do much damage in various ways—by their burrows, by their voracious gnawing of all sorts of things, by their omnivorous appetite. They undermine walls, destroy woodwork, devour stores. When pressed with hunger they may attack large mammals, and even man himself sometimes falls a victim. They have been known to eat holes in fat pigs, to gnaw off the legs of birds, and even to destroy the soles of elephants' feet. Their destruction may in many cases be left to their natural enemies—birds of prey and carnivorous mammals—but it is often necessary to resort to the use of traps and poisons. One of the most effective ways of destroying them is to feed them with a mixture of meal and plaster of Paris. Their skin is sometimes used for making glove-leather; and their flesh, according to *The Farmer's Friends and Foes*, by Theodore Wood (1887), is, if similarly cooked, superior to rabbit.



Black Rat (*Mus rattus*); Brown Rat (*Mus decumanus*).

There are several genera nearly related to Mus—e.g. Nesocia, of which an East Indian species, the Bandicoot-rat (*N. bandicota*), may measure over a foot in length; Hapalotis, represented by little jerboa-like animals in Australia; Echinothrix, with one species in Celebes, a rat with a very long muzzle, and spines among the fur; Cricetomys, represented by a formidable African species (*C. gambianus*) of large size and ferocious voracity. To some more remotely related rodents the term rat is often popularly applied—e.g. to the Water-vole (*Arvicola amphibius;* see VOLE), and to the American Musk-rat (*Fiber zibethicus*). See MOUSE, RODENTIA.

Rata (*Metrosideros robusta*), a New Zealand tree related to various species of Ironwood (q.v.). The seed is believed to be swallowed by a caterpillar, and to sprout in its interior, the fostering grub being of course killed. The tree begins life as a climber, attached to other forest-trees, and attains a height of 150 feet; but when it has killed the supporting stem the rata is able to sustain its own weight and to grow on as an independent tree, attaining ultimately a height of near 200 feet. The wood is very hard, formerly much used for making clubs, and is valuable for shipbuilding. See Abercromby, *Sea and Skies* (1889).

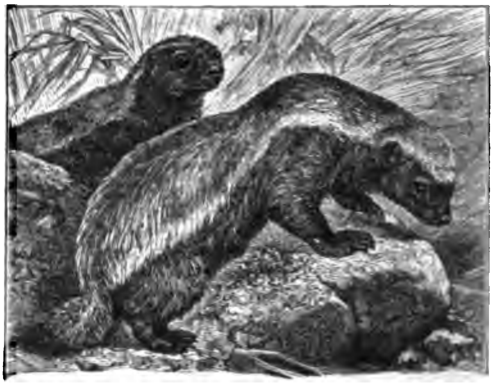
Ratafi'a, a flavouring essence made with the essential oil of Almonds (see ALMONDS). The name is sometimes given to other essences.

Ratak. See MARSHALL ISLANDS.

Ratcliffe Tables. See FRIENDLY SOCIETIES.

Rate. See BOROUGH, COUNTY, POOR-LAWS, and (under Tax) TAXATION.

Ratel (*Mellivora*), a genus of quadrupeds of the Bear family (Arctoidea), nearly allied to the Glutton (q.v.), from which it differs in having one false molar less in each jaw and the upper tubercular teeth slightly developed. The general aspect is similar to that of the badgers, but heavier and more clumsy. Three species are known, which inhabit Africa and India; one species, the Cape Ratel (*M. ratel* or *capensis*), inhabits the south of Africa, and is said to feed much on bees and their honey, its thick fur protecting it against their stings; the other inhabits the north of India, prowls about by night, is a voracious devourer of animal food, and often scratches up recently interred bodies from their graves. The Cape ratel is about the size of a badger, gray above, black below. It is easily tamed, and is amusingly active in confinement, continually running about its cage, and tumbling strange somersaults to attract the attention of spectators, from which it seems to derive great pleasure.



The Cape Ratel (*Mellivora ratel*).

Rath, the Irish name for a prehistoric hill-fort. See HILL-FORTS.

Rathenow, a town of Prussia, on the right bank of the Havel (here crossed by a stone bridge), 43 miles by rail W. by N. of Berlin. Optical instruments, wooden wares, machinery, bricks and tiles, are made. Pop. (1885) 13,072; (1890) 16,353.

Rathkeale, a town of Ireland, on the river Deel, 19 miles SW. of Limerick by rail. Pop. 2549.

Rathlin, a crescent-shaped island off the coast of Antrim, 6½ miles N. of Ballycastle. Measuring 6½ by 1½ miles, and 3398 acres in area, it has fine cliffs, consists of columnar basalt and limestone, and attains a maximum altitude of 449 feet. The soil in the valleys is fertile, but fishing is the leading industry, the kelp-manufacture being quite extinct. Rathlin is identified with the *Ricinia* of Ptolemy, *Ricnia* of Pliny, and *Raghlin* or *Ragherin* ('fortress of Ireland') of later writers. St Columba established a church here in the 6th century; and Bruce in 1306 took refuge in a castle, now a ruin. Pop. (1841) 1039; (1891) 365.

Ratibor, a town of Prussian Silesia, stands on the left bank of the Oder, 44 miles SSE. of Oppeln. It is the chief town of the principality of Ratibor, which, a sovereign duchy from 1288 to 1532, has since 1742 been subject to Prussia. The town manufactures tobacco, shoes, paper, glass, sugar, furniture, &c., and has large ironworks. Pop. (1875) 17,269; (1890) 20,578.

Ratich, WOLFGANG (sometimes called RATKE or Latinised as RATICHIUS), educationist, was born at Holstein in 1571, based a new system of education on Bacon's philosophy, which he expounded to the German princes at Frankfort in 1612, and had an opportunity of putting into practice at Köthen in 1618, by favour of the prince of Anhalt. His principle was the realistic one of proceeding from things to names, and from the mother-tongue to the study of foreign ones. But he got into bad relations with the clergy and with his patron, and was actually imprisoned for eight months. A second chance given him at Magdeburg in 1620 ended also in failure, and after some years of ineffective wanderings he died at Erfurt in 1635.

There are monographs on him by Krause (1872), Störl (1876), and Schumann (1876); and see R. H. Quick, *Essays on Educational Reformers* (1868; new ed. 1890).

Ratio. See PROPORTION, FLUXIONS.

Ration, in the British Army, is the allowance of provisions granted to each officer on service and in some colonies, and to each non-commissioned officer and soldier at all times unless on furlough or otherwise specially provided for. The ordinary ration is ¾ lb. of meat, with 1 lb. of bread ('best seconds'), increased by ¼ lb. of meat when in camp or abroad. Sometimes a grocery ration (tea or coffee, sugar, salt, &c.) is also issued, 1½d. being then deducted from the pay of the recipient. When men are not supplied with bread and meat rations an allowance of 6d. per diem is granted them. The bread ration may be increased during operations in the field, though not above 1¼ lb. of bread or 1 lb. of biscuit, and the officer commanding may direct the issue in addition of wine, spirits, or any other article of subsistence equivalent thereto. The families of soldiers accompanying them abroad are allowed the following: the wife (married under regulations), half a ration; each legitimate child under fourteen, quarter ration. A ration of forage at home consists of 10 lb. of oats, 12 lb. of hay, and 8 lb. of straw for each horse. An extra 2 lb. of oats is allowed in camp. Staff-officers and mounted officers of infantry provide their own forage except on active service, and are granted a pecuniary allowance of about 1s. 7d. (varying with the locality) per day to enable them to do so.

The full navy ration consists of the following articles: Daily—1¼ lb. of ship-biscuit or 1½ lb. of soft bread, ⅛ pint of spirit, 2 oz. sugar, 1 oz. chocolate, ¼ oz. tea; 1 lb. fresh meat and ½ lb. of fresh vegetables, when these are procurable; otherwise, 1 lb. salt pork, with ⅛ pint split peas, or 1 lb. of salt beef, with 9 oz. flour, ¾ oz. suet, and 1½ oz. of currants or raisins. On alternate salt-beef days—2 oz. preserved potatoes. Weekly—¼ pint oatmeal, ½ oz. mustard, ¼ oz. pepper, ¼ pint vinegar. The sailor's ration is issued free of any stoppage.

Rationalism, as 'a system of belief regulated by reason,' might be expected to mean the opposite of irrationality, crass ignorance, and perverse prejudice; and the growth of rationalism would then mean the progress of civilisation, the development of the intellectual and moral nature of men and nations. It is nearly in this sense that Lecky uses the word; attributing to its wholesome influence the decay of the belief in magic, witchcraft, and other hideous superstitions, and the substitution of a kindly tolerance in place of blind zeal for persecution.

But in ordinary English usage, general as well as theological, the connotation of the word is substantially different. It is generally employed as a term of reproach for those who, without utterly denying or attempting to overthrow the foundations of religion, make such concessions to the enemy as tend to subvert the faith; who admit the thin end of a wedge that pressed home will rend and destroy the fabric. They rely, more or less exclusively and blameworthily, on mere human reason instead of simply, frankly, and fully accepting the dicta of the divine word. An atheist would not be spoken of as a rationalist, nor would an irreligious, blaspheming freethinker. Rationalists in ordinary parlance are those who are more 'liberal' or 'advanced' than the main body of the orthodox; in especial those who take a 'low' view of inspiration, and minimise or explain away the miraculous details of the history of revelation and redemption. Rationalism is not so much a body of doctrine as a mood of mind, a tendency of thought shown in the attempt to apply to religious doctrine, the sacred story, and the sacred scriptures the same methods of research and proof as are used in mere human science and history, and the literatures of all times and peoples. This feature is also recognised, though with approval, by Lecky in his wider use of the word: 'Rationalism,' he says, 'leads men on all occasions to subordinate dogmatic theology to the dictates of reason and conscience. . . . It predisposes men in history to attribute all kinds of phenomena to natural rather than to miraculous causes; in theology to esteem succeeding religious systems the expression of the wants and aspirations of that religious sentiment which is implanted in man; and in ethics to regard as duties only those which conscience reveals to be such.' Rationalism, not being a system but a temper or drift of mind, has different aims at different times; just as 'liberalism' in politics was not the same thing before 1832 as it came to be after, or in 1832 what it was in 1867, 1885, or 1890. Opinions are heard in sermons and expounded in books by theological professors in 1891 without proving serious stumbling-blocks to the majority, which in 1860 would by all but a small minority have been regarded as distinctly rationalistic. Thus, till lately it was alarming rationalism to dispute the Mosaic authorship of Genesis, the Solomonic authorship of the Song of Songs, and the Davidic authorship of any of the Psalms; now the newer view is assumed by many orthodox teachers. And in the last quarter of the 19th century scholars earnestly support views which they themselves treated as highly dangerous twenty or thirty years earlier. Rationalism of this kind is a transition stage, but not necessarily a transition to unbelief.

The rationalistic temper may be traced in almost every age of the church's history: no doubt the extremer representatives of the Petrine party in sub-apostolic times regarded Paul's views as lax and rationalistic. If the Reformation was not rooted in rationalism (as to Catholics it seems to have been), many of the contentions of the reformers were such as all rationalists accept and sympathise with. Zwingli was a rationalist to Luther and the Lutherans; Socinus was of course a rationalist of an extreme type. The dry and barren dogmatic orthodoxy of Germany in the 17th century fostered a rationalism as cold and unspiritual. In the England of the 18th century, during the Deistic controversies, the Evangelicals of Germany thought, not altogether unjustly, that some of the most conspicuous opponents of the deists were not themselves free from the charge of rationalism; and the Evangelicals of Scotland regarded the 'moderates' of the 18th century, however orthodox in dogma, as thoroughly rationalistic in spirit. Rationalism is not so much opposed to orthodoxy as to mysticism, and what was called variously fanaticism, enthusiasm, 'high-flying,' and methodism. A soulless orthodoxy has not seldom been opposed by a fervent piety that by a not unnatural antithesis has tended to run into heretical extremes; while, on the other hand, actual rationalists have often been foremost amongst the champions of religion, and of revealed religion, against radical freethinking, deism, naturalism, and materialism.

In Germany the term rationalism is more definite in its reference than in England, but is not always used in quite the same sense. The two defective and mutually opposed schools of thought that Kant sought to supersede by his critical philosophy were, on the one hand, a shallow empiricism, and on the other a baseless and overweening metaphysical dogmatism or rationalism. Bacon also contrasted empirical philosophers with rationalists who spin their systems as spiders do cobwebs out of their own bowels. Wolff presents the most conspicuous example of the philosophical rationalism which held that all that is in heaven above and earth beneath could be 'proved' by pseudo-mathematical methods: and as God, responsibility, and immortality were amongst the things that could be proved at endless length and in various ways, this philosophical rationalism led directly up to a rationalist theology, which consisted mainly in a series of dogmas to be demonstrated from the philosophical axioms, including some at least of the doctrines of revealed religion. What in revelation could not be demonstrated according to this scheme was disallowed or explained away. Practical religion became in the *Aufklärung* a system of mere utilitarian morals.

Kant prepared the way for a deeper view of man, history, and the universe; but his own explicit statements on positive religion were pronouncedly rationalistic: and the negative side of his philosophy was well calculated to lay the foundations of another school of theological rationalists (often called *Vulgär-rationalismus*), of whom Tieftrunk (1759–1837), Bretschneider (1776–1848), and Wegscheider (1771–1849) may be taken as representatives. De Wette (1780–1849) shows the transition to Schleiermacher, who (though in the English sense of the word he was an outspoken rationalist) combined what was best in the opposing schools of rationalists and supernaturalists, founded a higher and truer religious philosophy, and heralded even the 'pectoral theology' of the mediation school.

But it was not in the sphere of speculation and dogma, but in that of biblical criticism, that German rationalism accomplished its main work, and left its deepest mark on subsequent theological development. In the early 18th century the 'Germans in Greek were sadly to seek,' as English scholars thought: the Germans themselves admitted that in studying the Scriptures they failed to escape from dogmatic presuppositions, and that it was the English divines who approached the New Testament in a historical spirit, which in the Germany of that day caused misgivings. It is noteworthy that Semler (1725–91), 'the father of rationalism,' obtained the doctorate for a thesis written against Whiston, Bentley, and other English scholars in defence of the 'three heavenly witnesses' of 1 John, v. 7. Semler in the schools, supported by Lessing and Herder in literature, was soon teaching that the books of the Bible must be studied as human productions: Eichhorn (1752–1827) thoroughly accepted and applied that principle. Rationalist criticism was carried to an absurd length by Paulus (1761–1851), who taught that the Gospels contained natural and not supernatural events, and whose most ingenious but inept 'explanations' of the miracles of the New Testament, 'retaining everywhere the husk but surrendering the religious kernel,' were made a laughing-stock by Strauss. Strauss's 'mythical theory' (excessively rationalist in the English sense of the term) was in its turn superseded by Baur (q.v.) and the new Tübingen school, whose epoch-making work marks the opening of the most recent period in scriptural criticism. The 'notes' of the newer criticism, whether more or less rationalist from the older English point of view, are the conviction that all truth is one, whether derived from the natural sciences, historical research, the dictates of conscience, or the records of divine revelation, and the willingness to accept what is apparently established by the consensus of scholars even where this involves giving up the belief in the inerrancy of Scripture. Many of the contentions of self-confident and aggressive rationalism have long since mutually destroyed one another. Nothing can be more contrary to the true historic and scientific spirit than the assumptions of a reckless sciolism: there is a false and a true rationalism; and it should be remembered that much that is now most surely believed by all has at one time or another been branded as rationalistic.

See the church histories; Tholuck, *Vorgeschichte des Rationalismus* (1853) and *Geschichte des Rationalismus* (1865, unfinished), and earlier monographs by Stäudlin and Rückert; H. J. Rose's essay *On the State of Religion in Protestant Germany* (1825), and Pusey's *Historical Inquiry into the Causes of the Rationalist Character of the Theology of Germany* (1828–30); A. S. Farrar, *Critical History of Free Thought* (1862); R. W. Mackay, *The Tübingen School and its Antecedents* (1863); Lecky, *History of Rationalism in Europe* (1865); Hurst, *History of Rationalism* (New York, 1866); Fisher, *Faith and Rationalism* (New York, 1879); Tulloch's *Rational Theology* (1872) and *Movements of Religious Thought* (1885); Draper, *Intellectual Development of Europe* (1867) and *Conflict between Science and Religion* (1874); Cairns, *Unbelief in the Eighteenth Century* (1881); Pfleiderer, *The Development of Theology in Germany since Kant* (Lond. 1890); also the articles in this work on CHURCH HISTORY, REFORMATION, DEISM, EXEGESIS, and works there cited, with the articles on the chief rationalist critics and thinkers.

Ratisbon (Ger. REGENSBURG), a town of Bavaria, stands on the right bank of the Danube, 82 miles by rail NNE. of Munich. Formerly a free city of the empire and seat of the Diet, Ratisbon presents a strongly marked mediæval character, with narrow crooked streets, and high, many-cornered, gabled houses. Among its churches the most remarkable is the noble Gothic cathedral, begun in 1275, but not completed till 1534, and restored in the 19th century. The Church of St James, formerly belonging to the Irish (*Scoti*) Benedictines, dates from the 12th century, and is built in the pure Byzantine style. The old town-hall was used for a century and a half (1645–1806) as the place of meeting for the imperial diet. At the Golden Cross Inn Charles V. met the mother of his son Don John of Austria. There are numerous interesting private dwellings, as the Thurn and Taxis Palace, with library (40,000 vols.), picture-gallery, &c., the royal villa, and others. A stone bridge (1135–46), 1024 feet long, connects Ratisbon with the busy trading suburb of Stadt am Hof. The manufactures include porcelain and stoneware, brass and steel wares, leather, tobacco, lead-pencils, chemicals, &c.; and there is an active trade, especially in corn and salt. Pop. (1875) 31,487; (1890) 37,365. Originally a Celtic town, Radasbona (whence Ratisbon), this place was made by the Romans a frontier fortress. Later it was the capital of the Dukes of Bavaria. Frederick II. declared it (1245) a free imperial city. During the 14th century it was the chief seat of the Indo-Levantine trade, and was one of the most populous cities of southern Germany. Here were signed the Ratisbon Interim (q.v.) in 1541 and the armistice between France and Austria in 1684. The city was stormed by Duke Bernhard of Weimar in 1633, and by both the Austrians and the French in 1809. It was ceded to Bavaria in 1810. See works by Weininger (7th ed. 1884) and Janner (3 vols. 1883–86).

Ratna'giri, a coast-town of India, 136 miles S. by E. of Bombay, with a fort and sardine-fishery. Pop. 12,616.—The *district* has an area of 3922 sq. m. and a pop. (1891) of 1,105,926.

Rattan, a walking-stick made from the stem of a palm that grows in Sumatra. See PALM, p. 722.

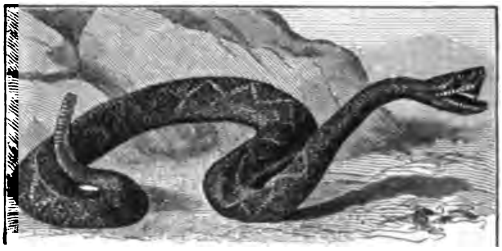
Rattany. See RHATANY.

Rattazzi, URBANO, an Italian statesman, was born at Alessandria, June 29, 1808. He studied law at Turin and practised as an advocate with great success at Casale. After the proclamation of the constitution in 1848 he was elected member of the Second Chamber for Alessandria, and began his political career as a democrat. His eloquence and liberal principles raised him to the ministry: Gioberti made him minister of the Interior and later of Justice; but after the defeat of Novara he was obliged to retire along with the rest of the ministry. When Napoleon III. threatened the liberty of Piedmont, Cavour, Rattazzi, and their parties joined together to defeat his schemes, and in 1853 Rattazzi took the portfolio of Justice under Cavour, and presented the bill for the abolition of convents. Being accused of weakness in suppressing the Mazzinian movement in 1857, he retired from office early in the following year. In 1859, however, he was back again in office as minister of the Interior. The threatened cession of Savoy and Nice, which he opposed, led to his retirement in 1860. Having changed his views on this point, he was in March 1862 entrusted with the formation of a new ministry, but had to resign at the end of the year in consequence of his opposition to Garibaldi; and once more prime-minister for six months in 1867, he lost the post for the same reason. He died at Frosinone, June 5, 1873. A want of stability was his chief drawback as a statesman.

His Speeches were edited by Scovazzi (8 vols. Rome, 1876–80). See a Life by Morelli (Padua, 1874), and *Rattazzi et son Temps* (Paris, 1881).

Rattlesnake (*Crotalus*), a genus of highly specialised venomous snakes, with a rattle of horny rings at the end of the tail. A long fang is borne on each maxilla, and is perforated by a canal, down which the venomous secretion of a modified salivary gland flows when the rattler strikes. Behind each fang are several reserve fangs, which replace it after breakage—a not unfrequent result of the bite. There are about fifteen species, exclusively American. Of these the Banded Rattlesnake (*C. horridus*) is abundantly distributed from Maine to Texas. Its maximum length seems to be about four feet, and the rattles have been known to consist of twenty-three rings, but forms and rattles so large are very rare. The predominant colour of the body varies from yellow to almost black. Among the other species are *C. durissus* (Mexico to Brazil), *C. molossus* (Mexico and Arizona), *C. lucifer* (California and other western regions), the Diamond Rattler—*C. adamanteus* (California and Mexico), the Horned Rattler—*C. cerastes* (California, Arizona, and Mexico).

Rattlesnakes are naturally sluggish and prefer defensive to offensive tactics, except when on the track of their natural prey—rabbits, rats, squirrels, and other small mammals. Not a few ideas about rattlesnakes must be dismissed as false: they do not fascinate or charm mammals or birds, though these may be overcome by an almost paralysing fear; the rattling does not lure prey nor attract mates, but is rather a reflex expression of excitement, apparently warning off molesters on whom the snake is doubtless unwilling to expend energy in the exhausting act of striking; finally, the number of rings does not necessarily indicate the age of the animal, though new rings seem to be added at successive sloughings. Rattlesnakes are generally nocturnal. The young are brought forth alive. The poison is very deadly, rapidly paralysing the nerve-centres and affecting the respiratory and circulatory functions. When a man is bitten it is customary to ligature above the wound, to suck out the poison, to use stimulants freely, and to inject antidotes such as permanganate of potash. Often, however, the result of the bite is fatal (see SNAKES).



Rattlesnake (*Crotalus horridus*) in act of striking.

Rattray, a police burgh of Perthshire, on the Ericht, opposite Blairgowrie. Pop. 2227.

Rauch, CHRISTIAN DANIEL, sculptor, was born at Arolsen, in Waldeck, 2d January 1777. In 1797 he became valet to Frederick-William II., king of Prussia, but, resolving to devote himself to art, was enabled by Frederick-William IV. to study at Rome, where he enjoyed the friendship of Thorwaldsen, Canova, and Wilhelm von Humboldt, the Prussian minister. In 1811 he was called by the king of Prussia to Berlin to execute the monumental statue of Queen Louisa now at Charlottenburg. Rauch was not, however, quite satisfied with this triumph of his art, but commenced a new statue of the queen, which he finished eleven years afterwards, a masterpiece of sculpture, now in the palace of Sans Souci. After this he lived principally at Berlin, but occasionally visited Rome, Carrara, and Munich. He laboured indefatigably in his profession, and by 1824 had executed seventy busts in marble, of which twenty were of colossal size. His works include two colossal bronze statues of Field-marshal Blücher (1827), a bronze statue of Maximilian of Bavaria (1835), and statues of Albert Dürer, Goethe, Schiller, and Schleiermacher. His masterpiece is the magnificent monument of Frederick the Great (1851) which adorns Berlin. He died at Dresden, 3d December 1857. See Life by Eggers (1873–90).

Rauhes Haus ('the Rough House,' so called) is the name of a great institution founded and managed by Johann Heinrich Wichern (1808–81) at Horn, near Hamburg, in connection with the German Home Mission (*Innere Mission*). It is partly a refuge for morally neglected children; partly a boarding-school for the moral and intellectual education of children of the higher classes; lastly, a training-school for those who wish to become teachers or officials in houses of correction, hospitals, &c., in promotion of the objects of the Home Mission. It was opened on November 1, 1831, by Wichern with twelve neglected children. By the addition of new houses the whole has, however, been very much enlarged, and has of late almost grown into a colony. A printing-office, a bookbinders' shop, and book-selling form part of the institution. The children live in families of twelve, each family being under the paternal superintendence of a young artisan, who employs the children according to their capabilities, partly in indoor, partly in outdoor manual labour. In connection with the Rauhes Haus there was founded in 1845 a kind of conventual institute for the education of young men as heads or superintendents of similar institutions. See works on the subject by Wichern (1833–83).

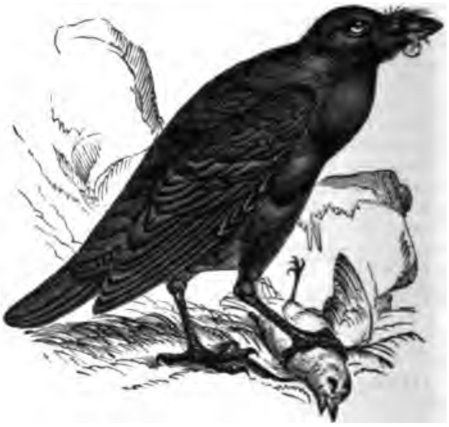
Raumer, FRIEDRICH LUDWIG GEORG VON, German historian, was born at Wörlitz, near Dessau, in the duchy of Anhalt, on 14th May 1781, studied law at Halle and Göttingen, and entered the Prussian state service in 1801. In 1811 he accepted the chair of History and Politics at Breslau; in 1819 he was called to fill the similar chair at Berlin. He was for some time secretary of the Berlin Academy. In 1848 he was sent to Paris as ambassador of the German parliament. He died on 14th June 1873. The first scientific historian to popularise history in German, Von Raumer wrote *Geschichte der Hohenstaufen* (6 vols. 1823–25), his best book, based on critical research, and agreeably written; *Geschichte Europas seit dem Ende des 15 Jahrhunderts* (8 vols. 1832–50); *Beiträge zur neueren Geschichte* (5 vols. 1836–39); and edited the useful *Historisches Taschenbuch* from 1830. In the years 1830–43 he made extensive journeys, going as far as the United States; the observations made during these trips were written in several books dealing with England (1835 and 1841), Italy (1840), the United States (1845), &c. See his *Lebenserinnerungen und Briefwechsel* (2 vols. 1861).

Raumer, KARL GEORG VON, geologist and geographer, a brother of the preceding, was born April 9, 1783, at Wörlitz, studied at Göttingen and Halle, and at the Mining Academy at Freiberg, was appointed professor of Mineralogy at Breslau in 1811, was translated in 1819 to Halle, and finally, in 1827, was appointed professor of Mineralogy and Natural History at Erlangen, where he died June 2, 1865. His most ambitious book was *Geschichte der Pädagogik* (1843–51; 5th ed. 1878–80), a portion of which was issued separately as *Die Erziehung der Mädchen* (4th ed. 1886). His most popular books were, after these, *Beschreibung der Erdoberfläche* (6th ed. 1866); *Palästina* (4th ed. 1860); and *Lehrbuch der allgemeinen Geographie* (1832; 3d ed. 1848). He also wrote books more immediately connected with his special study, as *Geognostische Fragmente* (1811), *Versuch eines ABC-Buchs der Kristallkunde* (1820–21), &c. See his Autobiography (Stuttg. 1866).—His son, RUDOLF VON RAUMER (1815–76), from 1846 a professor at Erlangen, won a high reputation in the field of Teutonic philology.

Ravaillac, FRANÇOIS (1578–1610), a bankrupt schoolmaster, who, after long imprisonment and a brief service in the Order of Feuillans, was moved by fanaticism to stab Henry IV. (q.v.) of France. He was torn asunder by horses. See Loiseleur, *Ravaillac et ses Complices* (1873).

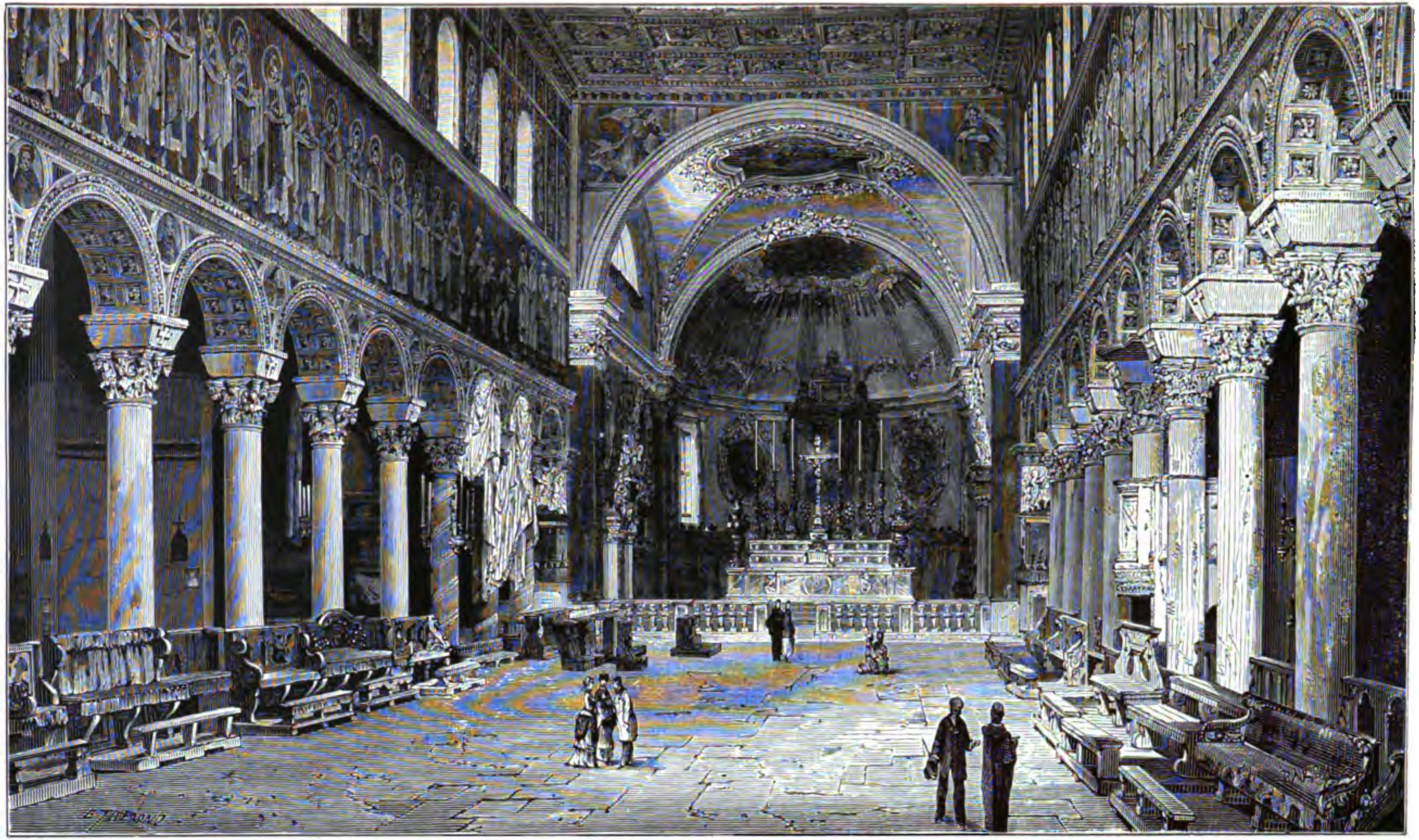
Ravelin. See FORTIFICATION.

Raven (*Corvus corax*), a species of Crow (q.v.), now somewhat rare in Britain except in remote regions or on rocky islands. It is, however, widely distributed in Europe, northern Asia, and North America. The plumage is glossy black, with a purplish-blue lustre on some parts. The bill and legs are also black. In length the raven measures about two feet. The males are rather larger and more lustrous than the females. Very early in the year the bulky nest is built on a cliff or tree; the three to five eggs are bluish-green, with brownish spots. The raven's note tends to be harsh, but is refined at the pairing season, and the bird may be trained to parrot-like imitation with remarkable success. The flight is powerful, and the bird often soars high. On small mammals, such as rats, the raven is fond of feeding, and its attacks on game and even lambs have led to its extermination in many districts. In Scandinavia the raven was sacred to Odin, but in many countries it is a bird of ill omen. Instances are on record of ravens which lived for four-score years, and there is no doubt that its natural longevity is great. Three varieties or sub-species of the raven are recognised in North America. See CROW; and R. W. Schufeldt, *The Myology of the Raven* (1890).



Raven (*Corvus corax*).

Ravenna, a city of Italy, 43 miles E. of Bologna, once close to, but now some 5 miles from the Adriatic, with which it is connected by the Corsini Canal, is enclosed by a wall 3 miles long, with five gates. It has been the seat of an archbishop since 438, and possesses a museum, a public library, a picture-gallery, municipal buildings (with a leaning tower), a theatre, &c. It has manufactures of silk, linen, paper, and glass, and a trade in wine and agricultural products. The streets are wide, and the squares are adorned with statues of the popes. The outward aspect of the



INTERIOR OF ST. APOLLINARE NUOVO, RAVENNA.

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town and its buildings is dull and disappointing, but the interiors of the churches are exceedingly interesting. Pop. 12,100; of commune, 60,573.

Possibly a Thessalian settlement, afterwards held by the Umbrians, Ravenna passed to Rome as one of the cities of Cisalpine Gaul south of the Po. It first became famous under Augustus as the station of the Adriatic fleet, with Classis—a flourishing suburb—as its port, a site marked now only by a church, and separated from the sea by the pine forest celebrated by Dante, Boccaccio, Dryden, and Byron. Deserted by the sea, and strongly entrenched by canals and marshes, Ravenna became the refuge of the Emperor Honorius (402), and the capital of Italy for the next 350 years. Imperial until Romulus Augustulus doffed the purple at the bidding of Odoacer (see ITALY), who ruled at Ravenna 476–493, it attained its greatest glory under Theodoric the Ostrogoth (493–526), whose mausoleum (La Rotonda)—now empty—is without the walls. Conquered by the generals of Justinian, Ravenna was the seat of Exarchs (q.v.) from Constantinople until 752, when it was taken by the Lombards, and afterwards by the Franks, by whom it was gifted to the pope. A republic in the early part of the 13th century, governed by its own dukes in the 14th, subject to Venice after 1440, it was won by Pope Julius II. in 1509, and continued papal until it became national in 1860.

Ravenna, chiefly on account of its numerous ancient churches, holds a unique position as 'the Pompeii of the 5th and 6th centuries'—that marked transitional period in early mediæval history. There are at least six churches of the time of Galla Placidia (390–450), the sister of Honorius and mother of Valentinian III. SS. Nazario e Celso is her mausoleum, and there lie her brother, her second husband Constantius III., and her son. Theodoric, leaving, with rare religious toleration, the cathedral of St Urso (almost entirely rebuilt, 1734) and the other churches to the Catholics, erected for his Arian Goths the basilica of St Martin (now St Apollinare Nuovo, with its marvellous mosaic processions of martyrs added about 560, when it was 'reconciled') as a cathedral, a baptistery (now St Maria in Cosmedin), and St Teodoro (now St Spirito). St Vitale (with contemporary portraits in mosaic of the emperor and Theodora)—the model for Charlemagne's cathedral at Aix-la-Chapelle—and the magnificent basilica of St Apollinare in Classe belong to the age of Justinian. The *round* campaniles, perhaps of the 10th century, form another architectural feature peculiar to Ravenna.

Dante died at Ravenna, September 14, 1321, and is buried there. A column, 2 miles from the walls, commemorates the fall of Gaston de Foix at the head of the French army of Louis XII., after a bloody and useless victory over the papal and Spanish troops, April 11, 1512. Byron resided at Ravenna from June 1819 to October 1821.

Ravensburg, a town of Würtemberg, 11 miles by rail NE. of Friedrichshafen, on Lake Constance. Pop. (1890) 12,267.

Ravenscroft, THOMAS (1592–1640), musical composer and author of *Melismata* (1611), and of a collection of psalm-tunes for four voices, *The Whole Book of Psalms* (1621) by various composers. Some of the tunes, such as St Davids, Canterbury, Bangor, and many others, which have since become popular, are by Ravenscroft himself.

Ravenspur. See HUMBER.

Ravignan, GUSTAVE FRANÇOIS XAVIER DELACROIX DE, a celebrated Jesuit preacher, was born at Bayonne, December 2, 1795, was professor at Montrouge, and became famous in 1837 as preacher at Notre Dame in Paris. He died 26th February 1858. He published an Apology of his order in 1844, and in 1854 a more lengthened work with the same view, *Clement XIII. et Clement XIV.* See memoirs by Poujoulat (1858) and De Ponleroy (1860; Eng. trans. New York, 1873).

Ravinala. See TRAVELLER'S TREE.

Rawal Pindi, a town and important military station of the Punjab, lies between the rivers Indus and Jhelum, 160 miles by rail NW. of Lahore. Since the extension of the railway to Peshawar, and since the last Afghan war, the town has increased at a rapid rate. Pop. (1868) 28,586; (1881) 52,980; (1891) 73,460. There are an arsenal (1883), a fort, a fine public park, several European churches, including the garrison church, in which Bishop Milman of Calcutta, who died here, was buried (1876), and the headquarters of the Punjab Northern State Railway. The place carries on an active transit-trade with Cashmere and Afghanistan. Here the Sikhs surrendered after their defeat at Gujrat (1849), and here too was held, in 1885, a great durbar or review, at which the Ameer of Afghanistan met Earl Dufferin, Governor-general of India.—The *district* (area, 4861 sq. m.; pop. 820,512) contains many of the towns connected with the Indian campaign of Alexander the Great.—The *division* has an area of 15,435 sq. m. and a pop. of 2,520,508.

Rawitsch, a town of Prussia, 64 miles by rail S. of Posen. Pop. 12,919.

Rawlinson, SIR HENRY CRESWICKE, Bart., orientalist and diplomatist, was born at Chadlington in Oxfordshire, 11th April 1810, and entered the East India Company's army in 1827. In 1833 he proceeded to Persia to assist in organising the Persian army. During the six years he spent in that country he began to study the cuneiform inscriptions, and made a translation of Darius' famous Behistun inscription, which he published in the *Journal of the Royal Asiatic Society*. After he left Persia he held command of Kandahar during the troublous times of 1840–42 (see AFGHANISTAN); he was appointed political agent at Bagdad in 1844, and consul-general there in 1851. He showed great bravery in the field, and remarkable skill and resource in diplomacy. In 1856, now made K.C.B., he was appointed director of the East India Company. In 1858–59 he was again in Persia as British minister; and was successively member (1868) and vice-president (1876) of the Council of India. In 1865–68 he sat in parliament for Frome. He held the presidency of the Royal Geographical Society (1871), to whose *Proceedings* he contributed valuable papers, a trusteeship of the British Museum (1879), and a directorship of the Royal Asiatic Society. He was made a baronet in 1891; and he died 5th March 1895. The 'father of Assyriology,' he wrote *A Commentary on the Cuneiform Inscriptions of Babylon and Assyria* (1850), *Outline of the History of Assyria* (1852), *The Cuneiform Inscriptions of Western Asia* (with Norris and George Smith, 5 vols. 1861–70), *England and Russia in the East* (2d ed. 1875), and other books.

His brother, GEORGE RAWLINSON, orientalist and historian, was born at Chadlington in Oxfordshire in 1815, took a first-class in classics from Trinity College, Oxford, in 1838, and was elected a Fellow of Exeter College in 1840. In 1859 he preached as Bampton Lecturer on *Historical Evidences of the Truth of the Scripture Records*, and two years later was chosen Camden professor of Ancient History. In 1872 he was made a canon of Canterbury. His historical publications cover nearly the entire history of the ancient Orient. The series opens with the standard edition of Herodotus (4 vols. 1858–60; 3d ed. 1876), which was followed by *The Five Great Monarchies of the Ancient Eastern World* (4 vols. 1862–67), *The Sixth Great Oriental Monarchy of Parthia* (1873), *The Seventh or Sassanian Empire* (1876), *History of Ancient Egypt* (1881), and *History of Phœnicia* (1889). The same ground is also covered in part in the smaller popular works, *Egypt and Babylon from Scripture and Profane Sources* (1884), *Manual of Ancient History* (1869), *Religions of the Ancient World* (1882), &c. Besides these, he has written several books of biblical exposition and religious criticism, as *Contrasts of Christianity with the Heathen and Jewish Systems* (1861), a series of sermons preached before the university of Oxford; Esther, Ezra, Nehemiah, &c., for The Speaker's Commentary; Exodus with a commentary (1882–85); *Moses, his Life and Times* (1887); *Kings of Israel and Judah* (1889); *Isaac and Jacob* (1890); brief essays contributed to *Present Day Tracts*; and the article PHŒNICIA in the present work.

Rawmarsh, a town in the West Riding of Yorkshire, 2¼ miles N. by E. of Rotherham, with china and iron works, and neighbouring collieries. Pop. (1851) 2533; (1891) 11,983.

Ray, a popular name applied to many of the flat cartilaginous fishes or Elasmobranchs. Skate (*Raia batis*), Thornbacks (*R. clavata*), Electric Rays (Torpedo), Sting-rays (e.g. Trygon), Eagle-rays (e.g. Myliobatis) are representative. They lead a somewhat sedentary life at the bottom of the sea, moving sluggishly by undulations of the pectoral fins which form a large part of the flat body. They are all carnivorous. The true rays, of which skate and thornback are typical and very common species, form the family Raiidæ. Many attain a large size, sometimes measuring six feet across. The flesh is edible, but strongly flavoured and not very highly esteemed. See CARTILAGINOUS FISHES, DEVIL-FISH, ELECTRIC FISHES, SKATE.

Ray, or WRAY, JOHN, naturalist, was born at Black-Notley, near Braintree, in Essex, 29th November 1628. From Braintree free-school he went up to Cambridge, where he was fellow, Greek lecturer, mathematical tutor, and junior dean in Trinity College, but after a time began to devote himself entirely to the study of natural history. At the Restoration he accepted Episcopal ordination, but was ejected by the 'Black Bartholomew' (1662). Thereupon, accompanied by a kindred spirit, Francis Willughby, a friend and former pupil of his own, Ray travelled over most of the United Kingdom, collecting and investigating botanical and zoological specimens; and in 1663 they started on a tour through the Low Countries, Germany, Italy, and France, with a similar object, Willughby taking the zoology under his charge, and Ray the botany. In 1667 Ray was elected a Fellow of the Royal Society, to whose *Transactions* he occasionally contributed valuable papers. In 1672 his friend Willughby died, leaving him guardian to his two sons. After several changes of residence, in 1679 Ray settled down in his native village, where he died, 17th January 1705. As a botanist and zoologist he ranks very high, the classification of plants which he proposed being practically in the main the foundation of what is now known as the 'Natural System' of classification (see BOTANY). Ray's zoological works are considered by Cuvier as the foundation of modern zoology. The chief of his works on botany are *Methodus Plantarum Nova* (1682); *Catalogus Plantarum Angliæ* (1670), the basis of all the subsequent floras of Britain; and *Historia Plantarum* (3 vols. 1686–1704). His zoological works include the *Synopsis Methodica Animalium* (1693) and three posthumous volumes on Birds, Fishes, and Insects, published by Dr Derham. He was also the author of some theological works. His friend Willughby, having collected the materials for an extensive work on the animal kingdom, left to Ray the task of arranging and classifying them (see WILLUGHBY). See *Memorials of Ray* (1846), and his *Correspondence* (1848), both edited by Dr E. Lankester for the Ray Society, which was founded in 1844.

Rayahs, the Christian peasantry, labourers, and small farmers, who lived under Turkish rule, or rather misrule, in the Balkan peninsula. The word means 'cattle,' and as cattle these people were treated by their Turkish masters in Bosnia, Servia, Bulgaria, and the neighbouring states.

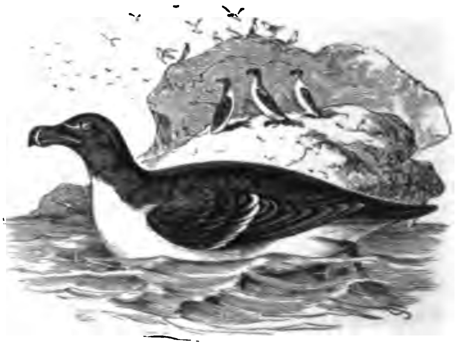
Rayleigh, LORD, physicist. John-William Strutt, third Baron Rayleigh, was born 12th November 1842, studied at Trinity College, Cambridge, and was the senior wrangler (1865), Smith's prizeman, and fellow of his college (1866). He was professor of Experimental Physics at Cambridge from 1879 to 1884; in 1888 succeeded Tyndall as professor of Natural Philosophy at the Royal Institution; and is D.C.L., LL.D., and F.R.S. He has contributed much to the scientific periodicals, edited Clerk-Maxwell's *Heat*, and is author of *The Theory of Sound* (1877–78). In 1894, with Professor Ramsay, he separated from atmospheric nitrogen the new gas argon—hitherto undetected, but constituting about 1 per cent. of the atmosphere.

Raynouard, FRANÇOIS JUSTE MARIE, poet and philologist, was born at Brignolles, 18th September 1761, studied at Aix, and in 1791, an advocate and a deputy, joined the Girondins, and was for a time imprisoned. His poems and tragedies were successful, and in 1807 he was elected to the Academy, of which he became perpetual secretary in 1817. A member of the imperial legislative body from 1806, he continued to produce dramas, but towards the fall of the Empire turned his attention to linguistic and particularly Provençal studies. His researches into the origin and transformations of this tongue led to many valuable discoveries, though his theories as to the relation of the language of the troubadours to the other Romance tongues are not now accepted. Raynouard died at Passy, near Paris, 27th October 1836.

His chief writings are *Eléments de la Grammaire Romane* (1816); *Choix de Poésies Originales des Troubadours* (6 vols. 1816–21); *Grammaire comparée des Langues de l'Europe Latine dans leur Rapports avec la Langue des Troubadours* (1821); and *Lexique Roman, ou Dictionnaire de la Langue des Troubadours* (6 vols. 1838–44).

Razor. See BEARD, CUTLERY.

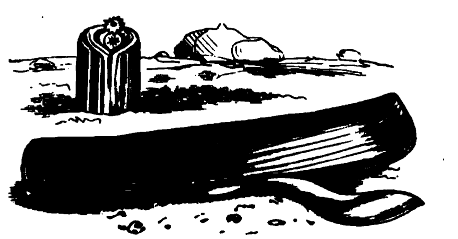
Razor-bill, or RAZOR-BILLED AUK (*Alca torda*), a species of Auk (q.v.), very common on



Razor-bill (*Alca torda*).

the coasts of Britain and of all the northern parts of the Atlantic Ocean. In March and April they congregate in great numbers on cliffs and islands for the breeding season. A single egg, measuring about 3 inches in length, and of a white or light brown colour streaked with dark brown, is laid in a crevice or under a ledge of rock. The male helps to sit on the eggs. The razor-bill measures about 17 inches. The plumage is of a glossy greenish black on the upper parts and dazzling white underneath. It is a handsomer bird than the Guillemot (q.v.), and can be readily distinguished from it at a distance by its upturned tail. The flesh of the razor-bill is used for food, and the eggs are esteemed a delicacy. They are less easily obtained than those of the guillemot, being usually laid in concealed situations.

Razor-fish, or RAZOR-SHELL (*Solen*), a genus of bivalves of which the common British species *S. siliqua* and *S. ensis* are familiar examples. The shell is remarkably elongated, and gapes at both ends, the siphons are short, the foot is large and powerful. The species are numerous, and inhabit the sands of all seas except in the coldest parts of the world. Some of the tropical species have shells of great beauty. The solens burrow in sand, making vertical holes 2 or 3 feet in depth, and ascending and descending by means of their foot, which is capable of being elongated and contracted to bore a passage for the animal, and to drag it through. They are used for food, and also by fishermen for bait. To obtain them, a hooked iron implement is used. Another method is to drop a quantity of salt on the mouth of the hole, which causes them to come up, when they are quickly seized.


Razor or Solen-fish (*Solen siliqua*).

Ré, ÎLE DE (*Rex insula*), is a small, low-lying island off the coast of the French department of Charente-Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 miles long and 3 broad, measures 28 sq. m., and has about 16,000 inhabitants, who are chiefly engaged in the preparation of salt (32,000 tons annually). The west coast is rocky; on the east side there are some good harbours. Oyster-farming has of late become an important branch of industry (35,000,000 annually). Wine is made and exported. The chief town, St Martin (pop. 2788), was fortified by Vauban. Ars and La Flotte have each about 2000 inhabitants.

Reade, CHARLES, novelist and playwright, was born at Ipsden House on 8th June 1814. The youngest of eleven, he came on both sides of good lineage, his father an Oxfordshire squire, his mother a clever Evangelical; from her he 'inherited his dramatic instinct.' After five years (all flogging) at Iffley, and six under two other and milder private tutors, in 1831 he gained a demyship at Magdalen College, Oxford, and in 1835, having taken a third class in honours, was duly elected to a lay fellowship. Next year he entered at Lincoln's Inn, and in 1842 was called to the bar, meanwhile having made the first of many tours abroad and at home, and developed a craze for trading in violins. 'I studied,' he tells us, 'the great art of Fiction for fifteen years before I presumed to write a line of it;' and it was not till 1850 that he put pen seriously to paper, 'writing first for the stage—about thirteen dramas, which nobody would play.' Through one of these dramas, however, he formed his platonic friendship with Mrs Seymour, a warm-hearted actress, who from 1854 till her death in 1879 kept house for him. She animated, counselled, guided him; and, apart from his quarrels and lawsuits (which were many), his life after 1852 is little except a record of the production of plays and novels, by the former of which he generally lost money, by the latter won profit and fame. The plays include *Masks and Faces* (1852), written in conjunction with Tom Taylor, and having Peg Woffington for its leading character; *Gold* (1853), the germ, and *Sera Nunquam* (1865), the dramatised form, of *Never too Late*; and *Drink* (1879), an adaptation of Zola's *L'Assommoir*. Of his eighteen novels may be mentioned *Peg Woffington* (1852); *Christie Johnstone* (1853), the Newhaven fisher lass; *It is Never too Late to Mend* (1856), a tale of prison abuses and life in Australia; *The Cloister and the Hearth* (1861), its hero Erasmus' father, condemned, like Reade himself, to celibacy; *Hard Cash* (1863), against private lunatic asylums; *Griffith Gaunt, or Jealousy* (1866); *Foul Play* (1869), in conjunction with Dion Boucicault, against ship-knackers; *Put Yourself in his Place* (1870), against trades-unions; *A Terrible Temptation* (1871); and *A Woman-hater* (1877), for woman's rights. His last years clouded by sorrow and ill-health, he died at Shepherd's Bush on Good Friday, 11th April 1884, and was buried in Willesden churchyard beside his 'beloved friend.'

Charles Reade was not one of the greatest novelists of the century (who number three, at most four); but of the second order he is perhaps the best. He is sometimes coarse, theatrical sometimes rather than dramatic, and sometimes even dull, weighed down with authorities—the blue-books, books of travel, and the like, with which he fettered his imagination. With the greatest novelists one is conscious only of the story, with him one is always conscious of the story-teller; some tone or mannerism from time to time jars upon us. And yet what a story-teller it is. How he carries us with him, stirs us, saddens, gladdens, terrifies, delights. No novels are better than his to read aloud. For they hold the listeners spell-bound, and 'Bravo!' or oftener just a long-drawn 'Oh!' attests Reade's magnificent powers far better than can all the fine-spun criticisms in which A. concedes and B. denies him the gifts of humour and pathos; in which M. declares that 'Reade invented the True Woman,' and N. that 'of the woman who is essentially of our time he has never had even the faintest conception;' in which X. discovers 'in the short *Wandering Heir* at least half a dozen situations all new and all strong,' and Y. pronounces it 'very decidedly the worst of Reade's shorter stories.' These things need not perplex us, the simple admirers of *Griffith Gaunt*, of the fight with the pirates, of the bursting of the reservoir, and of the scenes at the gold-diggings. At the same time we may rejoice in the unanimous verdict that is passed by the critics on *The Cloister and the Hearth*. It Mr Swinburne—from whom praise is praise indeed—places 'among the very greatest masterpieces of narrative. Its tender truthfulness of sympathy, its ardour and depth of feeling, the constant sweetness of its humour, the frequent passion of its pathos, are qualities in which no other tale of adventure so stirring and incident so inexhaustible can pretend to a moment's comparison with it—unless we are foolish enough to risk a reference to the name by which no contemporary name can hope to stand higher or shine brighter, for prose or for verse, than does that of Shakespeare's greatest contemporary by the name of Shakespeare.'

Charles Reade: A Memoir (2 vols. 1887), by his brother and a nephew, is a most unhappy piece of biography. The *Gentleman's Magazine* for 1882 contains two articles by Mr W. Besant and 'Ouida;' and in his *Miscellanies* (1886) is Mr Swinburne's article from the *Nineteenth Century*. *Readiana* (1882) is a collection of the novelist's fragments; and *Extracts* from his works, with an introduction by Mrs Ireland, appeared in 1891.

Reader. See LAY-READER.

Reading, a municipal, parliamentary, and county borough, the capital of Berkshire, on the Kennet, near its influx to the Thames, 36 miles by rail W. of London (by road 39, by river 74). Its strong castle was wholly demolished by Henry II.; and the splendid Benedictine abbey, founded in 1121 by Henry I., who was buried here, is represented by considerable ruins and a fine gateway, restored in 1861, and surrounded by public gardens. Nine parliaments were held within its hall; and the last of its mitred abbots was hanged by Henry VIII., with two of the brethren. There are handsome municipal buildings and two excellent town-halls, a lofty clock-tower, a free library, concert-room, museum, &c. Other buildings are the Italian assize courts (1861); a large grammar-school (1486; rebuilt 1870–71), of which Dr Valpy was long head-master; St Lawrence's Church (1434; restored 1868), with a large flint tower 189 feet high; and the Royal Berkshire Hospital. Drainage-works were completed in 1874, water-works in 1878; and the largest (59 acres) of three public parks was gifted in 1891 by Mr G. Palmer. Reading is an important mart for corn and other agricultural produce, and has manufactures of iron, paper, sauce, &c., whilst two of its industrial establishments are world-famous—Huntley and Palmer's huge biscuit-factory and Sutton's seed-emporium. Reading, which is in the diocese of Oxford, gives title to a suffragan bishop. Its representation was reduced from two to one in 1885, when, however, the parliamentary borough was extended. The first charter was granted by Edward III. Pop. (1851) 21,456; (1881) 46,054; (1891) 55,752; county borough (1891) 60,054. Reading suffered much from the Danes between 868 and 1006, and in 1643 surrendered to Essex after a ten days' siege. It was the birthplace of Archbishop Laud, Justice Talfourd, and Goldwin Smith, but not of Miss Edgeworth, who is often claimed as a native. It has memories also of Chaucer and Bunyan.

See works by Coates (1802–9), Man (1816), Doran (1835), and J. B. Jones (1870).

Reading, a city of Pennsylvania, capital of Berks county, on the left bank of the Schuylkill River, 58 miles by rail NW. of Philadelphia. It is pleasantly situated on an ascending plain, and from the neighbouring hills draws its water-supply and abundant iron ore. The principal manufactories of Reading are its iron and steel works. These include many rolling-mills, forges, foundries, furnaces, machine-shops, nail-works, &c. It has also manufactories of shoes, hats, beer, cigars, leather, paper, bricks, &c. Settled in 1748, it became a city in 1847, and is the seat of an Episcopal bishop. Very many of the inhabitants are of German descent, and half the newspapers are in that language. Pop. (1880) 43,278; (1890) 58,661.

Reading, a town of Massachusetts, 12 miles by rail N. by W. of Boston, with boot and shoe and furniture factories. Pop. (1890) 4088.

Reading Beds. See EOCENE SYSTEM.

Reading In. See INDUCTION.

Reagents. See BACTERIA, Vol. I. p. 649.

Real, a silver coin and money of account in Spain, Mexico, and other old Spanish possessions, is the $\frac{1}{20}$th part of the piastre, or $\frac{1}{4}$th of the *peseta*, the franc of the new Spanish decimal system, and has a value, varying with the exchange, of about $2\frac{1}{2}$d. The real was first coined in Spain in 1497. It is also a money of account in Portugal, being the equivalent of 40 reis. In Java it is the name of a weight for gold and silver articles, corresponding to 17 dwt. 14 gr. troy weight.

Real is a term used by lawyers to describe the nature of certain rights and actions. The rights of an owner of property are real rights—i.e. he has a right to claim some specific thing and hold it against all other persons. Contractual rights, on the other hand, are personal—i.e. they are good only against the person who is bound to perform the contract. Forms of action are classified according to the nature of the right which is in dispute. The Roman law gave an action *in rem* for the recovery of any thing, whether movable or immovable, which was withheld from the person entitled; an action *in personam* was the form in which compensation could be obtained for breach of contract or other wrongful act. In Scotland, and in other countries where the Roman law has been studied and followed, real rights and real actions are defined very much as they were defined by the civilians; England has taken a course of its own. At the time when the common law was taking shape land was of primary importance. The owner of chattels (movable things) was entitled to damages if his property was detained from him or converted to the use of another; but he had no real action to recover the thing itself. A real action was an action to recover land or some right connected with land. Some interests in land (e.g. the interest of a tenant under a lease) were regarded as personal rights against the owner; in technical language the interest of a tenant for years is a chattel real, or a chattel which savours of the realty. The English law of property frames all its rules with reference to these somewhat arbitrary distinctions. Thus, for example, on the death of an owner his real property passes at once to his heir or to the devisee named in his will; his personal property (including his chattels real) passes to his executor or administrator for distribution among the persons named in his will or the next-of-kin. Real property was formerly favoured in some points by the law, but modern legislation has made property of all kinds equally accessible to creditors, and the rules which apply to land have been considerably simplified and improved.

Realgar. See ARSENIC.

Realism in philosophy is diametrically opposed to Nominalism, as involving the belief that genus and species are *real* things, existing independently of our conceptions and their expression, and that these are alike actually the object of our thoughts when we make use of the terms. Again, as opposed to Idealism, the word implies an intuitive cognition of the external object, instead of merely a mediate and representative knowledge of it.

In art and literature the word Realism or Naturalism is employed to describe a method of representation without idealisation, which in our day in France has been raised to a system and claims a monopoly of truth in its artistic treatment of the facts of nature and life. It claims that the enthusiasms and exaggerations of romanticism must give place to a period of reflection and criticism; that we must not select from the facts put before our eyes, but merely register them and the sensations they engender for themselves alone, apart from all considerations of mere beauty, to say nothing of religion or morality; and that the experimental romance must hereafter follow the rigid methods of science, in being based alone on 'human documents' supplied from the close observation of the present, or from laborious erudition—the retrospective observation of the past. As a gospel this militant Realism is the offspring of the Positive philosophy and the physiology and psychology of the age; and in effect, in the hands of its apostles, it has become a new morality which reforms not by precept but example, not by the attraction of the good, but by the repulsion of the evil. The practical result is that for French realists there is in the moral world only the evil, in the visible world only the ugly, and the triumphs of our modern fiction are the pitiless impersonality of *Madame Bovary*, the cold splendours of *Salammbô*, the brutal vulgarities of Zola, the refined sensualism of Bourget and Guy de Maupassant, the pretentious inanities of the Goncourt brothers, and the dreary pessimism of Dostoievsky and Tolstoi. If realism were perfect it would include all reality, order as well as disorder, the general as well as the particular, the lofty as well as the low. For there are men and women who are neither selfish nor drunken, nor lecherous; your experimental cesspool is not Paris, your Paris is not the universe; your hospital-wards may contain cases of all moral maladies, but you forget the moving world of health and life outside its walls; your vaunted collection lacks one specimen, not the rarest, and certainly the most beautiful. For the dream is as true a leaf of life as the sober vision, and idealism is the permanent revenge of man over the inequalities of life—the protest of creative mind against external fatality. Idealistic art seizes life at its richest moments, and presents it preserved for ever by its immaterial essence from inconstancy and degradation. This so-called realism is not reality—the steps of true art must ever be elimination and generalisation; its postulates, the eternal conventions of form, style, language, and subject, necessary because they are elemental.

Real Presence. See LORD'S SUPPER, TRANSUBSTANTIATION.

Real-schulen. See EDUCATION, Vol. IV. p. 208.

Reaping, the act of cutting corn, was from time immemorial until far through the 19th century performed with an instrument called a reaping-hook or sickle. The sickles in use among the ancient Jews, Egyptians, and Chinese appear to have differed very little in form from those employed in Great Britain. The reaping-hook is a curved instrument of about a foot and a half in length, tapering from a breadth of about two inches at the butt-end, where it is fixed into a wooden handle. The edge is sometimes serrated; but, as a rule, it has long been made plain and sharp like a knife. In many parts of the British Isles it was supplanted by the scythe in the earlier half of the 19th century. In other parts it lived until the modern reaping-machine was ready to take the place of it as well as of the scythe. The sickle or hook did its work admirably, but it was necessarily slow. On small farms in some districts it is still employed; and occasionally on large farms, when the crop is much laid and twisted, it is resorted to. By the scythe corn can be cut at a rather less cost per acre than with the hook; but the work is not always so neatly done. As nice a stubble will be left by a good hand with the scythe, and often nicer than by the hook, but the sheaves are not, as a rule, so tidy after the scythe, though they will stack rather earlier. Of a fair working crop an adept at the scythe would cut 2 or 2¼ acres per diem. The average, however, would not exceed 1½ acres. In fact, if the crop is heavy, that extent is a very hard day's work.

An attempt to trace the history of the reaping-machine would carry us far back into the earlier stages of agriculture. Pliny the Elder, who was born early in the 1st century of the Christian era, found a reaping-machine in Gaul. He says: 'In the extensive fields in the lowlands of Gaul vans of large size, with projecting teeth on the edge, are driven on two wheels through the standing corn by an ox yoked in a reverse position. In this manner the ears are torn off, and fall into the van.' Palladius, about four centuries later, found a similar appliance for reaping corn in Gaul. He gives a more detailed but similar description of the machine. Fig. 1, copied from Mr Woodcroft's *Appendix to the Specifications of English Patents for Reaping-machines*, represents what is conceived, from the descriptions, to have been the form of this ancient reaper.

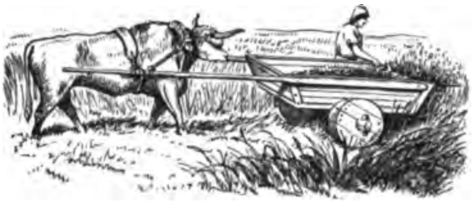


Fig. 1.—Ancient Reaping-machine.

In modern times the idea of a mechanical reaper appears to have originated with Capel Lofft (q.v.), who in 1785 suggested a machine something after the pattern of the ancient one described above. Between that time and the Great Exhibition of 1851 in London, from which the general use of mechanical reapers may be said to date, the patents taken out for reaping-machines were very numerous. Among the most promising of these may be mentioned those of Mr Gladstone of Castle-Douglas; Mr Smith of Deanston; Mr Kerr, Edinburgh; Mr Scott of Ormiston; Mr Dobbs, an actor in Birmingham; Mr Mann of Raby, near Wigton; and the Rev. Patrick Bell of Carmylie, Forfarshire. In 1826 Mr Bell constructed an efficient and simple machine, which long continued in use, and several features of which are observable in the reapers of the present day. The inventor of this, the first machine of the kind in Scotland, received a public testimonial from agriculturists, in consideration of the services he thus rendered to agriculture. In America Mr Hussey and Mr M'Cormick took out patents for reaping-machines of superior character in 1833 and 1834 respectively. The movements of the cutters of these machines were various. A few were advancing only, some sidelong and advancing, others reciprocating and advancing, a large number continuous and advancing, and others continuous and alternate. The reciprocating and advancing motion is that now employed on the machines in use.

The principal difference in the machines now so largely used for cutting corn is in the form and character of the cutters, and in the mode of delivering the grain after it is cut.

The cutting-knives are of two kinds—one, obtuse-angled and serrated; the other, acute-angled and for the most part plain. Both are attached to a bar, and are made to work through another bar of iron fitted with hollow fingers, called guard-fingers, which, projecting forwards, catch the standing corn, and retain it firmly until it is cut. The serrated knife saws through it, the plain knife clips it, as it were, the finger-guard forming the fixed blade of the scissors.

The delivery of the sheaves divides the machines into three kinds—(1) those delivered by manual labour; (2) those delivered by mechanical labour, or self-deliverers; and (3) combined reapers and binders, which deliver the sheaves ready bound. The delivery of the sheaves by manual labour is now chiefly at the back of the machine, the side-delivery being generally abandoned, unless in the self-deliveries. In delivering the grain, a man, with a short-handled rake in his hand, sits upon the machine almost opposite the cutting apparatus. With this he inclines the grain towards the knife; and, when sufficient has been cut to make a sheaf, he rakes it off the platform of the machine, on to which it has fallen, and deposits it on the ground. With the back-delivery the sheaves must be tied up and removed out of the way of the machine before it comes round again. Such a reaper, therefore, always requires a full supply of hands to attend upon it. Carefully handled, this machine will take up laid and twisted crops admirably. Its cost ranges from £18 to £25.

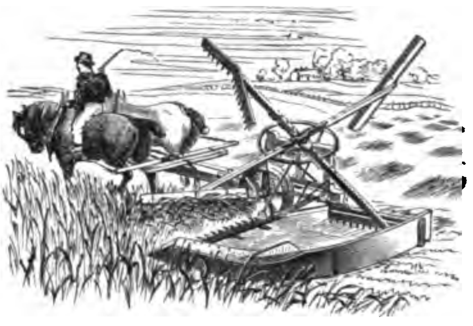


Fig. 2.—Samuelson's Self-delivery Reaping-machine.

The mechanical or self-delivery machines, as they are generally called, are of two kinds—one lays the cut corn in swathes, the other deposits it in sheaves. Samuelson's sheaf-deliverer will be made plain by fig. 2. The machinery consists of a series of four rakes—two toothed and two plain—attached to an upright shaft in such a manner as to admit of a free ascending, descending, and horizontal motion. The two toothless rakes or 'dummies' are shorter in the arms by six inches than the other two, and are merely employed to incline the grain towards the cutter. By an ingenious eccentric motion, the rakes are made to sweep the sheaves off the platform at intervals of about 12 feet apart, to the side, and out of the way of the horses. The self-deliverer costs from £25 to £30.

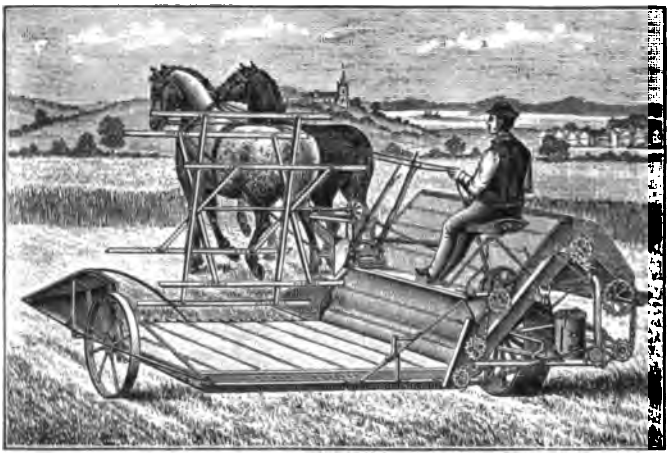


Fig. 3.—Howard's Binder.

The more recent automatic combined reaper and binder promises to supersede entirely all other reaping-machines. The general appearance and arrangement of Howard's light steel-frame sheaf-binder is shown in fig. 3. The cutting portion of the binder is very similar to that of an ordinary reaping-machine. The cut grain as it falls back on the machine is conveyed by an endless web over the top of the driving-wheel to the knotter. Here it falls into two arms called compressor jaws. These retain it on the knotter table till a sheaf of the prescribed size has accumulated. 'Whenever a sheaf of the desired size has been delivered to the compressors, these relieve the tripper, which sets in motion the needle (carrying the binding twine) and the knotting apparatus. The needle is circular, and in its course it passes the band (twine) round the sheaf, when the band is caught by the knotter, and almost instantaneously a firm and secure knot is tied, while the needle is drawn back ready to operate on a new sheaf. As soon as the knot is tied and the string cut, the sheaf is ejected from the machine in a horizontal position, dropping gently on the ground on its side quite clear of the machine' (*Book of the Farm*). With a moderate crop of standing grain the binder in its various improved forms does its work in a most admirable manner, though when the crop is badly 'laid' it cannot be used satisfactorily. It is expeditious, and surpasses all other methods in neatness and thoroughness of work. When the binder was first introduced wire was the binding material. There were strong objections to its use, however, and it was not until twine was substituted that the invention made any headway. There are now several British firms engaged in making binders, which are gaining in popularity year by year. A binder costs about £50.

See Woodcroft's *Appendix to Patents for Reaping-machines;* Mr Jacob Wilson's 'Essay on Reaping-machines,' in *Transactions of Highland Society* for January 1864; *Book of Farm Implements* and *Book of the Farm*, by Henry Stephens; J. C. Morton's *Cyclopædia of Agriculture*.

Reason. See the articles in this work on Psychology, Logic, Induction, Syllogism, Kant, Philosophy, and works cited under these.

Réaumur, RENÉ ANTOINE FERCHAULT DE, physicist, was born at La Rochelle, 28th February 1683, and studied in the Jesuits' College at Poitiers, and afterwards at Bourges. In 1703 he went to Paris, where he attracted general attention by the publication of three geometrical Memoirs; and in 1708 he was elected a member of the Academy of Sciences, and was charged with the supervision of the work *Description des Divers Arts et Métiers*, published under the auspices of the government. Réaumur lightened his labours with occasional researches into various subjects of natural history. These researches occupied him from 1708 to 1715, and were followed by a series of investigations into the condition of the woods, auriferous rivers, and turquoise mines of France. The collections of Memoirs of the Academy of Sciences from 1722 till 1725 contain a number of papers by Réaumur, in which he details his discoveries of the mode of producing steel from iron, and of the mode of tinning iron. For these and other researches he received from the French government a sum of 12,000 livres, which he spent in promoting and encouraging the industrial arts in his native country. In 1739 he succeeded in producing an opaque glass which was equal to the porcelain of Saxony and Japan. His invention of the Thermometer (q.v.) which bears his name need not be more than mentioned here. He died of a fall from a horse, 17th October 1757, leaving behind him a voluminous collection of works on all the subjects above stated, also a treatise on 'the silk of spiders,' a number of Memoirs (1731–40), containing his thermometric researches on air, and on mixtures of fluids with fluids or solids, and his *Mémoires pour servir à l'Histoire des Insectes* (Amsterdam, 12 vols. 1737–48).

Rebec (Arabic *rebab*), an ancient musical instrument of the violin kind, of which the body, instead of consisting of two hemispherical enlargements, like other instruments of the same tribe, was narrow towards the neck, and gradually enlarged till it rounded off at the lower end. Milton, in his *L'Allegro*, characterises this instrument as the 'jocund rebec.'

Rebecca Riots, a series of popular outbreaks which originated in Carmarthenshire in 1843–44, and quickly spread over Pembroke, Cardigan, and Brecon. They grew out of the impatience of the people at the great increase of toll-gates on public roads, and owed their singular name to their adopting as a motto Genesis, xxiv. 60. Bands of men five hundred strong, their leaders disguised in women's clothes, scoured the country by night, threw down the toll-bars, and then dispersed. A strong force of soldiers was poured into the country, but the rioters offered an obstinate resistance, and were not put down without great difficulty and considerable bloodshed. The commission appointed by government to inquire into the causes of the outbreak found that it grew out of a genuine public grievance, whereupon measures of relief were introduced. The rioters seized were punished lightly.

Rebellion. 'The Great Rebellion' generally means the revolt of the Long Parliament against the authority of Charles I. (q.v.). See also CROMWELL, FALKLAND, HAMPDEN, &c.; ENGLAND (p. 352); and the works of S. R. Gardiner. The revolts on behalf of the House of Stuart in 1715 and 1745 are often, particularly in Scotland, spoken of emphatically as 'The Rebellion' (see JACOBITES). The term is applied in the United States to the secession of the southern states.

Rebus, an enigmatical representation of a name or thing by using pictorial devices for letters, syllables, or parts of words. The term probably originates from the device speaking to the beholder *non verbis sed rebus.* Devices of this kind, allusive to the bearer's name, were exceedingly common in the middle ages, particularly in England. In many instances they were used by ecclesiastics and others who had not a right to armorial ensigns. See BADGE.

Récamier, MADAME (*née* JEANNE FRANÇOISE JULIE ADÉLAIDE BERNARD), a famous Frenchwoman, was born at Lyons, 4th December 1777. She grew up a girl of remarkable grace and beauty, and at fifteen she was married to M. Jacques Récamier, a rich banker about thrice her own age. Her salon was soon filled with the brightest wits of the literary and political circles of the day, but fortunately for herself Madame Récamier possessed a temperament that saved her from temptation and almost scandal. For Madame de Staël she had a warm affection that survived the exile required by the jealousy of Napoleon. Soon after this her husband was completely ruined, and Madame Récamier visited Madame de Staël at Coppet in Switzerland (1806). Here she met Prince August of Prussia, who alone of all her innumerable admirers is supposed to have touched her heart. Indeed a marriage was arranged, provided M. Récamier would consent to a divorce. The good man did not refuse, but his kindness was too much for the generous heart of Madame Récamier, who declared she could not leave him in his adversity. The most distinguished friend of her later years was M. de Chateaubriand. In 1846 he became a widower, and he then wished to marry Madame Récamier, whose husband had been dead since 1830, but the lady declined the honour without interrupting the current of their friendship. Chateaubriand died 4th July 1848, and she followed him to the grave on 11th May 1849.

See *Souvenirs et Correspondance tirés des Papiers de Madame Récamier*, edited by her niece, Madame Lenormant (1859), and *Madame Récamier*, by the same (1872); also the biography by Brunier (1875), and the *Letters* of Benjamin Constant to her, at length published in 1881.

Recanati, a town of Italy, 15 miles S. of Ancona, has a Gothic cathedral with a monument to Pope Gregory XII. Here Leopardi was born. Pop. 5824. Porto Recanati, 6 miles NE. on the Adriatic coast, has a pop. of 3040.

Receipt is the technical as well as popular term signifying a legal acknowledgment of money received in discharge of a debt or demand. In England it is often believed that a written receipt is the only legal proof of payment; the fact being that it is only one mode of proving it. If the money be paid in presence of witnesses, or even without witnesses, provided a jury or judge believe the statement on oath of the party paying it, this is in England quite as good evidence of the payment as if a written receipt were given; and even a written receipt is conclusive only where it is under seal, or endorsed on a conveyance under the Conveyancing Act of 1881, unless the purchaser had notice to the contrary, or on a marine policy between assured and underwriter. In other cases a receipt is only *primâ facie* evidence, and may be explained. If a receipt is in writing and the sum paid exceeds 40s. it must be stamped with a penny receipt-stamp (which may be an adhesive stamp), to be cancelled before delivery, otherwise the receipt is inadmissible as evidence of payment; but on payment of certain penalties the receipt may be after-stamped with an impressed stamp. Not only is a receipt proper subject to stamp-duty, but also any note or memorandum given to a person on payment of money, and acknowledging payment of any part of a debt or demand, whether signed or not; so receipts given on payment of bills of exchange or promissory-notes are liable to stamp-duty. But a mere acknowledgment of indebtedness, as a receipt 'on loan,' or an I O U, is not stampable as a receipt. There are several exceptions from liability to stamp-duty. Such are receipts for deposits with bankers to be accounted for; receipts for any parliamentary taxes or duties, or for any payment to the Sovereign; receipts by officers, seamen, marines, or soldiers for wages or pay; receipts for purchase of government stock or for money due under Exchequer Bill; receipts written on any bill or note of the Bank of England or of Ireland, on the back of duly stamped bills of exchange or promissory-notes, or upon the back of duly stamped instruments acknowledging the receipt of money; and generally receipts to or by government departments. At one time, under the Act of 1803, it was supposed to be the duty of the debtor to provide stamped paper for a receipt, the creditor being liable in a penalty of £10 if he refused to sign. This act, however, is repealed, and the better view is that when the debtor tenders payment the creditor is bound to give a proper discharge, the form of the discharge being regulated by custom. In Scotland the receipt of money cannot be proved by witnesses where the debt was created by writing, and it is not allowed to dispute the validity of a written receipt except in cases of fraud. It is only in the case of ready-money sales that receipt of the price can be proved by parole. See Tilsley's *Stamp Laws* (3d ed. 1871).

Receiving Stolen Goods. See THEFT.

Recent Period. See POSTGLACIAL AND RECENT SYSTEM.

Recidivists, in France, are the habitual criminals. In 1883–84 the French government proposed to send them to New Caledonia, giving them a certain measure of freedom; but against this proposal the Australian colonies protested most vigorously. See NEW CALEDONIA.

Recife. See PERNAMBUCO.

Reciprocity, in Political Economy, a term for an arrangement between two countries having a protective tariff against other countries, to admit each into the other's territories certain specified taxable articles of commerce duty-free or at exceptionally light duties. The classes of articles are arranged to balance one another on one side and the other. Such mutual arrangements are sometimes called Fair Trade (q.v.) as opposed to Free Trade (q.v.) and thoroughgoing Protection (q.v.), and has been advocated as between Britain and her colonies. The mutual relation between Canada and the United States, advocated in 1885–91 by a powerful party in Canada as well as on the other side of the frontier, proposed a complete commercial union—Zollverein (q.v.); so that, while between Canada and the United States there should be no tariff at all, all goods from the rest of the world (including Great Britain) should have a strong protective tariff to face. See A. J. Wilson's *Reciprocity*, &c. (1880).

Recitative. See MUSIC, OPERA.

Reclamation. See WASTE LANDS.

Reclus, JEAN JACQUES ÉLISÉE, geographer, was born at Sainte-Foix la Grande (Gironde) on 15th March 1830, and educated at Montauban and under Carl Ritter at Berlin. In consequence of his extreme democratic views he left France after the *coup d'état* of 1851, and spent the next seven years in England, Ireland, North and Central America, and Colombia. He returned to Paris in 1858, and published *Voyage à la Sierra Nevada de Sainte-Marthe* (1861), and an introduction to the *Dictionnaire des Communes de la France* (1864). For being concerned in the Communistic outbreak of 1871 he was banished from France, but returned under an amnesty in 1879. Whilst living in exile in Switzerland he began his great masterpiece, *Nouvelle Géographie Universelle* (14 vols. 1876–89). Reclus has also written another great work, a physical geography entitled *La Terre* (2 vols. 1867–68; Eng. trans. 1871 and 1887); *Histoire d'un Ruisseau* (1866); besides *Les Phénomènes Terrestres* (1873) and *Histoire d'une Montagne* (1880).

Recognisance is a kind of judicial bond entered into with a court of record, the object of which is to secure the doing of some act, as the appearance of witnesses at a criminal trial, or the keeping of the peace by one who has threatened or assaulted another. The form of it is thus: 'A B doth acknowledge to owe to our lady the Queen the sum of ten pounds,' or some other sum, to be levied of his goods if he fail in the condition endorsed; and then a condition is added, which states that, if the thing secured is done, then the recognisance is to be void. This is the mode by which justices of the peace secure the attendance of the prosecutor and witnesses at the trial of a prisoner who has been committed for trial, or the future good behaviour of one who has committed a breach of the peace. If the thing secured is not performed, then the recognisance is estreated—i.e. extracted and put in force, a debt of the amount specified being forthwith due to the crown.

Recoil. See CANNON, GUNNERY, MONCRIEFF PITS.

Recollets (Lat. *recollectus*, 'gathered together'). See FRANCISCANS, Vol. IV. p. 793.

Record, as a legal term, is used in the United Kingdom to signify anything entered in the rolls of a court, and especially the formal statements or pleadings of parties in a litigation. In general the rule is well settled that the pleadings which make up the record do not enter into details of the evidence, but merely set forth the conclusions or inferences, leaving the details of evidence to be supplied at the trial before a jury, or, if there is no jury, at the hearing before the judge or court. One of the incidents of a Court of Record is that the court or judge can commit for contempt any person who insults the court or wilfully obstructs the business. A trial by record means that one of the parties has set up some former decision of the court, while the other denies that such a decision ever existed; whereupon the only mode of solving the question is by producing the record of the former action, and so settling the dispute. In Scotland the closing of the record is a step which requires the sanction of the judge, who closes the record after each party has said all he wishes to say by way of statement and answer.

Recorde, ROBERT, mathematician, was born about 1500 at Tenby, in Pembrokeshire, Wales. He completed his education at Oxford, but, wishing to make medicine his profession, removed to Cambridge, where in 1545 he received the degree of M.D. In 1547 he was in London, engaged in the composition of *The Urinal of Physic* (1548), and was about the same time appointed physician to Edward VI., as afterwards to Queen Mary. Ten years later we find him in the debtors' prison in London, where he died miserably in 1558. His works are all in the form of dialogues between a master and his pupil, and are written in the rude English of his time; they are *The Grounde of Artes, teaching the Perfect Woork and Practise of Arithmeticke* (1543); *The Pathwaye to Knowledge* (1551), an abridgment of Euclid's *Elements; The Castle of Knowledge, containing the Explication of the Sphere both Celestial and Material*, (1551), an astronomical work, in which he compares the Ptolemaic and Copernican systems; *The Whetstone of Wit* (1557), a treatise upon algebra. In the appreciation of the general results derivable from algebraic formulæ he is far beyond his contemporaries, with the sole exception of Vieta (q.v.).

Recorder is a judge of a city or borough court of quarter sessions. He must be a barrister of not less than five years' standing, is appointed by the crown, holds office during good behaviour, and the salary is paid by the city or borough out of the borough fund. He sits as sole judge of the court of quarter sessions for his district, but he cannot grant licenses or be an official in licensing matters, or order rates to be levied. The recorder is not prohibited from practising at the bar, and indeed his salary is usually small. He can appoint as deputy, in case of necessity, a barrister of five years' standing, and, if need be, an assistant-recorder. In London he is elected by the Lord Mayor and aldermen, and as 'mouthpiece of the city' he certifies the customs of London. He is chief judge in the Mayor's Court of London, and is one of the judges sitting at the Central Criminal Court, commonly called the Old Bailey. Among the many well-known men who have held this post were Lord Coke and Lord-chancellor Jeffreys. There is no such office in Scotland, but the sheriff discharges similar duties.

Recorder, the name of an old musical instrument somewhat like a flageolet, but with the lower part wider than the upper, and a mouthpiece resembling the beak of a bird.

Records, PUBLIC (Lat. *recordari*, 'to remember'), contemporary authenticated statements of the proceedings of the legislature, and the judgments of those higher courts of law which are distinguished as Courts of Record. An act, 1 and 2 Vict. chap. 94, sets at rest the question what is legally to be held a record, by providing that the word records shall be taken to mean all rolls, records, writs, books, proceedings, decrees, bills, warrants, accounts, papers and documents whatsoever belonging to Her Majesty, or then deposited, or which ought to be deposited, in any of certain places of custody which are enumerated. This statute, together with the Act 40 and 41 Vict. chap. 55, and the Order in Council of 5th March 1852, has placed under the care of the Master of the Rolls the vast mass of documents stored in the Public Record Office.

Parchment is the material on which the greater portion of the records are written. The so-called 'rolls' of the Exchequer and Common Law Courts are comparatively short skins attached at the top after the manner of books, but the lines of the writing run parallel to the line of binding. In other cases they are sewed together consecutively, as in the case of the Patent and Close Rolls, and then form true 'rolls' of great length. Some records are in the form of books, as Domesday; others are filed—i.e. each document is pierced with a string or gut passed through it, the whole being fastened together in bundles. Many of the later records are written on paper.

The early parliamentary records and statutes are principally in Norman-French, which continued in partial use till the time of Henry V.; all the other great series of records, except those of parliament, are in Latin down to the reign of George II. or later, except during the Commonwealth, when English was substituted.

Public records, which can be traced in germ before the Conquest, gradually expanded under the Norman and Plantagenet kings. They enabled the subject to defend and maintain those feudal rights and privileges which were gradually trenching on royal prerogatives, and to protect himself from arbitrary exactions; while to the king they furnished precedents which could not be questioned for his calls of military service and taxation.

The various courts being the King's Courts, and following the sovereign from place to place, their earliest depositories were the royal palaces in different parts of England; but when the higher courts were permanently established at Westminster, 'treasuries,' or places of custody for the records of the different courts, were appointed there. A portion of the public records were, as far back as Henry III.'s reign, deposited in the Tower of London and the New Temple; and in the reign of Edward III. the Tower had become a permanent treasury. The parliamentary committee of 1837 enumerated among the places of deposit a room in the Tower over a gunpowder magazine, and close to a steam-engine in daily operation; a chapel at the Rolls, where divine service was performed; underground vaults at Somerset House; damp and dark cellars at Westminster Hall; the stables of the late Carlton Ride; and the Chapter-house, Westminster. From the reign of Edward II. downwards the attention of parliament had often been called to the safe custody and arrangement of the records as an object of solicitude. The fullest examination in recent times was made by a committee of the House of Commons in 1800, whose report presents the most comprehensive account of the records in existence. A commission was appointed to go on with the work which the committee had begun, and was renewed six times between 1800 and 1831. All the several record commissions directed the commissioners to cause the records to be methodised, regulated and digested, bound and secured, and to have calendars made, and original papers printed; and numerous valuable publications have been issued by the commissioners from time to time. The new edition of Rymer's *Fœdera*, the calendar of Inquisitiones Post Mortem, and the editions with excellent indexes of the earlier Patent and Close Rolls and the Rolls of the Curia Regis are especially to be noted. An inquiry as to the materials for English history to be found in the Vatican and other foreign libraries was instituted about 1834 by the Record Commissioners, and the results were printed under the title 'Appendices to Report on the *Fœdera*,' but have never been formally published. Copies, however, were disseminated, and may be consulted in the British Museum Library and elsewhere, but the report itself has never appeared. Following this example, agents have been employed by the Public Record Office at Paris, Simancas, Venice, and Rome for many years, and the results of their labours have been partly published, while the remainder may be consulted at the Record Office.

A full investigation into the proceedings of the Record Commissioners was made by a committee of the House of Commons in 1835, and since 1840 annual reports have been issued by the Deputy-keeper of the Records. By the statutes referred to above the Master of the Rolls is empowered to appoint a deputy-keeper of the records, and, in conjunction with the Treasury, to do all that is requisite in the execution of this service. He makes rules for the management of the office, and fixes what fees may be demanded. He allows copies to be made, which, when certified by the deputy and assistant keepers, and authenticated with the seal of the office, are producible as evidence in courts of law. The Home Secretary directs from time to time such of the catalogues, calendars, and indexes, and such of the records as he thinks fit, to be printed, and sold at prices fixed by him. All Record publications may be procured directly from the Queen's Printers, East Harding Street, Fleet Street, and detailed catalogues of them may be obtained from the same source.

The present Public Record Office, a handsome fireproof building in Fetter Lane, was begun in 1851 on a plan which admits of extension as the records of the kingdom accumulate (for it must be remembered that modern documents as well as old form the subject of the deputy-keeper's care), and provision has been made for the transfer into his hands of the records which are growing from day to day in the great administrative and legal departments of the state, as soon as they have ceased to be needed for frequent reference.

The principal contents of the Record Office may be classified under seven principal groups. Records of (1) the Superior Courts of Law, including the Courts of Chancery, Queen's Bench, and Common Pleas, and the Exchequer, with its important fiscal as well as legal machinery; (2) Special and Abolished Jurisdictions, such as the Courts of Arches, Chivalry, Requests, and Star-chamber; (3) Duchy of Lancaster; (4) Palatinate of Durham; (5) Palatinate of Lancaster; (6) Principality of Wales; (7) State Papers and Departmental Records, including the archives of the Admiralty, Colonial Office, Foreign Office, Home Office, Treasury, and other departments.

Several handbooks to this enormous mass of materials have been published, of which the most useful are *An Account of the most important Public Records of Great Britain*, by C. Purton Cooper (2 vols. 8vo, 1832); *Official Handbook to the Public Records*, by F. S. Thomas (8vo, 1853); *Our Public Records*, by A. C. Ewald (8vo, 1873); and *A Guide to the Principal Classes of Documents preserved in the Public Record Office*, by S. R. Scargill-Bird (8vo, 1891). An introduction to the art of searching for materials, whether historical, topographical, genealogical, or legal, is afforded by the present writer's *Records and Record-searching* (8vo, 1888), while a person not acquainted with the ancient legal hands cannot do better than consult C. T. Martin's edition of Wright's *Court Hand Restored*. This contains useful glossaries, lists of abbreviations, ancient alphabets, and specimens of the old handwritings, which vary greatly from century to century. See PALÆOGRAPHY.

The bulk of the national records may be imagined from the fact that, to cite only two classes of documents, there are more than 18,000 Close Rolls, and many thousands of Coram Rege and De Banco Rolls, each of the latter in the Tudor period containing from 500 to 1000 skins of parchment.

The supreme needs of such a depository are indexes, and indexes *to* indexes. The latter requirement is tolerably supplied by the 'List of Calendars, Indexes, &c.' in appendix ii. to the 41st Report of the Deputy-keeper (8vo, 1880); but the indexes themselves to which this list of 748 items is a directory are sadly deficient. They do not furnish guidance to a twentieth part of the mass of documents, and many of them are merely eclectic. A recent addition to this series is 'General' Plantagenet Harrison's voluminous MS. Index to the De Banco and other rolls, which has been acquired at the public expense.

Numerous charters of the greatest antiquity are to be found in the Public Record Office, and there of course is preserved Domesday Book; but, understanding by 'records' a fairly continuous series of official documents, we may say that the earliest are the Pipe Rolls or Great Roll of the Exchequer. That for 31 Henry I. stands alone, but is soon followed by an unbroken series of Pipe Rolls extending from 2 Henry II. down to modern days. These are accounts of the revenue of the kingdom both as regards receipt and expenditure, and they contain items of the greatest possible historical interest. The Pipe Roll Society (established 1884) is gradually printing them. Next in order of antiquity are the Patent Rolls, which begin with 3 John and come down to the present day, and the Close Rolls, which present a similarly unbroken series from 1204. The former contain matters *patent* or open to the public, such as grants of offices, crown-lands, liberties, confirmations of previous grants, grants to corporate bodies, patents of honour, licenses, pardons, ratifications of treaties, proclamations, safe-conducts, presentations to benefices, restitutions of temporalities to bishops, abbeys, &c.

The Close Rolls contain mandates, letters, and writs of a private nature which were closed or sealed up, and record the directions of the king as to domestic and public matters, orders to the sheriffs on all kinds of questions, and directions as to raising subsidies. The historical value of these two sets of Rolls is immense, as in the earlier years all the state correspondence, both foreign and domestic, is recorded in one or other of them.

Other records of great value which date either from the reign of Edward I. or from still earlier times are the Cartæ Antiquæ, early transcripts of charters ranging from Ethelbert, king of Kent, to Edward I.; Charter Rolls, containing the king's grants of land, dignities, &c.; Escheat Rolls, accounts of lands and property forfeited to the crown; Feet of Fines, records of the endings of fictitious suits as to land, which are in reality deeds of conveyance, ranging from 7 Richard I. to William IV.; Rotuli Curiæ Regis, some of which are as early as Richard I., and are records of the cases decided in the King's Court up to the reign of Edward I., by whom the court was divided into the King's Bench, Common Pleas, and Exchequer; Coram Rege Rolls, or records of the crown side of the King's Bench, including Assize, Eyre, Coroners, and Gaol Delivery Rolls; De Banco Rolls, or records of the Court of Common Pleas; Inquisitiones Post Mortem, a treble series (Chancery, Wards and Liveries, Exchequer) of inquiries as to the land held by tenants *in capite* at time of decease, and as to their heirs; Originalia Rolls of the Exchequer, containing entries of any service, rent, or salary reserved in grants or charters; Subsidy Rolls, also Exchequer documents, often containing the names of the taxpayers under villages and towns, and most valuable to the topographer; Pell Records, including the Liberate Rolls and Issue Rolls, consisting of entries of payments of salaries, pensions, &c.; Customs Rolls for various ports; Memoranda Rolls (Exchequer), enrolments of writs of *Scire Facias*, informations, outlawries, and a multitude of other matters; Pardon Rolls, enrolments of pardons up to 2 James I.; Quo Warranto Rolls, respecting usurpations of offices or franchises; Oblata or Fine Rolls, offerings to the king for renewals of charters, enjoyment of lands, offices, and privileges; Parliament Rolls, petitions to and proceedings in parliament, beginning from the reign of Edward I.; Statute Rolls, the Journals of the Lords and Commons from Henry VIII., and other parliamentary records.

The foregoing are more or less continuous records, but there are some of an occasional character or of limited annual duration, but still of great importance, such as the Hundred Rolls, presentments of unjust claims of privileges such as free warren frankpledge, and assizes of bread and ale; the Liber Niger, and Liber Rubeus Scaccarii, and Testa de Nevill, lists of tenants *in capite* and knight's fees; Taxatio Ecclesiastica, an account (1291) of the taxation of benefices; Inquisitiones Nonarum, which included a valuation of benefices in the fourteenth year of Edward III.; French Rolls, Norman Rolls, Gascon Rolls, copies of treaties, truces, orders, summonses, grants of safe-conduct, and other items respecting the affairs of those parts of France that were under the English crown; Valor Ecclesiasticus, a valuation of benefices in 26 Henry VIII.; Baga de Secretis, trials for state offences of a specially secret nature, from Anne Boleyn to the Stuart adherents of 1715 and 1745; Royalist Composition Papers (1649–60), containing statements as to estates and families of Royalists.

The *state papers* (Domestic, Foreign, Colonial, Irish, and Scotch) originally sprung from the Privy-council and Chancery, and include the correspondence of the Privy-council, secretaries of state, and other public departments, with miscellaneous domestic papers from the time of Henry VIII. These, being the correspondence of the highest political officers of the kingdom, relate to an infinite variety of matters. They have been carefully arranged, and more than 120 volumes of calendars, covering a large portion of the field, have now been published.

The activity of the authorities of the Public Record Office has, however, not been confined to the records stored in Fetter Lane, for since 1858 the Master of the Rolls has issued, under the authority of the Treasury, more than 200 volumes of the series known as *Chronicles and Memorials of Great Britain and Ireland.* These are carefully edited texts of the ancient chroniclers, such as William of Malmesbury, Gervase of Canterbury, William of Newburgh, and Matthew Paris, collated with MSS. in English and continental libraries, and prepared by specially selected editors.

The Historical Manuscripts Commission, though not in name a department of the Record Office, is in reality closely connected with it. In answer to requests from this body, private libraries and muniment rooms all over England, Ireland, and Scotland have, almost without exception, been thrown open to authorised inspectors, who have reported on their principal MS. contents. Since 1870 many volumes of reports on these collections have been published, embodying transcripts of documents of special interest, and giving brief abstracts of a host of others.

The Literary Search Room at the Public Record Office is open from 10 to 4 every day, except Saturday, when it closes at 2 o'clock, and a few public holidays, when the office is shut up. Any respectable person may, on entering his name and address in a book kept in the lobby, attend and consult almost any document he may desire to see. A few of course are subject to special reservation.

Scotland.—The public records of Scotland were undoubtedly numerous and multifarious as early as 1282, as appears from an inventory of muniments examined in that year by the order of Alexander III.; and another inventory of Scottish rolls and writs was compiled at the command of Edward I. of England in 1291. Few, if any, of the documents mentioned in these lists are now known to exist. In 1651 the records of the Scottish parliaments and courts of justice were removed by Cromwell to the Tower of London. The more important of these, to the number of 1609 volumes, were restored in 1657, and the remainder, after the restoration of Charles II., were packed in eighty-five hogsheads and shipped on board a frigate for Scotland; but in a violent storm they were transferred to a smaller vessel, which went down with its precious cargo. The control of the records has from very early times been entrusted to the Clerk of the Rolls and Registers, or Lord Clerk Register, one of the high officers of state, who had a seat in the Scottish parliament, and to whom, and his deputies and other officers appointed by him, it was assigned to superintend both the formation and custody of the public records. These were at first in the inconvenient form of rolls, but in the reign of David II. the practice was introduced of writing them in books. By an act of 1463 the king's rolls and registers were appointed to be put in books; but the accounts in the Exchequer continued, nevertheless, to be kept in rolls till the passing of another act in 1672, appointing them to be written in books. Originally the records were kept in the Castle of Edinburgh, but in later times they were deposited under care of the Clerk Register, in the Laigh Parliament House, now part of the Advocates' Library; and shortly before the Union the whole records were transferred to that depository, where they continued till the erection of the large building called the General Register House (1787). The Register House serves the purpose of preserving and making available the national muniments, as well as accommodating the whole offices of record connected with the supreme court. The Lord Clerk Register and his depute have now merely the *custody* of the records, their preparation being entrusted to another class of officers.

Under the Scottish records are included the Acts of Parliament and of Privy-council, and the records of the supreme courts of justice; also the records of the Great Seal, Privy Seal, and Signet. An important class of records are the *Retours of Services.* A service is by the law of Scotland, in cases of intestacy, necessary to transmit a right to real property to the heir from his ancestor. At present this service consists of the decision of the sheriff of the county or the sheriff of Chancery; but the form in use till 1847 was by retour, a writing which contained the verdict of a jury returned in answer to a brieve from Chancery for finding the heir at the death of his ancestor. The register of retours contains services from 1545.

The registers connected with the transmission of heritable rights are even more important. After several unsuccessful attempts to introduce a system of registration, the *Register of Sasines* was established by Act 1617, chap. 16. By the system then introduced, since continued with modifications in detail, all instruments requisite to the transmission of real property must, in order to convert mere personal right into real right, be put on record for publication. Besides the general register in Edinburgh there were particular registers for the various counties kept at their respective county towns; but any instrument might be recorded either in the particular or the general register. Volumes were issued from the General Register House to the local recorders of sasines, which, when filled, were returned to the General Register House. This arrangement was changed by the Lands Registration Act of 1868, providing for the entire discontinuance of the particular registers before the last day of 1871, and enacting that all writs of this class be thenceforth recorded in the general register in Edinburgh, which register is so kept that the writs applicable to each county are recorded in separate series of volumes. By means of the Register of Sasines any title to real property can be ascertained with certainty and precision, and may, if necessary, be traced back nearly three centuries. It is also obligatory to record in separate registers all instruments necessary for the constitution, transmission, and extinction of voluntary encumbrances. See REGISTRATION. This system, while confirming the credit of the proprietor, also operates in favour of the security of creditors. There is a special *Register of Entails*, in which, in terms of Act 1685, chap. 22, deeds of entail must be recorded at the sight of the Court of Session. There are also the records of the various commissariats, which include testaments and other relative documents. The object of registration in all these cases is *publication;* but charters by subjects, dispositions, bonds, contracts, and other probative writs may, under Act 1698, chap. 4, be recorded in the *Register of Deeds* for *preservation.* A third object of registration is *execution.* Every deed constituting a personal claim of debt, or an obligation to perform some lawful prestation, if intended to be made the subject of personal diligence for payment or performance, must be registered previously to execution being issued on it. Calendars of state papers relating to Scotland preserved in the English Record Office have been recently published; while the publication of the Scottish records in the Register House has been going on at intervals since 1811. These include the Acts of Parliament, Register of the Great Seal, Register of the Privy-council, Exchequer Rolls, Accounts of the Lord High Treasurer, and other records.

See Ayloffe's *Calendars of Ancient Charters* (1774); *Acts of the Parliaments of Scotland*, vol. i. appendix to preface; *Reports of the Public Record Commissions*; the Record Publications—preface to the earliest volume of each series.

Ireland.—Many of the records perished during the wars prior to the final reduction of Ireland, and those which survived these commotions were long exposed to mutilation and destruction from the unsatisfactory arrangements for their custody. A commission was appointed in 1810 for the preservation and arrangement of the Irish Records, whose labours, conducted with considerable success, were terminated by the revocation of the commission in 1830. In 1847 commissioners were again appointed to investigate the state of the records, in consequence of whose labours a bill for their safe custody was prepared, but afterwards abandoned. In 1867, however, the Public Records (Ireland) Act was passed, and from 1869 the Reports of the Deputy-keeper of the Irish Records have been annually published. These include some documents and calendars in their appendices, notably a calendar of '' Fiants' (*fiant literæ patentes*) from Henry VIII.

Three volumes of a calendar of the Irish Patent and Close Rolls were published in 1861–63; and some other publications, including volumes of facsimiles of national MSS., have been issued by the Irish Record Office. This department since its formation in 1869 has done a great work in the way of collecting records from various depositories and arranging and cataloguing them. The records are open to searchers on payment of fees, but the deputy-keeper may dispense with fees if he thinks that literary profit will accrue to the public from the searchers' work. One important feature of the Irish Record Office is the collection of Parish Registers made under Acts 38 and 39 Vict. chap. 59, and 39 and 40 Vict. chap. 58. This is an example which should be followed in England.

Recovery. See ENTAIL.

Recruit, a person who voluntarily adopts the profession of arms and enlists in the army. See, for the conditions, ENLISTMENT, ARMY, REGIMENT.

Rectifying is a process applied to alcohol, chloroform, or other volatile liquid, by which the last traces of impurities are removed by distillation. Many varieties of stills and condensers have been devised for this purpose, for further reference to which see DISTILLATION, and ALCOHOL.

Rector (Lat. 'ruler'), in the Church of England, is a clergyman who has the charge and cure of a parish where the tithes are not impropriate, and who accordingly has the whole right to the ecclesiastical dues therein; where the tithes are impropriate the parson is a Vicar (q.v.). In the Episcopal Churches of the United States and (since 1890) Scotland all incumbents are called rectors. See also EDUCATION, and UNIVERSITIES.

Rectum, the terminal portion of the intestinal canal, named, from its comparatively straight course, the rectum (see DIGESTION), is the seat of various affections requiring medical or surgical assistance. Some of these affections, as fistula, fissure (see ANUS), piles, prolapsus ani, have already been considered. Amongst the other diseases of the rectum of sufficient importance to claim notice in these pages are—

(1) *Stricture of the Rectum*, which may be either of a simple or malignant nature. *Simple stricture* consists in a thickening and induration of the submucous tissue, less often of the muscular or mucous coat of the rectum, so as to form a ring encroaching on the calibre of the tube. It is situated most often about an inch from the anus, and the contraction is so great and unyielding that it is often difficult to pass a finger through it. It may occur as the result of injury or operation, of old ulceration (e.g. from dysentery), of syphilis, or without ascertainable cause. The symptoms are constipation and great pain, and a straining in evacuating the fæces, which, if not liquid, are passed in a narrow, flattened, or worm-like form that is very significant of the nature of the case. In an advanced stage of the disease diarrhœa and prolapsus often supervene. However great may be the constipation, strong purgatives must be altogether avoided. Soft and unirritating evacuations must be procured by such medicines as the confection of senna combined with sulphur (see PILES), or injections of castor-oil or of tepid water. The diet should be regulated so as to assist the action of the medicines. Nutritious soups are serviceable, since, at the same time, they support the strength and leave little matter to be excreted. Gradual dilatation by suitable bougies often gives great relief, but must be steadily persevered with, as the contraction is almost certain to recur. *Malignant stricture*—most commonly due to the scirrhous, but sometimes to the epithelial form of cancer—is by no means a very rare affection. Until ulceration sets in the symptoms are like those of simple stricture, only exaggerated in degree; but afterwards there is a discharge of fetid muco-purulent matter streaked with blood. In this disease the treatment can, in most cases, be only palliative. Sometimes, however, if the tumour is low down and localised it may be removed with at least temporary relief. If complete obstruction occur, or is threatened, the surgeon may resort to the formation of an artificial anus in the loin or groin as a last resource.

(2) *Spasm* of the *sphincter ani* muscle is characterised by extreme pain in the region of the anus, especially when an attempt is made to evacuate the bowels. The muscle contracts so firmly that the surgeon cannot easily introduce the finger into the rectum. The spasm may be caused by piles, by fissure of the anus, by ulceration of the rectum, and sometimes apparently by mere constipation. It is often relieved by the application of the belladonna ointment of the British Pharmacopœia.

(3) *Neuralgia of the rectum*, known also as *proctalgia*, is sometimes met with, and is especially prone to attack children and gouty persons. It is usually relieved by the judicious use of aperient medicines and such treatment as is used for other forms of Neuralgia (q.v.).

(4) *Pruritus podicis*, or *itching of the anus*, is a very common and extremely troublesome affection. Sometimes it depends on the presence of threadworms, of old piles, constipation, or some other local cause of irritation, while in other cases it is one of the manifestations of some constitutional condition. The treatment must depend upon the exciting cause. See works on the rectum by Allingham, Cripps, Henry Smith.

Reculver, a village of Kent, 1 mile from the sea, and 9 miles W. of Margate, with remains of the Roman station *Regulbium*. Pop. 298.

Recusants, persons who refuse or neglect to attend at the worship of the established church on Sundays and other days appointed for the purpose. The offence as a legal one may be held to date from 1 Elizabeth, chap. 2; but there were four classes punishable under the statutes against recusancy —simple 'recusants;' 'recusants convict,' who absented themselves after conviction; 'popish recusants,' who absented themselves because of their being Roman Catholics; and 'popish recusants convict,' who absented themselves after conviction. Protestant dissenting recusants were relieved from the penalties of recusation by the Toleration Act of 1 Will. and Mary, chap. 18. Catholics were partially relieved in the year 1791, and completely by the Emancipation Act of 1829.

Red. Most of the important red pigments have been already noticed. For carmine and crimson lake prepared from cochineal, and also for the madder reds, see LAKES. The reds of which oxide of iron is the colouring ingredient—viz. Indian red, Venetian red, and light red—are referred to under OCHRES. Vermilion (q.v.) is one of the finest and most beautiful reds. It has now been ascertained, however, that it is not always quite so permanent, at least as a water-colour pigment, as was formerly supposed. For house-painters' use this colour is often adulterated with red lead, which, though forming a useful paint for some common purposes, is fugitive. The substances used for dyeing textile fabrics red are noticed under the head DYEING.

Redan. See FORTIFICATION, SEBASTOPOL.

Redbreast (*Erythaca rubecula*), a bird of the family Sylviidæ, well known in the British Isles because of its very general distribution, its early and legendary associations, its conspicuous plumage, and the fact of its being resident. Its range is gradually extending northwards, and now it is found breeding in the Hebrides and Orkneys; in spring it is found on the island of Jan Mayen, in autumn it visits the Faroes, but it has not yet been recorded in Iceland. Southwards it breeds throughout Europe (but only locally in the south of Spain), in North-west Africa and the Canaries, Madeira, and the Azores; eastwards to the Ural Mountains. In winter its migrations extend to the Sahara, Egypt, Palestine, and Persia. The redbreast, known familiarly as Robin or Robin Redbreast, is about 5¾ inches long, olive-brown in colour on the upper parts; chin, throat, and upper breast reddish orange, bordered with bluish gray on the sides of the neck and shoulders; under parts dull white; bill black; legs and feet brown; the body fairly full and round, the legs slender. The female is usually but not always duller than the male. In habit robins are domineering and pugnacious; solitary, or found only in pairs, preferring plantations, but coming near dwelling-houses when forced by severe weather. Nesting begins in March. The nest of dead leaves, dried grass and moss, and lined with hair and feathers, is made in banks, hollow trees, and sometimes in strange and extraordinary places. The eggs, five to seven, are usually white with light reddish blotches, or pure white. Two or three broods are produced in the season. In autumn the young are forced by their parents to migrate, and at this season there is generally a great influx of robins from the northern parts of the Continent, where they have been passing the summer. The food consists chiefly of insects and worms; often of berries and other fruits; and in winter bread-crumbs and scraps of meat. Its song is sweet and plaintive, but of little compass, and not much noticed when other songsters abound. The widely distributed robin of the United States and Canada is a Thrush (*Turdus migratorius*).

Redcar, a popular bathing-resort in the North Riding of Yorkshire, 10 miles by rail NE. of Middlesborough. Its smooth, firm sands stretch 10 miles from the mouth of the Tees to Saltburn. Pop. (1851) 1032; (1891) 2818.

Red Cedar. See JUNIPER.

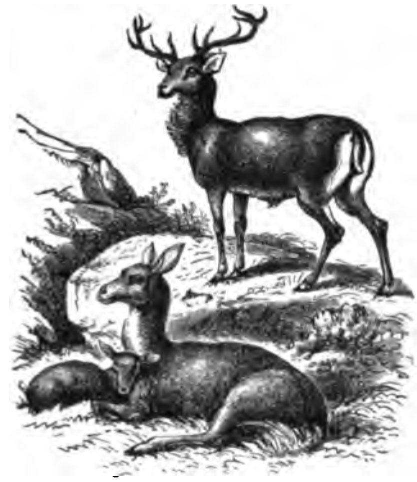
Red Crag. See PLIOCENE SYSTEM.

Red Cross, THE, is the badge and flag adopted by every society, of whatever nation, formed for the aid of the sick and wounded in time of war, recognised and authorised by the military authorities of its own nation, and enjoying certain privileges and immunities under the treaty known as the Convention of Geneva. Hence 'Red Cross Society' has become a generic name for all such voluntary efforts, and cannot be monopolised by any one of them. For three centuries or more a medical service has been attached to armies, and was long thought sufficient for every emergency, but the revelations made during the Crimean war (1853–56) were terrible. The merciful mission of Miss Nightingale and her companions, while reducing the losses by one-half, threw light upon shocking defects, and compelled the acknowledgment of want of organisation in everything connected with the health of the troops and care for the wounded. Nevertheless, when the war broke out (1859) in Lombardy similar inefficiency was apparent. Loud complaints arose, but the first practical result ensued from the publication by M. Durant of his *Souvenir de Solferino*. The account of this battle (June 24, 1859), which lasted fifteen hours and in which 300,000 combatants were engaged, was so heart-rending as to force public attention to the necessity for supplementing the medical and sanitary service by volunteer societies trained and organised in time of peace. The book was discussed at Geneva at a meeting of the *Société Genèvoise d'Utilité Publique*, February 9, 1863, a date which may be taken as the starting-point of the Red Cross. An international conference was then convoked, which assembled at Geneva, October 26, 1863, and included among its thirty-six members delegates from fourteen governments and six associations. A proposed code of international enactments was discussed, and the main recommendations agreed to were (1) the formation in each country of a committee to co-operate with the army sanitary service in communication with the government, and occupying itself in time of peace with preparing supplies of hospital stores, training nurses, &c., and during wars furnishing the same in aid of their respective armies, neutral nations being invited to assist such national committees; (2) the declaration of the neutrality of hospitals, of the officials of the sanitary service, of the unpaid nurses, of the inhabitants of the country aiding the wounded, and even of the wounded themselves. The conference suggested the adoption of the same distinctive and uniform badge (the red cross on a white ground) for all hospitals and sanitary officials as well as for the volunteer relief agents. A treaty, the Convention of Geneva, embodying these resolutions was signed at a second conference at Geneva in 1864 by twelve out of sixteen representatives there assembled, and it has since been acceded to by every civilised nation. International conferences have been held at Paris (when the convention was extended to naval warfare), Berlin, and Vienna, but the resolutions passed at Geneva have undergone no material alteration. The International Committee still continues at Geneva, for though its pioneering work is over it forms an important centre of communication between belligerent states, and appoints agencies whenever war is declared, to facilitate the action of the different societies and the transmission of relief offered by neutrals. The English Order of the Hospital of St John of Jerusalem, the National Society for Aid to the Sick and Wounded in War, the Eastern War Sick and Wounded Relief Fund, the Stafford House Fund, the French Société de Secours aux Militaires Blessés, the Russian Johanniter, and the Austrian Samariter Verein are among the best known of the numerous Red Cross societies. The International Committee at Geneva publishes quarterly, since 1869, the *Bulletin International des Sociétés de la Croix Rouge*. See also *The Red Cross: Its Past and*

Future, by G. Moynier (trans. by J. Furley, 1883), a Red Cross knight of the foremost rank, having been the first to enter Paris with provisions, and having received for his many and great services the gold medal from the committee at Versailles, and decorations from the various French Red Cross societies, which contains the text of the Convention of Geneva; *Under the Red Cross*, by Pearson and M'Laughlin; *Notes and Recollections*, by W. M'Cormack. See AMBULANCE.

Red Cross, THE ROYAL. This decoration was instituted by Queen Victoria in 1883. It is conferred on any ladies, English or foreign, recommended by the Secretary of State for War, for special exertions in providing for the nursing, or for attending to sick and wounded soldiers and sailors. The decoration is a cross of crimson enamel gold-edged, attached to a dark-blue ribbon red-edged, one inch in width, tied in a bow and worn on the left shoulder.

Red Deer, or STAG (*Cervus elaphus*), a large and very handsome animal, inhabiting some of the forests of Europe, West Asia, and North Africa. Those living in the more northern parts are smaller. In Britain red deer are found on Exmoor, in the Highlands of Scotland, and in some parts of Ireland.



Stag, Hind, and Calf (*Cervus elaphus*).

The full-grown animal stands over 4 feet at the withers, and is dark reddish brown in colour, slightly grayish in winter. The Antlers (q.v.), with which the rival males fight, belong to what is called the elaphine type, having protrusive brow-tines, well-marked bez-tines, a rounded beam, and terminal snags 'arranged in a cup or crown.' As usual, they are shed in the spring of each year, and gain 'points' with each year's fresh growth, a 'royal stag' having twelve, though this is not the maximum. Darwin mentions an antler 30 inches in length with fifteen snags, and another with thirty-three, while Flower refers to 'a pair of antlers, weighing 74 lb., and with forty-five points.'

The male stags are distinguished by the possession of antlers, and are rather larger and stronger than the females. Their voice is also stronger, for they bellow very loudly when enraged or when challenging their rivals. The combats are very fierce, and sometimes fatal even to both combatants, for their antlers sometimes interlock inextricably. In fighting, the projecting brow-tines form most effective weapons. The breeding season is in September or October, but the young are not born till the end of May or the beginning of June. As in most species of Cervus they are first slightly spotted with white. In the first year the young male has only a hint of antlers, in the second year only small unbranched beams; thereafter a tine is gained each year.

Nearly allied to the red deer is the North American Wapiti (*C. canadensis*), and there are other closely related species (if not varieties) in Persia, Cashmere, and Tibet. See DEER, STAG, STAG-HOUND; and *Red Deer*, by R. Jefferies (1884).

Reddendo. See CHARTER.

Redditch, a busy manufacturing town on the borders of Worcester and Warwick shires, stands on an acclivity 13 miles SSW. of Birmingham by rail. Needles, pins, fish-hooks, and fishing-tackle are made extensively. Pop. (1851) 4802; (1881) 9961; (1891) 11,295.

Reddle, RADDLE, or RED CHALK (Scot. *keel*), an impure peroxide of iron (ferric oxide) associated with very variable proportions of clay or chalk, or sometimes other substances. It varies greatly too in hardness, some kinds being difficult to crush and others quite soft. In colour it passes from a pale brick-red to a tint occasionally nearly as bright as vermilion. It is found in many places abroad, and in England in Somersetshire, the Forest of Dean, at Wastwater in Cumberland, and, of a quality valuable for polishing optical glasses, near Rotherham in Yorkshire. Some kinds of it are used for marking sheep, others for carpenters' and masons' pencils, and the finer qualities for artists' crayons. Red ochre is one of the varieties.

Red Earth, the name given to the reddish loam or earth which so frequently occurs in regions composed of limestones. This earth is the insoluble residue of those portions of the calcareous rock which have been dissolved by rain. Such red earths are of common occurrence in limestone caverns. See CAVE.

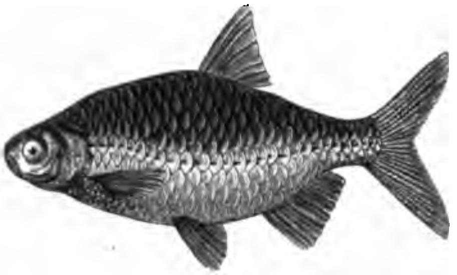
Redemptionists, one of the names of an order of monks devoted to the redemption of Christian captives from slavery. They are more frequently called Trinitarians (q.v.).

Redemptorists, called also LIGUORIANS, a congregation founded by St Alfonso Liguori (q.v.).

Redesdale, the valley of the river Reed in Northumberland, extending almost from the Scottish border in a south-easterly direction for over 16 miles, until it opens up into the valley of the Tyne, the river joining the North Tyne at Reedsmouth. It is for miles a mere mountain vale, sloping upwards into bleak and dreary moorland, but it has a quiet beauty of its own that is not easily forgotten by the traveller. The river springs out of the Cheviot Hills, which lie athwart the head of the dale, and down its course from Carter Toll on the border lay one of the chief roads into England. Watling Street itself traverses its middle and upper part. Near the southern end of Redesdale is the famous field of Otterburn (q.v.), but 16 miles from the border, which point again is but 10 miles from Jedburgh. The men of Redesdale of old were brave and turbulent, and bore more than their share in Border feuds and forays.—Redesdale gave from 1877 the title of earl to John Thomas Freeman Mitford (1805–86), who was son of the ex-Speaker, John Mitford (died 1830), first Baron Redesdale, and who himself from 1851 was Chairman of Committees in the House of Lords, and a determined enemy of change in ecclesiastical matters.

Redeswire, RAID OF THE, a battle fought 7th July 1575 close to the English border at the pass leading across the Cheviots into Redesdale, about 6 miles ESE. of Chesters in Roxburghshire. A number of Scots attacked an English force to avenge the slaughter of a countryman, but were beaten back and on the point of being utterly routed, when the provost and townsmen of Jedburgh arrived hot from the 10 miles' march, and at once set on the enemy. The Englishmen were soon completely defeated, with the loss of several considerable prisoners. There is a prosy ballad on the subject in Scott's *Border Minstrelsy*.

Red-eye, or RUDD (*Leuciscus erythrophthalmus*), a fish belonging to the same genus as roach, chub, and minnow. It is common in lakes, slow rivers, and fens, in many parts of Europe and in England. It much resembles the Roach (q.v.), but is shorter and deeper. It is richly coloured, the name Rudd referring to the colour of the fins, the name Red-eye to that of its iris. The fish is better eating than the roach, and sometimes attains a weight of 2 lb.



Red-eye or Rudd (*Leuciscus erythrophthalmus*).

Redgrave, RICHARD, painter, born in London on 30th April 1804, in 1826 was admitted a student of the Academy, and was elected an A.R.A. in 1840, an R.A. in 1851. From 1847 onwards he took a prominent part in art instruction, and in 1857 was appointed Inspector-general of Art Schools, which office, with that of Surveyor of the Royal Pictures, he resigned in 1880, being then created a C.B. In 1882 he was placed on the list of retired academicians, and next year he ceased to exhibit, having since 1825 contributed 145 pictures to the Academy, besides forty sent elsewhere. He wrote, with his brother, *A Century of English Painters* (1866), and edited several valuable catalogues. He died 14th December 1888. See his *Reminiscences* (1891).

Reding, ALOYS VON, the famous champion of Swiss independence, was born in 1755, in the canton of Schwyz. After serving in Spain he returned to Switzerland in 1788. As captain-general of the canton of Schwyz he repulsed the French Republicans, May 2, 1798, at Morgarten. After the formation of the Helvetic Republic Reding was one of those who eagerly worked for the restitution of the old federal constitution. In 1802 he founded in the eastern parts of Switzerland a league, with the intention of overthrowing the central government. Reding went to Paris in order to gain over the First Consul, but failed. Till 1803, and again after 1809, he acted as Landamman or chief-magistrate of Schwyz. He died 5th February 1818.

Red-letter Days. See BLACK LETTER.

Red Liquor. See CALICO-PRINTING, p. 645.

Redoubt. See FORTIFICATION.

Redout Kalé, a fortified post on the Black Sea coast of Russian Caucasia, is situated in a marshy region at the mouth of a small river, about 10 miles N. of Poti. It was the chief shipping-place for Circassian girls to Turkey, and was captured by the British fleet in 1854.

Redpole. See LINNET.

Red River, the lowest western branch of the Mississippi, rises near the eastern border of New Mexico, flows eastward through Texas, forming the entire southern boundary of Indian Territory, thence south-east through Arkansas and Louisiana, and enters the Mississippi below 31° N. lat. It is 1600 miles long, and receives numerous branches, the Washita (Ouachita) the most important. It is navigable for seven months to Shreveport (350 miles). A few miles above is the Great Raft, of driftwood, which formerly blocked up the river.

Red River of the North, a navigable river of the United States and Canada, rises in Elbow Lake, Minnesota, near the sources of the Mississippi, and flows south and west to Breckinridge, then north, forming the boundary between Minnesota and North Dakota, and so into Manitoba and through a flat country to Lake Winnipeg. Its course is 665 miles (525 in the United States). The Red River Settlement was the origin of Manitoba (q.v.). For the Red River Expedition, see CANADA, Vol. II. p. 695, and RIEL.

Red Root (*Ceanothus*), a genus of deciduous shrubs of the natural order Rhamnaceæ. The common Red Root of North America (*C. americanus*), which abounds from Canada to Florida, is a shrub of two to four feet high, with beautiful thyrsi of numerous small white flowers. It is sometimes called *New Jersey Tea*, an infusion of its leaves being sometimes used as tea. It serves also as an astringent, and for dyeing wool of a cinnamon colour. A Mexican species has blue flowers, and a California kind is used for evergreen hedges.

Redruth, a town of Cornwall, on a hillside (414 feet) in the centre of a great mining-district, 9 miles by rail W. by S. of Truro. It has a town-hall (1850), public rooms (1861), a miners' hospital (1863), &c. William Murdock (q.v.) here in 1792 first used gas for lighting purposes. Pop. (1851) 7095; (1871) 10,685; (1891) 10,324.

Red Sea. The Red Sea is an arm of the Indian Ocean, running north-north-west from the Gulf of Aden, with which it communicates by the Strait of Bab-el-Mandeb, 13½ miles across. Its length is about 1200 miles, and its width in the central portion is between 100 and 200 miles, the greatest breadth being about 205 miles; it narrows towards the southern entrance, while in the north it is divided by the peninsula of Sinai into two gulfs, the Gulf of Suez, 170 miles long by 30 miles wide, and the Gulf of 'Akaba, 100 miles in length.

The Arabian coasts of the Red Sea are usually narrow sandy plains backed by ranges of barren mountains; the African coasts towards the north are flat and sandy, but farther south high tablelands rise some distance inland, culminating still farther south in the lofty mountains of Abyssinia. A marked feature in the configuration of the Red Sea is found in the large existing and upraised coral-reefs running parallel to both the eastern and western shores, those to the east being more extensive and farther from the coast than those to the west; the most important are the Farisan Archipelago in the eastern reef, and the large island of Dahlak, lying off Annesley Bay, in the western reef. In addition to the islands of organic formation mention may be made of the volcanic group lying in 14° N. lat., the largest of which, Jebel Zugur, is 10 miles long, 7 miles wide, and 2074 feet in height; farther north, on the islet of Jebel Teir, is a volcano which was active until quite recently. A dangerous reef, the Dædalus, lies directly in the path of steamers in 24½° N. lat., and a lighthouse has been placed on it. The principal harbours on the Red Sea are Mocha, Hodeida, Lokeyyah, Jiddah, and Yenbo' on the Arabian coast, and Massowah, Khor Nowarat, and Suakim on the African coast.

In ancient times the Red Sea was used as a means of communication by the Phœnicians and other maritime peoples, until the discovery of the route round the Cape of Good Hope diverted the traffic into another channel, only to be revived, however, on a much more extensive scale with the construction of the Suez Canal.

The tides are very variable, depending largely on the direction and force of the winds, which also to a great extent determine the direction and velocity of the surface currents. The hot climate is due to the almost cloudless sky, and consequent want of rain, the altitude of the sun, and the absence of rivers. The mean temperature of the air generally ranges between 70° and 94° F. during the day, though readings of over 100° are often registered in the shade; but during the night the temperature may fall to the freezing-point, owing to radiation in the clear atmosphere. The prevailing wind on shore is north-north-west almost universally, but from October to May south-south-east winds prevail over the southern portions of the sea, a belt of calms and variable winds occurring in the central regions, while in the northern portions the usual north-north-west winds are met with. Evaporation is very great, and the air over the water is always very moist in the summer; hurricanes are unusual, but rain-squalls frequently occur with the southerly winds, and moderate gales and sandstorms, called 'dragons' in the popular language of the Arabs, are not uncommon.

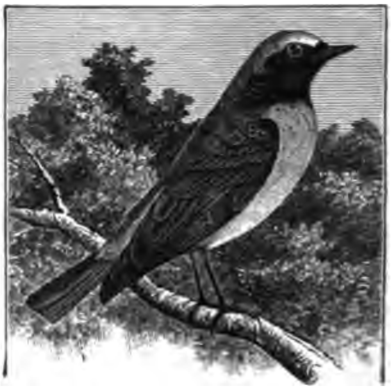
The mean temperature of the surface water in the Red Sea varies at the northern end between about 65° and 79° F., in the central regions between 75° and 86°, and at the southern end between 78° and 89°; readings of over 100° have been recorded at the south end of the sea. The temperature of the water below the surface decreases down to a depth of about 200 fathoms, from whence down to the bottom a mean temperature of about 71° is found all the year round; this agrees with the temperature conditions prevailing in the enclosed seas of the East Indies, for instance, according to the observations made on board the *Challenger*, the depth at which the minimum temperature occurs (i.e. 200 fathoms in the Red Sea) indicating the depth of water over the barrier separating the Sea from the open ocean. In winter, in the northern part, the whole body of water from surface to bottom usually has a mean temperature of 71°.

The salinity of the water is almost constant at about 1·030 (ordinary ocean water is about 1·026), and this is due to the fact that no rivers flow into it, little rain falls, and the evaporation is excessive. It has been estimated that, were the Red Sea entirely enclosed, it would become a solid mass of salt in less than two thousand years, but this is prevented by an inflow of water through the Strait of Bab-el-Mandeb, and it is also known that a current of very salt water flows out underneath the incoming surface current.

The greatest depth in the Red Sea is about 1200 fathoms, and the mean depth of the whole area about 375 fathoms. From the point of greatest depth, which is near the centre, the bottom rises towards each end. Owing to the absence of rivers the deposits approach in character those formed in the open ocean, being largely composed of Foraminifera, Pteropods, and other pelagic shells. The marine fauna and flora are extensive, and have been described by Haeckel and other naturalists; it has been shown that a migration of the Red Sea and Mediterranean faunæ is taking place along the Suez Canal. The origin of the name—the Lat. *Mare Rubrum* and the Gr. *Erythra Thalassa*—is much disputed. The Hebrew name is *Yam Sûph*, which Gesenius explains as the 'sea of reeds.' The path by which the Israelites went out of Egypt was along the course of the valley called Wâdy Tumeilât, apparently an old arm of the Nile now silted up. The Lake of Ismailieh (*Timsah*) was then most probably the head of the Gulf of Suez, but the exact point of passage of this arm of the sea still remains obscure.

Redshank. See SANDPIPER.

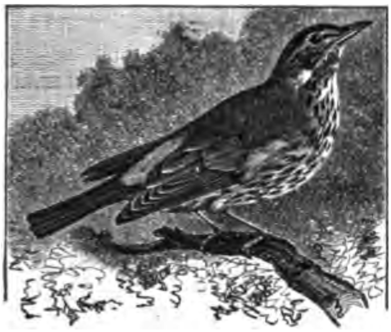
Redstart (*Ruticilla phœnicura*), a bird of the family Sylviidæ, ranging in Europe from the North Cape to the wooded regions of central and southern Europe; in Asia to the valley of the Yenesei in summer, and to Palestine, Arabia, and Persia in winter; in Africa from the Canaries and Madeira and Senegal to Abyssinia in winter. In Great Britain it is a summer visitor to most parts, though unaccountably absent from some; in Ireland it has been very seldom recorded, but since the summer of 1885 it has nested annually at Power's Court, County Wicklow. The male is about 5½ inches long, has the head, back, and wing-coverts slate-gray; the forehead and eye-streak white; chin, throat, and cheeks jet black; wings brown, with pale outer edges; the tail and upper tail-coverts bright rufous chestnut; the rest of the under parts buff; bill black; legs and feet brown. The female has the upper parts grayish brown, under parts lighter, the tail less brilliant, and no bright colours on the head. The redstart is a bird of lively manners. Its food consists of flies, gnats, small butterflies, and other insects; the young are fed largely on caterpillars. The nest is built of moss and dry grass, lined with hair and feathers, in holes in trees or walls; the eggs are usually six in number, and of a light blue colour. The song is slight, but soft and melodious; the alarm note is a plaintive *wheet*. In some parts of the country this bird is called the 'Fire-tail,' *start* being derived from the Anglo-Saxon *steort*, 'a tail.' The Black Redstart (*R. titys*) is now a well-known visitor to many parts of the English coasts, especially of Devon and Cornwall, in autumn and winter, and also to the east and south coasts of Ireland. It is more rare in Scotland, but it has been found as far north as the Pentland Skerries. It has been recorded in Iceland, the Faroes, southern Scandinavia, and Denmark. From Holland southwards it is abundant in spring. Its home is in southern Europe and northern Africa, whence it ranges eastwards to the Ural Mountains, Palestine, and Nubia. Other species of redstart are found, one (*R. mesolerea*) in Cyprus, Asia Minor, and Persia; another (the Indian Redstart, *R. rufiventris*) from Lebanon eastward; and a third (*R. ochrurus*) in the Caucasus and Armenia.



Redstart (*Ruticilla phœnicura*).

Red Water (disease). See BLACK WATER.

Redwing (*Turdus iliacus*), a species of Thrush (q.v.), well known in Britain as a winter bird of passage. It spends the summer in the northern parts of Europe and Asia; it occurs in Iceland, and straggles even to Greenland: its winter range extends to the Mediterranean, Persia, Northern India, and Siberia as far as Lake Baikal. In size it is somewhat smaller than the song-thrush or mavis. Its flight is remarkably rapid. The general colour is a rich clove-brown on the head, upper parts of the body, and tail; the wing-feathers darker, but with lighter external edges; the lower parts mostly whitish, tinged and streaked with brown; the under wing-coverts and axillary feathers bright reddish orange. The redwing arrives in Britain rather earlier than the Fieldfare (q.v.), and, like it, congregates in large flocks, but is less numerous and less gregarious. Its food consists of insects, small snails, and berries. It has an exquisite, clear, flute-like song, which it pours forth from the summit of a high tree, gladdening the woods of the north.



Redwing (*Turdus iliacus*).

Redwood. See PINE.

Ree, LOUGH, a lake in the centre of Ireland, between Connaught and Leinster, is an expansion of the river Shannon (q.v.).

Reed, the common English name of certain tall grasses, growing in moist or marshy places, and having a very hard or almost woody culm. The Common Reed (*Phragmites communis*, formerly *Arundo Phragmites*) is abundant in Britain and continental Europe, in wet meadows and stagnant waters, and by the banks of rivers and ditches. It grows chiefly in rich alluvial soils. The culms are 5 to 10 feet high, and bear at the top a large, much-branched panicle, of a reddish-brown or yellowish colour, having a shining appearance, from numerous long silky hairs which spring from the base of the spikelets. The two outer glumes are very unequal; and the spikelet contains 3 to 4 perfect florets, with a barren one at the base. The culms, or stems, are used for making garden-screens, for light fences, for thatching houses and farm-buildings, for making a framework to be covered with clay in partitions and floors, for battens of weavers' shuttles, &c. So useful are reeds in these ways, and particularly for thatching, that it is found profitable in some places to plant them in old clay-pits, &c. Probably they might be planted with advantage in many peat-mosses where they are now unknown. The plant is not very common in Scotland; but in the fenny districts of the east of England it covers large tracts called *reed-ronds*, and similar tracts occur in many parts of Europe. Nearly allied to this is *Arundo donax*, the largest of European grasses, plentiful in the south of Europe, and found in marshy places as far north as the south of the Tyrol and of Switzerland. It is 6 to 12 feet high, and has very thick, hollow, woody culms, and a purplish-yellow panicle, silvery and shining from silky hairs. The woody stems are an article of commerce, and are used by musical instrument makers for reeds of clarionets, mouth-pieces of oboes, &c. They are also made into walking-sticks and fishing-rods; and see the article WRITING. The creeping roots contain much farina and some sugar. Of *Arundo Karka* (called *Sur* in Sind) the flower-stalks are very fibrous; and the fibres, being partially separated by beating, are twisted into twine and ropes. The Sea Reed is *Ammophila* (q.v.)—or *Psamma—arundinacea.*

Reed, in Music, the sounding part of several instruments, such as the clarionet, bassoon, oboe, and bagpipe, so called from its being made from the outer layer of a reed (*Arundo sativa* or *donax*) found in the south of Europe. The name is also applied to the speaking part of the organ, though made of metal. Reeds are generally divided into two kinds—the *beating* reed, used in the organ, clarionet, &c., requiring to be placed within a tube to produce a musical sound, and the *free* reed, used in instruments of the harmonium and concertina kind. The Organ (q.v.) reed (fig. 1) consists of a metal tube, *a*, with the front part cut away and having a metal (brass, German-silver, or steel) tongue, *b*, covering the orifice, attached at the upper end, and bent forward at the lower end to permit of vibration. The admission of a current of air to the outer tube causes the tongue to vibrate against the edge of the opening in the tube *a*, producing a musical note, the pitch of which is determined by the length of the free end of the reed; this is regulated by a strong movable spring, *c*, pressing against it, the quality of the sound depending on the length and form of the outer tube. In the Clarionet (q.v.) reed the mouth forms the outer tube. The reed in the drone of the bagpipe is on the same principle as the organ reed, and is made of a piece of reed tube a few inches long, cut across a knot at one end so as to make a stop. A slit is cut in it with a knife to make the tongue. It is shown in fig. 2, *a*, *in situ*, the outer tube being shown in section; the air enters from the bag in the direction of the arrow, the free end is the stopped one. The double beating reed (fig. 2, *b*) is that used in the bassoon, oboe, and the chanter of the bagpipe, and consists of two reeds, shaped so as to be tied together in the form of a tube at one end, either with or without the aid of a metal pipe, to fit the end of the instrument, and thinned away at the other end, where the two meet with a little space between them in the

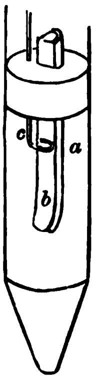


Fig. 1.

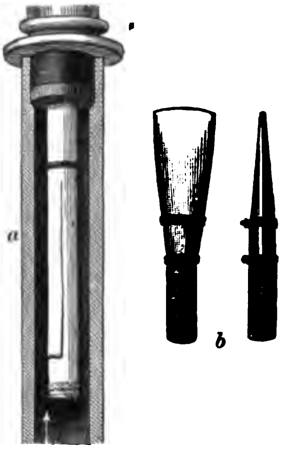


Fig. 2.

centre. The air being blown into the thin end causes the two reeds to vibrate against one another. The free reed, shown in fig. 3, consists of a metal tongue, *b* and *c*, fixed at one end to a metal plate, *a*, having an elongated slot large enough to allow the free end of the tongue to vibrate through it on the admission of a current of air; and this vibration forms the note, the pitch of which is regulated by the length of the reed.

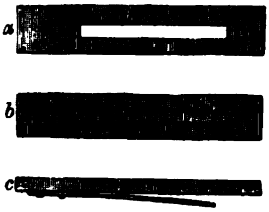


Fig. 3.

Reed Bird. See Bob-o-link.

Reed Mace. See Typha.

Reef. See Coral.

Reel, a lively dance, popular in Scotland, which may be danced by two couples, but admits a greater number. The music is in general written in common time of four crotchets in a measure, but sometimes in jig time of six quavers.

Reels. See Bobbins.

Rees, Abraham (1743–1825), a native of Montgomeryshire, and Unitarian minister for forty years at the Old Jewry, London, compiled an Encyclopædia (q.v.) on the basis of Ephraim Chambers'.

Reeve (Sax. *geréfa*), a title applied to several classes of old English magistrates over various territorial areas: thus, there were *borough-reeves*, over boroughs; *port-reeves*, in trading-towns, in ports, as in London (q.v.); *high-reeves*, &c. The Sheriff (q.v.) is the *shire-reeve*. The reeve in Chaucer is what is still called *grieve* in Scotland, a land-steward.

Reeve, Clara, novelist, daughter of the rector of Freston in Suffolk, was born at Ipswich in 1725, lived a quiet life, and died unmarried, 3d December 1803. She translated Barclay's *Argenis* (1772), and in 1777 published the *Champion of Virtue, a Gothic Story*, renamed next year *The Old English Baron*. It was dedicated to Richardson's daughter, and was avowedly an imitation of Walpole's *Castle of Otranto*, with its extravagances toned down. She published four other novels, and *The Progress of Romance* (1785).

Reeves, John, was born in 1752, and educated at Merton College, Oxford. Called to the bar about 1780, he became chief-justice of Newfoundland (1791–92), one of the king's printers (1800), a superintendent of aliens (1803–14), and law clerk to the Board of Trade, and died in 1829. He published much on law, and a widely popular edition of the Bible, with selected scholia (9 vols. 1825).

Reeves, John Sims, one of England's greatest singers, was born at Shooter's Hill, Kent, on 21st October 1822. At fourteen he was a clever performer on various instruments, and was appointed organist and director of the choir in the church of North Cray in Kent. He first appeared in public as a baritone at Newcastle in 1839. This début was a complete success; and he acquired fresh fame, but as a tenor, in London. In order to perfect his voice and style he studied at Paris (1843) for some time, and then appeared at Milan in the tenor part of Edgardo in *Lucia di Lammermoor*. He returned to England in 1847, and, coming out at Drury Lane as Edgardo, was immediately recognised as the first English tenor, a position he maintained for many years. He was engaged in 1848 at Her Majesty's Theatre, and in 1851 sang as first tenor at the Italian Opera in Paris. After ceasing to sing on the stage (after 1860) he became popular all over the country as a ballad-singer at concerts. He especially excelled in singing oratorio parts, his first oratorio rôle having been in *Judas Maccabæus* in 1848; from that year onwards he sang almost regularly at the great annual musical festivals. His voice was of wide range, and of great natural purity and sweetness. On 11th May 1891 he made 'positively his last appearance.' See Life by Sutherland Edwards (1881), and *My Jubilee*, by Sims Reeves (1889).

Refectory. See Monastery.

Referendum. See Switzerland.

Reflection. A surface on which a beam of light falls may be either rough or smooth. If it be rough, the greater part of the incident light is irregularly scattered by the innumerable surface-facets, so as to be reflected or dispersed in all directions; if it be smooth, a proportion (but never the whole) of the incident light is regularly reflected or turned back in definite paths. A smooth, dustless mirror is not visible to an eye outside the track of rays reflected from it. If the polished surface be that of a transparent substance (e.g. glass) optically denser than the medium conveying the light to it, comparatively little light is reflected; but the more oblique the incidence, the smoother the polish, and the greater the difference between the optical density of the glass and that of the medium in which it is immersed, the greater the proportion reflected. Thus less light is reflected from glass under water than from glass in air; and conversely, if the light travel in the denser medium and strike the bounding surface between it and a rarer medium—as where light ascending through water strikes its upper free surface—it will, if its obliquity of incidence exceed a certain limit, be almost totally reflected; the small loss that ensues arising wholly from absorption, while no light is transmitted into the air above. This may be shown by holding a clear tumbler of water above the head: the image of objects beneath is seen reflected in a bright mirror surface; and a phenomenon of the same order is seen on thrusting a test-tube containing air below the surface of water, when it will appear to have a lustre like quicksilver. If the reflecting surface be that of an opaque body the bulk of the incident light is reflected, a percentage being lost by absorption. What has been said about light applies equally to ether-undulations of all kinds, and therefore the theory of reflection has general reference to radiant heat, light, actinic radiation, and electro-magnetic undulations (see Magnetism). Reflection arises in all cases from a difference in the transmissibility of ether-disturbances on the two sides of the bounding surface.

On reflection from polished surfaces we have, so far as regards the directions of the reflected rays, the following laws observed: (1) The incident 'ray,' the normal (*i.e.* a line drawn perpendicular) to the surface at the point of incidence, and the reflected 'ray' all lie in one plane, the 'plane of incidence;' and (2) the angle of incidence (the angle which the incident 'ray' makes with the normal to the reflecting surface) is equal to the angle of reflection (the corresponding angle between the normal and the reflected 'ray'). These laws apply equally to ether-waves of all lengths, and therefore to light of all colours; and they also hold good whatever be the shape of the surface. If the surface be plane their application is simple; and if the surface be curved we have, in effect, to consider the curved surface as made up of indefinitely small facets, to each of which the above laws can be applied. The geometrical consequences of these laws make up what used to be called Catoptrics, that part of geometrical optics which deals with reflection; and this coincides in its propositions with that part of kinematics which gives an account of the reflection of waves. Here the ether-waves (using the term 'waves' in its most general sense) are assumed to travel through optically homogeneous media, and can consequently be traced out by imaginary lines drawn at right angles to the wave fronts or along the directions pursued by the waves, these imaginary lines being called 'rays.'

Plane Reflecting Surfaces.—(1) Rays which are parallel to one another before striking a plane reflecting surface are parallel after reflection. (2) If light diverging from or converging towards a point, Q, be reflected from a plane mirror, it will appear after reflection to diverge from or converge towards a point, *q*, situated on the opposite side of the mirror and at an equal distance from it. In fig. 1, the rays diverge from Q; after reflection they appear to diverge from *q*. If, on the other hand, the course of the light is such that the rays appear before reflection to converge upon *q*, they will after reflection actually pass through Q. (3) A consequence of the preceding proposition is that when an object is placed before a plane mirror the virtual image is of the same form and magnitude as the object, and at an equal distance from the mirror on the other side of it. The right hand of the image, taken as looking towards the mirror, is necessarily opposite to the left hand of the object; so that no one ever sees himself in a single plane mirror as others see him or as a photograph shows him, but he sees all his features reversed. (4) When two mirrors are placed parallel to one another, light from an object between them is reflected back and fore, so as to appear on each occasion of reflection as if it came from images more and more remote from the mirrors. On each occasion the course of the rays of light is the same as if the virtual image behind the mirror had been a real object; and a new virtual image is produced, apparently as far behind the reflecting mirror as the virtual object had been in front of it. Thus, in fig. 3, where AB and CD are mirrors, the distance Q-CD = CD-*q*1; *q*1-AB = AB-*q*2; and so on indefinitely; and also Q-AB = AB-*q*′; *q*′-CD = CD-*q*″; and so on indefinitely; so that if the mirrors were perfectly plane and parallel, and if they reflected all the light which fell on them, an observer between the mirrors would see in this experiment (which is called the endless gallery) an indefinite number of images. A variation of this experiment, carried out with mirrors not parallel to one another, but inclined at an angle which is some aliquot part of 180°, gives the principle of the Kaleidoscope (q.v.). (5) When a beam of light is reflected from a mirror and the mirror is turned through a given angle the reflected beam is swept through an angle twice as great. This principle is utilised in the construction of many scientific instruments, in which the reflected beam of light serves as a weightless pointer, and enables us to measure the deflection of the object which carries the mirror. (6) When a beam of light is reflected at each of two mirrors inclined at a given angle the ultimate deviation of the beam is (if the whole path of the light be within one plane) equal to twice the angle between the mirrors; for example, in fig. 4, the angle SDB, which measures the ultimate deviation of the original beam SA, is easily proved equal to twice the angle BCA between the two mirrors. This proposition is applied in the Quadrant (q.v.) and Sextant (q.v.). (7) When a wave of any form is reflected at a plane surface it retains after reflection the form which it would have assumed but for the reflection, this form being, however, guided by reflection into a different direction.

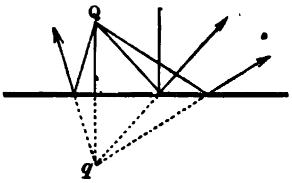


Fig. 1.

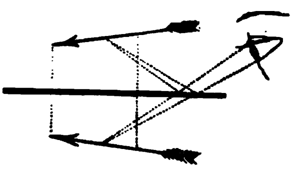


Fig. 2.

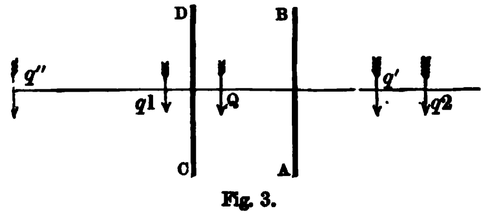


Fig. 3.

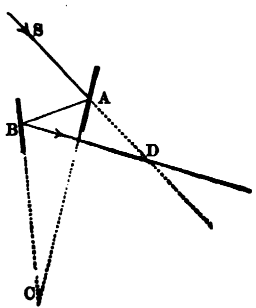


Fig. 4.

Curved Reflecting Surfaces.—In these we have to trace out the mode of reflection of incident rays from each 'element' or little bit of the reflecting surface; and this leads, through geometrical working, to such propositions as the following: (1) Parallel rays, SP, travelling parallel to the axis of a concave paraboloid mirror (fig. 5) are made to converge so as all actually to pass accurately through F, the geometrical *focus* of the paraboloid; and, conversely, if the source of light be at F, the rays reflected from the mirror emerge parallel to one another—a proposition of great utility in lighthouse work, search-lights, &c. (2) If the paraboloid mirror be convex, parallel incident rays have, after reflection, the same course *as if* they had come from the geometrical focus of the paraboloid. (3) In a concave ellipsoid mirror, light diverging from one 'focus' of the ellipsoid is reflected so as to converge upon the other 'focus' of the curved surface; and by a convex ellipsoidal mirror light converging towards the one focus is made to diverge as if it had come directly from the other focus. (4) In a hyperboloid reflector the two geometrical foci have properties corresponding to those of the ellipsoid. (5) In spherical reflectors, which are those most easily made, there is no accurate focus except for rays proceeding from the centre and returning to it. When parallel rays are incident on a

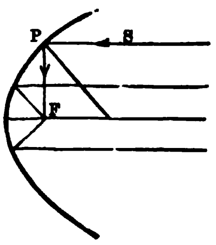


Fig. 5.

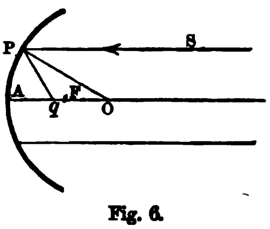


Fig. 6.

concave spherical mirror we see from fig. 6 that if they be parallel to the axis of the mirror each ray is made to pass after reflection through a point, q, which is nearer to F (a point midway between the mirror and its centre, O) the narrower is the pencil of rays. If, therefore, the pencil of rays be very narrow in comparison with the radius, OA, the rays will after reflection approximately converge upon F, which is called the principal focus of the mirror; and the principal focal distance, $AF = \frac{1}{2}AO = \frac{1}{2}r$, where r is the radius of the spherical mirror. The farther any ray is from the axis AO, the farther from F is the point, q, to which that ray is reflected; and the difference, Fq, is called the longitudinal aberration for that ray. The reflected rays from the various parts of the mirror form by their intersection a Caustic (q.v.), the apex or cusp of which is at F. If, instead of using a parallel beam of incident light, we have light coming from a point at a definite distance along the axis, we find (see fig. 7) first that any ray from Q to A travels back along AO, whence the focus of reflection is somewhere in the line AOQ; and that any ray, QP, is reflected to a point, q, such that the angle $QPO = qPO$; and therefore (since by Euclid, vi. 3, $QO : qO :: QP : qP$) if the pencil be relatively very narrow, so that QP comes to be equal to QA, and qP to qA, we have $QO : qO :: QA : qA$. This proportion reduces to the equation $1/Aq + 1/AQ = 2/AO$; whence we can readily find Aq when AQ and AO are known. Thus, if, for example, the radius of curvature AO be 12 inches (the principal focal length being then 6 inches), and if Q be 30 inches from A, we have $1/Aq + 1/30 = 2/12$; whence $1/Aq = 8/60$ and $Aq = 7\frac{1}{2}$ inches. The same formula may be written $1/d + 1/d' = 1/f$, where d and d' are the distances from A of the two 'conjugate' foci, q and Q, and f is the principal focal length. The two 'conjugate' foci are reciprocal; if light start from q it will be reflected to Q. As Q, the source of light, approaches O, q also approaches O; when Q is at O, q also is at O; as Q continues to move towards F, q moves out more and more rapidly beyond O; when Q is at F, q is at an infinite distance, or the reflected rays are parallel; when Q is between F and A the reflected rays are divergent, as if from a virtual focus on the opposite side of A. If the mirror be convex, fig. 8 shows that AO and AQ have, with respect to the reflecting surface, opposite signs; so also have AO and AQ; so the equation above becomes $1/Aq + 1/AQ = -1/AO$; whence, taking the same numbers as before, Aq is equal to -5 inches; a virtual image, seeming to come from a point 5 inches on the other side of the reflecting surface.

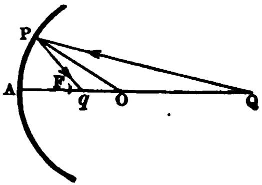


Fig. 7.

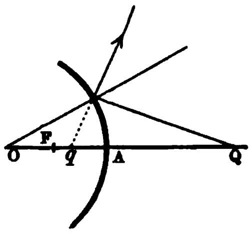


Fig. 8.

As to the quality of the light reflected there are some peculiarities to be observed. From the surface of a transparent body, of greater optical density than the surrounding medium, light polarised in the plane of incidence and reflection is more largely reflected at oblique incidences than light polarised at right angles to that plane; when the angle of incidence is such that the reflected and refracted rays tend to be at right angles to one another, the whole of the light reflected is polarised in the plane of incidence and reflection; and if light polarised at right angles to that plane be made to fall upon glass at the particular angle of incidence just referred to, it will not be reflected at all, but will wholly enter the glass. Plane-polarised light polarised in any other plane than that of incidence or one at right angles to it, is, after total reflection in glass, found to be elliptically polarised (see POLARISATION); and this phenomenon is always presented in reflection from metals. In the case of electro-magnetic radiation (see MAGNETISM) theory and practice concur in indicating that conductors are good while non-conductors are bad reflectors; and the same general proposition holds good with reference to those more frequent but otherwise similar ether-oscillations to which the phenomena of Radiant Heat, Light, and Actinism are due.

Reflex Action. See NERVOUS SYSTEM.

Reform is a comprehensive name for those changes in the law by which the House of Commons has been made a truly representative body. In the 18th century only freeholders voted in English county elections; in many boroughs the franchise was restricted to members of the corporation; boroughs of this class were usually under the influence of the crown or of some wealthy individual who regarded them as a part of his property. In 1745 Sir F. Dashwood moved an amendment to the address, claiming for the people the right to be freely and fairly represented; in 1766 Lord Chatham took up the cause of Reform; Wilkes proposed an excellent scheme of redistribution in 1776; in 1780 the Duke of Richmond proposed annual parliaments, universal suffrage, and equal electoral districts; but his plan met with no support. Pitt entered public life as an avowed reformer, and in 1785 he introduced a measure of redistribution; the part of his scheme most open to objection was the proposal to compensate owners of rotten boroughs. His bill was rejected, and he dropped the subject. The king was opposed to change, and in the public mind reform came to be identified with the revolutionary opinions which were beginning to prevail in France. Fox and Grey kept alive the demand for a wider franchise and a better distribution of power; and after the lapse of years the Whig friends of reform found an able leader in Lord J. Russell. His first motion on the subject was proposed in 1820, and in 1830 he accepted office under Lord Grey. A Reform Bill was brought in, and the second reading was carried by a majority of one. A subsequent defeat in committee compelled the government to dissolve. The country declared unmistakably for Lord Grey; his second Reform Bill was passed in the Commons by a large majority. It was rejected by the Lords, and the same fate would have befallen a third bill introduced in 1832, but the resistance of the Lords was overcome by the threat to create as many new peers as might be necessary to pass the bill. After something like a century of discussion the first Reform Act received the royal assent. The greater part of the labouring classes were still unenfranchised; the Radical reformers were still unsatisfied; but the Whigs and Tories were unwilling to disturb the settlement of 1832. Agitation was stimulated by the so-called People's Charter put forth in 1838; but it was not till 1852 that Lord J. Russell reopened the question of Reform. Successive governments continued to bring in abortive schemes, until at last in 1867 Lord Derby and Mr Disraeli succeeded in passing the act by which household and lodger franchises were extended to the boroughs. In 1884 Mr Gladstone proposed to assimilate the franchise in counties to that which had been given to the boroughs; but the Lords refused to pass any bill for extending the franchise until the details of the government scheme of redistribution were before them. The action of the Lords led to considerable agitation in the autumn recess. The bill was re-introduced in an autumn session; and the question at issue between the two Houses was settled by a very remarkable act of compromise. The government agreed not only to communicate their plan of redistribution to the leaders of the opposition, but to settle the details by mutual arrangement; Lord Salisbury and Sir S. Northcote attended meetings of the cabinet, and conferred with ministers for that purpose. The results of this conference were embodied in a series of bills which were passed into law before the general election of 1885. Two points in the measures of 1884–85 have been somewhat severely criticised—the adoption of single-member districts, a mode of distribution which suppresses the opinions of all local minorities (see REPRESENTATION), and the addition of twelve members to the House of Commons, which was already too large a body for deliberative purposes.

At the end of the reign of George III. there were, in a population of 22,000,000, only 440,000 voters. The Reform Bill of 1832 added less than 500,000 voters to the electorate; the reform of 1867–68 increased the electorate from 1,136,000 to 2,448,000. At the passing of the measures of 1884–85 the electorate had by natural growth risen to about 3,000,000; and the Act of 1884 added at once about 2,000,000 more to the list of voters. Of the new electors, about 1,300,000 were in England and Wales, 200,000 in Scotland, and 400,000 in Ireland.

See the articles PARLIAMENT, CHARTISM, GLADSTONE, RUSSELL (EARL); May's *Constitutional History;* and the speeches of Gladstone, Bright, Disraeli, &c.

Reformation. The religious revolution of the 16th century, known as the Reformation, is the greatest event in the history of civilisation since Paganism gave place to Christianity as the faith of the leading nations of the world. It marks the supreme importance of this revolution that the age which preceded and the age which followed it belong to two different phases of the human spirit. With the Reformation begins what is distinctively known as *Modern Europe*, while the epoch that preceded it bears the equally distinctive designation of the *Middle Ages*. As a revolution in which all the countries of western Europe were more or less directly involved, the subject of the Reformation has necessarily been treated in the different accounts of these countries. In the articles on Luther, Charles V., Henry VIII., Calvin, Knox, and others further details will be found regarding the aims and methods of the revolution in the various countries where it declared itself. Here, therefore, it will be sufficient to indicate briefly the general causes which produced it, the special course and character it took among the different peoples, and its chief results for the human spirit at large.

The central fact of the Reformation was the detachment from papal Christianity of the nations distinguished by the general name of Protestant. By this severance an order of things came to an end under which Christian Europe had been content to exist from the close of the 8th century. From the year 800, when, by a mutual understanding of their respective functions, Charlemagne was crowned emperor of the Romans by Pope Leo III., western Europe had come to regard the papacy as the essential condition of individual and corporate life, as prime a necessity in human affairs as the sun in the course of nature. Thus conceived, the power of the church underlay all human relations. It was the consecration of the church that constituted the family; the church defined the relations of rulers and their subjects, and the church was the final court of appeal on the ultimate questions of human life and destiny. In the nature of things such a power could never be realised as it was ideally conceived. Yet during the 11th and 12th centuries, the period when the power of the popes was most adequate to their claims, they undoubtedly went far to make the idea a reality. But the energies of the human spirit were bound sooner or later to issue in developments with which mediæval conceptions were fundamentally irreconcilable. By the 13th century, along every line of man's activity, there were already protests, conscious and unconscious, against the system typified in the pope at Rome.

The most remarkable of these protests was the order of ideas associated with the name of Joachim of Flora in Calabria (died 1202). Under the name of the 'Eternal Gospel' (used for the first time in 1254) these ideas ran a course which for a time seriously threatened the existence of the mediæval church. The new teaching struck at the very root of the papal system, for its essence was that the hour had come when a new dispensation, that of the Holy Spirit, should supersede the provisional gospel delivered by Christ. During the second half of the 13th and the first half of the 14th century the influence of these ideas is traceable in every country of Christendom, and it was only the unflinching action of the church that postponed its disintegration for other three centuries. The numerous sects which either sprang from or were quickened by this movement speak clearly to the revolutionary fever that had seized on men's spirits and was impelling them to other ideals than the traditions of Rome. Mainly the offspring of the third order of St Francis, these sects swarmed throughout every Christian country under the names of Beguins, Beghards, Fratricelli, Flagellants, Lollards, Apostolic Brethren, &c., and everywhere spread discontent with the existing church. Even John Knox (in answer to a letter by James Tyrie, a Scottish Jesuit) claims Joachim of Flora as an ally in the work which it was the labour of his own life to achieve—the ruin of the papacy, and the promotion of what he deemed a purer gospel.

Simultaneously with this manifestation of revolutionary feeling there were tendencies in the sphere of pure thought in essential antagonism to the teaching of the church. The labour of the thinkers of the middle ages was to reconcile faith, as inculcated by religious authority, with human reason as they found it embodied in the accessible writings of Aristotle. In the 13th century, however, the Arabic texts of Aristotle, and notably that of the great commentator Averrhoes, made their way into the Christian schools, and thenceforward a leaven of scepticism was a present element in all the universities of Europe. As the result of the teaching of Averrhoes, a name of the most sinister import to every true son of the church, materialism and pantheism became common creeds among thinkers, and the notion spread even among intelligent laymen that Christianity was not the absolute thing the church had taught them to believe. In Dante's (died 1321) fierce exclamation that the knife is the one reply to him who denies the immortality of the soul we have the outburst of a passionate faith in presence of a widespread libertinism of thought.

But the most serious menace against the integrity of the papal system lay in the political development of Europe during the last three centuries of the middle ages. As the countries of western Europe became more and more individualised, their peoples grew every year into a fuller consciousness of distinct national interests and national ideals. While this was the tendency of the various nations, the pope during these centuries gradually lost his position as the disinterested umpire of Europe, and sank into an Italian prince, with a temporal policy of his own which led him to seek allies among other potentates as they fell in with his own special ends of the moment. But such alliances naturally gave offence to the princes excluded from them, and led to a suspicious discontent with the Roman see, which, as was afterwards proved in the case of England, needed only the requisite occasion to flame into outright rebellion. The saying of Philip Augustus (died 1223)—'Happy Saladdin, who has no pope!'—expressed the feeling, which every century grew stronger, that the pope would become an impossible factor in European politics. To this feeling should be added the fact that, as the middle classes grew in intelligence and well-being, they looked with envy on the immense wealth of the clergy, and grumbled at the large sums that annually went to the coffers of Rome.

During the 14th and 15th centuries mediævalism gave every sign of an exhausted phase of human development. By the so-called Babylonish Captivity, when the papal residence was fixed for seventy years at Avignon (1305–76), and by the Great Schism (1378–1417), during which the spectacle was seen of first two and afterwards three popes claiming to be the vicars of God on earth, the papacy suffered a loss of prestige in the eyes of all Europe which it never afterwards fully recovered. It was the further misfortune of the church during this eclipse of its ancient glory that all spiritual life seemed to have gone out of every rank of its clergy. Testimonies from every country prove beyond question that by the end of the 15th century the clergy had become grossly unfit to be the spiritual guides of the people. The sources of intellectual life had equally failed wherever the old philosophy authorised by the church continued to be the subject of teaching and study. In the later half of the 15th century scholasticism had become the veriest trifling which ever engaged the mind of man. In all the interests of man's well-being, therefore, a renaissance was needed to evoke new motives and supply new ideals which should lift humanity to a higher plane of endeavour. Such a renaissance came, and fortunately the church did not prove equal to suppressing this second burst of life as it had suppressed that of the 12th and 13th centuries.

It was again in Italy that the new life first declared itself. While north of the Alps scholasticism reigned in all the schools, the movement known as the Renaissance (q.v.) had in Italy been in full course for above a century. In itself the Renaissance was as far as possible from leading men to higher ideals in religion; yet in two of its results it gave a direct impetus to the Reformation. Inspired by the life of antiquity, the humanism of the Renaissance paganised the church and quickened that moral disintegration which was the prime cause of the religious revolution. On the other hand, through its opening of men's minds by new studies and new measures of things, the Renaissance lightened the load of tradition, and made a new departure in the life of Christendom a less formidable conception. In Erasmus (1467–1536), who has always been regarded as a true nursing father of the Reformation, we clearly discern these two results of the revival of the ancient literatures. In so many words he states his grave fears lest the church should be wholly paganised by the universal imitation of classical modes of thought and speech; while his own unsparing criticism of the church and its traditions proves how much he owed to the so-called 'new learning.'

The very zeal with which the revival of antiquity was pursued in Italy was itself a countercheck to religious reform in the country that of all others needed it the most. All contemporary literature proves that during the later part of the 15th and the opening of the 16th century the court of Rome was as profoundly immoral as that of any of the heathen emperors had been in the same city. The spiritual claims of the papacy were the jest of ecclesiastics themselves. 'This fable of Christ,' a certain dignitary of the church is reported to have said in the Vatican, 'has been to us a source of great gain.' Among the Italian people, however, there was never the slightest indication of a national movement towards any serious breach with the papacy. The religious melodrama enacted by Savonarola at Florence (1489–98) never struck at the central ideas of papal Christianity; and Savonarola, besides, never like Luther or Knox woke a deep response in the national consciousness. While in Italy, therefore, there was no widespread religious quickening as in other countries of Christendom, there was no political reason such as elsewhere produced a breach with the papacy. For the Italian people the pope was not a foreign prince with temporal interests of his own conflicting with those of the nation at large. The different republics which partitioned the country might at times regard the pope as an enemy to their individual ambitions; but the nation as a whole was fully conscious of the honour of having the vicar of God in their midst, and as in the past they had stood by him against the emperors, so in the great religious revolution of the 16th century they also remained faithful to him throughout the gradual dismemberment of his spiritual dominion.

Of the countries north of the Alps Germany was the first to be widely influenced by that revival of learning which had its origin in Italy. In Germany, however, the new spirit wrought under fundamentally different conditions, and lighted the way to vastly different issues. There was every reason why Germany should lead the way in the schism from Rome. Outside Italy Germany was the country where every abuse of the mediæval church was seen in its grossest form. The ignorance and sensuality of the clergy, the scandalous sale of livings, the disproportionate papal exactions—all these evils came to be vividly realised by the quickened consciousness of the nation. Between Rome and Germany, moreover, an antagonism existed in the very conditions from which mediævalism had sprung. It was in virtue of the mutual understanding between pope and emperor that the church came to fill the place it did in western Europe. But almost from the first the interests of Rome and the empire had been in collision, so that pope and emperor came to be mere rivals for the first place among the western powers. It was natural, therefore, that in Germany Rome should be regarded with a jealousy and suspicion which might easily grow into irreconcilable hostility.

These workings of the national mind found intensified expression in the acts and writings of Martin Luther, who, with a genius and audacity which have given him a place among the moulders of man's destinies, proclaimed the need of a new departure in the religious life of humanity. In rejecting the traditional claims of the papacy Luther at the same time supplied a new principle by which, as he contended, a higher and truer life of the soul might be lived. By his doctrine of Justification by Faith Luther threw each individual on his own responsibility for the reason and life which is entrusted to him. Hitherto the deepest concerns of men had been inextricably bound up with pope and priest, and in this had lain the essential principle of mediæval Christianity. By the new principle Luther made the pope no longer an indispensable factor in individual or corporate life, and thus initiated a new phase in the development of society. As was to be expected, this principle, so organic in its working, cleft the German nation in twain, and gave rise to a struggle which did not close till more than a century after the death of Luther himself. Luther's attack on the sale of indulgences (1517), the burning of the papal bull (1520), Luther's condemnation by the Emperor Charles V. at the diet of Worms (1521), his temporary triumph at the first diet of Spires in 1526 (the beginning of modern Germany, according to Ranke), the confession of the Protestant faith at Augsburg (1530), are the outstanding events in the contest closed by the peace of Augsburg in 1555, nine years after Luther's own death, but again renewed in the disastrous Thirty Years' War (1619–48), and finally settled by the peace of Westphalia (1648).

The religious revolt of Germany left no country of Christendom unmoved. Before the 16th century had closed the bulk of the Teutonic peoples had followed her example and broken with the papacy. Under one aspect, indeed, the Reformation may almost be regarded as a Teutonic revolt against the domination of the Latin races. Between 1525 and 1560 Denmark and Sweden, taking the occasion of a political revolution, both declared for Protestantism; and in 1581 the United Provinces definitively threw off their double allegiance to Spain and the pope. But it is more important to trace the course of the revolution in the great powers of the West.

In Spain heresy of all kinds had no chance of finding a home. In its terrible Inquisition, reorganised in 1478, it had an institution ready made for effectually dealing with all attempts at reform or revolution. Luther found followers in Spain as in other countries; but they were literally extinguished before their voices could be heard, and of all the great powers Spain profited least by the quickening spirit of the Reformation.

Much more interesting and important is the history of religious reform in France. Between 1520 and 1530, the period of Luther's greatest activity, both renaissance and reform found a firm footing in France, and so many circumstances seemed to favour the future of both that for a time it was doubtful with which side the victory would eventually lie. On the one side was the university of Paris, which throughout the middle ages had claimed for itself the right—denied to the pope himself—of sovereign decree on the truth or falsity of all religious doctrine. As its decrees had in every case the strenuous support of the parliament of Paris, the university was a formidable force to be reckoned with by every innovator in studies or religion. In 1519 Luther's dispute with Eck had been referred to the doctors of Paris for decision, and their judgment, delayed for two years, had been the unqualified censure of Luther's position. Thenceforward every advocate of the new religion, and they daily grew in numbers, especially among the middle class, both in Paris and in the provinces, was pursued by the unrelenting hate of the parliament and the university. On the other hand, the king (Francis I.), eagerly encouraged by his famous sister, Margaret of Navarre, who herself had strong Protestant leanings, was at first disposed to use the new religious movement as a weapon to his hand in his dealings with the court of Rome. In the end Francis saw that separation from Rome meant the disruption of the French nation, and after 1534 he resolutely set himself to the extermination of every heretic in his dominions. His son and successor, Henry II. (1547–59), carried out this policy with even greater rigour, but in spite of all efforts to suppress them the French Protestants grew into a body formidable alike by their position, wealth, and intelligence. The Huguenot wars, the Massacre of St Bartholomew (1572), and the Edict of Nantes (1598) are the outstanding events in this long struggle, which, involving political as well as religious questions of the first importance, threatened the very existence of France by suggesting to Philip II. the possibility of annexing the divided country as a province of Spain. By the Edict of Nantes the French Protestants attained a certain measure of religious freedom; by its revocation in 1685 Protestantism was stamped out of the country, and France thus deprived of the noblest elements in its society.

The religious revolution in Switzerland is second only to that of Germany in its direct influence on the subsequent fortunes of the European nations. In Switzerland we have the case of a double revolt from Rome springing from the same conditions, yet each having a character and an animating soul of its own. At Zurich, as early as 1519, and independently of Luther, Ulrich Zwingli, who, according to Ranke, combined in himself the best elements of renaissance and reform, gave rise to a movement which split the Swiss cantons into two hostile sections, and issued in the peace of Cappel (1531), which permitted to each canton the choice of its own form of faith. More important than the movement of Zwingli at Zurich is that associated with Calvin and Geneva. As in almost every other case of revolt, political considerations wrought with religious zeal in the breach of Geneva with Rome. Before 1530 the town had received the new religion from French refugees, who thus gave its peculiar character to the creed eventually associated with Calvin and Geneva. But it was in the successful effort of the town in throwing off the yoke of the Catholic Dukes of Savoy (1534) that it found itself forced to join the great Protestant schism, and to fashion a civil and religious polity compatible with an independent corporate life. It was in the accomplishment of this task that Calvin proved himself the great consolidator of the tendencies that underlay the Protestant movement. Inspired by Calvin, it was the pre-eminent destiny of Geneva at once to produce a reasoned civil and religious creed and a type of Christian believer that offered a solid front against the vast powers still at the command of the Roman see, and assured to Protestantism its own independent course in the history of mankind.

In 1532 the schism of England from Rome also became an accomplished fact. In this result had issued the negotiations of Henry VIII. with Pope Clement VII. for his divorce from Catharine of Aragon. But the view summed up in Gray's line, 'And gospel light first dawned from Bullen's eyes,' implies a totally inadequate recognition of the many forces that went to produce the English Reformation. The king's divorce was the mere occasion of what must sooner or later have been the only solution of England's relations with the popedom. In England all the forces, in greater or less degree, were at work which had produced the religious revolution in Germany. As in Germany, the church alike in its teaching and practice no longer represented the highest consciousness of the nation. It has of late been shown that its degradation was far from being so general or so complete as the official reports of Henry had seemed to prove; yet the state to which it had come was clearly such as to lend some countenance to the most drastic measures against it. By the end of the 15th century, also, the Renaissance, which was everywhere the solvent of tradition, had found its representatives in England. Linacre, Grocyn, Colet, and Sir Thomas More were all men more or less emancipated from mediævalism, though none of them broke communion with Rome. Both More and Colet spoke their minds freely on the unworthy lives of the clergy; and the latter by his foundation of St Paul's School in 1510, and by his placing it under lay supervision, took a step of the highest importance in the direction of the new order. But it is in the political development of England that we find the adequate explanation of her final breach with Rome. For centuries the pope had come to be more and more regarded as a foreign prince, whose powers, as he claimed the right to exercise them over Englishmen and English property, were incompatible with English interests and English liberty. Moreover, by the date of Henry's accession the pope was a mere Italian prince, whose own interests led him to seek the support of the strongest arm. When Clement VII., therefore, declared against the divorce from Catharine, Henry regarded the decision not as the oracle of Christendom, but as the counsel of an earthly prince whose own interests left him no other alternative.

The breach with Rome was thus inevitable; but it still remained to be settled whether the old or the new religion should finally gain the English people. Henry himself to the close of his life professed to have broken with the old only in the one point of the headship of the church. In the reign of Edward VI. a clear departure was made from the doctrinal system of the ancient church; but the temporary reaction under Mary showed how strong a hold that system still possessed on the hearts of the people. When Elizabeth came to the throne in 1558 it was only her prudent policy that saved the country from the internecine divisions of France and Germany. Three parties were equally bent on realising their own conceptions of a religious settlement. The adherents of the old religion, who still probably made a half of the people, had not lost hope of a return to the old spiritual allegiance. Those who had renounced the papacy themselves made two distinct parties, each bent on ends so conflicting, that it was evident from the first that they could never work in common. The governing principle of the one party, from which eventually sprang the Church of England, was to minimise the differences between the old faith and the new, and as far as possible to maintain the continuity of the religious tradition in the country. The other, which drew its inspiration from Calvin and Geneva, and was afterwards known as the Puritan party, aimed at a root and branch rejection of papal Christianity as at once in the interest of what they thought a purer creed, and as the only safeguard against a return to the old constitution. It was owing to her politic handling of these conflicting parties that at Elizabeth's death England was of one mind regarding the question of the papal supremacy, and that the severance from Rome became a definitive fact in the development of the country. By happy turns of events, such as her excommunication by Pius V. in 1570, and by the extraordinary issue of the Spanish Armada in 1588, not only was the number of Catholics reduced, but such as still clung to the ancient faith thenceforward put their allegiance to their native prince before any claim of the Roman see. It was this final triumph of the Protestant revolution in England that saved the movement in all the other countries of Europe.

The triumph of the Protestant movement in Scotland is likewise a fact of the first importance in European history. In Scotland, from the very beginning of Luther's revolt, we find the presence of the same elements which elsewhere led to revolution. As in other countries, the Scottish clergy had lost the respect of the country. As early as 1525 Lutheran books were so widely read that an act of parliament was passed forbidding their importation. The very efforts of the church to stamp out the new heresy, as in the burning of Patrick Hamilton in 1528, and of George Wishart in 1546, served only to hasten the turn of affairs which it had dreaded. Jealousy of the wealth and political influence of the clergy disposed the nobility to throw in their lot with the party of revolution. When in 1559 Knox returned from his long sojourn abroad, his unflinching zeal and personal force supplied the momentum that was needed to complete a revolution already in full course; and in the following year Protestantism was formally established as the religion of the country. The consequences of this revolution extended far beyond Scotland. Had Mary on her return in 1561 found Scotland united in the Catholic faith, she would have commanded the destinies of England. Elizabeth could never have effected a religious settlement, and, with England paralysed, Protestantism could not have held its own against the united forces of Catholicism.

Thus, by the middle of the 16th century, it seemed as if the revolution must sweep all before it, and the papal system be as completely effaced by Protestantism as Paganism had been effaced by Christianity. At the beginning of the revolt the authorities of the ancient church did not fully realise that the forces arrayed against them menaced their very existence. When the true extent of the danger was realised the church displayed all the resources of an institution whose roots were in the very heart of Christendom, and which, alike by its traditions and by its special adaptations to the wants of the human spirit, appealed to the deepest instincts of a large section of all the peoples of western Europe. The Society of Jesus, founded in 1540, supplied an army of enthusiasts, whose policy and devotion saved Rome from dissolution. By the decrees of the Council of Trent (1545–63), inspired by the spirit and aims of the Jesuits, the church reaffirmed its traditional teaching, conceding nothing either to renaissance or reform; and a succession of popes during the later half of the 16th century carried out with a zeal worthy of the better ages of the papacy the policy marked out for them by the Jesuits. Through the disunion of the Protestants and the strenuous efforts of the papacy, the middle of the 16th century saw the tide of revolution checked; and in certain countries, more especially in Germany, the Jesuits even gained ground which had been lost. By the close of the same century Europe was portioned between the two religions almost by the same dividing lines as exist at the present day.

It has been said that the central fact of the religious-revolution of the 16th century was the severance of the Protestant nations from the Roman see; but the great schism inevitably led to issues of which the Protestant reformers never dreamed, and which they would have denounced in as unqualified terms as any theologian of the mediæval church. The reform of religion preached by Luther or Calvin implied no real change in the modes of thought that distinguished mediævalism. Their theology was but another form of scholasticism; their attitude to the classical tradition or to any departure from their own conception of the scheme of things was precisely that of the Schoolmen trained on the Decretals and Aristotle. For an infallible church they substituted the Bible as the unerring expression of God's relation to man; the interpretation of the Bible they left to the individual consciousness. This freedom was of necessity only nominal, since the members of any Protestant church were members only on condition of their accepting the church's interpretation of the contents of the Bible, and since each different church deemed itself the special depositary of the only true conception of the perfect will of God. Nevertheless, it was from this attitude of the Protestant reformers to the Bible that the developments of modern thought sprang. A reformer like John Knox would have stamped out every form of thought hostile to his own synthesis of things divine and human; but it was not in the power of the Protestant system to do what had been so effectually done by the church of the middle ages. In the mediæval conception church and state made one organism; what menaced the life of the one menaced the life of the other. Hence the state was at the church's bidding whenever its arm was needed to deal with any suggestion of heresy. But having no great central head, such an organic union was impossible for any Protestant church, and religious error could not be regarded as a crime against the existing government. So complete was the revolution wrought by this changed relation of church and state that toleration of different creeds, and not an iron uniformity, was in time seen to be the indispensable condition of civil society. But in this lies the fundamental distinction between mediævalism and the modern spirit. Mediævalism rested on the belief that society was threatened if any of its members questioned the body of truth of which the church was the custodier; it is the distinctive principle of the modern spirit that truth shall be followed wherever facts are believed to lead.

For authorities on the Reformation, see the articles in this work on the chief reformers, and those on RENAISSANCE, CHURCH HISTORY, ENGLAND (CHURCH OF), POPE, ROMAN CATHOLIC CHURCH. Here we simply enumerate certain important books along the lines of the foregoing article, and following its order of treatment. Bryce, *The Holy Roman Empire*; Renan, *Joachim de Flor et l'Évangile Éternel* ('Nouvelles Études d'Histoire Religieuse'), and *Averroès et l'Averroïsme*; J. A. Symonds, *The Renaissance in Italy*; Bishop Creighton, *A History of the Papacy during the Period of the Reformation*; Ranke, *Deutsche Geschichte im Zeitalter der Reformation*; Gieseler, *Lehrbuch der Kirchengeschichte* (vols. iv. and v. in trans. published by T. and T. Clark, under the title of *A Compendium of Ecclesiastical History*); Beard, *Life of Luther*; Köstlin, *Life of Luther* (a trans. of the abridged life is published by Longmans); Döllinger, *Die Reformation, ihre innere Entwickelung und ihre Wirkungen* (the most powerful statement from the Catholic point of view); Zeller, *Histoire d'Allemagne*, tome vii. (1891); M'Crie, *Reformation in Spain*; Michelet, *Histoire de France* (vols. ix.–xii.); Baird, *Rise of the Huguenots*; Bungener, *Calvin, sa Vie, son Œuvre, et ses Écrits* (1863); Kampschulte, *Johann Calvin* (vol. i. 1869); Burnet, *History of the Reformation* (in England); Strype, *Memorials of the Reformation*; Froude, *History of England* (first four vols.); Brewer, *Reign of Henry VIII.*; Dixon, *History of the Church of England from the Abolition of the Roman Jurisdiction*; Worsley, *The Dawn of the Reformation: Its Friends and its Foes*; Aubrey Moore, *Lectures on the History of the Reformation*; Lee, *Lectures on the History of the Church of Scotland*; Cunningham, *History of the Church of Scotland*; Grub, *Ecclesiastical History of Scotland*; Bellesheim, *History of the Catholic Church of Scotland* (vol. ii.—Hunter Blair's trans.). Seebohm's *Era of the Protestant Revolution*, though somewhat one-sided, is an excellent little handbook for the whole period.

Reformatories and Industrial Schools.

When the time arrived that statesmen and reformers combined to study the causes of crime with the view to systematic efforts for its repression, it soon became evident that the most effective method would be to check the first development of it in the young. Close observers agreed in the fact that by far the larger number of habitual criminals commenced their malpractices before they were twenty years old, and nearly 60 per cent. when under fifteen. Hanging and imprisoning did not check the growth of the class of juvenile criminals. In the early part of the 19th century there were said to be in London two hundred flash houses frequented by 6000 boys and girls, who had no means of livelihood but thieving. Something had even at that time been done to provide a better mode of dealing with these young people. The Marine Society, for taking charge of friendless children and sending them to sea, dates from 1756. The Philanthropic Society's Farm School at Redhill was founded about 1788, and some other schools were no doubt established not long after this; but the first official attempt to solve the difficulty was the foundation of Parkhurst Reformatory, under an act of parliament passed in 1838. Previously to this it appears to have been the practice to grant pardons to young offenders on condition of their being placed under the care of some charitable reformatory institution, and the preamble of the act above named refers to this practice as having proved so beneficial that it was considered expedient to carry it more fully into effect. It made escape from these institutions or breach of their rules punishable, and converted the buildings at Parkhurst, lately used as a military hospital, &c., into a reformatory prison for young offenders sentenced to transportation or imprisonment. Parkhurst Reformatory was in fact a prison, though conducted according to a special system designed more with a view to reform than to punish.

In 1854 an advance was made by enabling courts to pass on a prisoner under sixteen years old a direct sentence of detention in a reformatory for not less than two or more than five years, in addition to imprisonment in gaol for not less than fourteen days. The reformatory was subject to inspection by an officer appointed by the Secretary of State, and the certificate of the Secretary of State was necessary to make it a legal place of detention. Treasury contributions towards the maintenance of the reformatory were authorised, and a compulsory contribution by the parent in relief of the Treasury charges. In 1857 another step was taken by enabling quarter sessions and borough councils to contribute to the establishment of a reformatory, providing that the plans were approved by the Secretary of State. These local authorities were also empowered to contract with other reformatories for the reception of juvenile prisoners from their jurisdictions. The authorities were by this act allowed to grant licenses on probation to the inmates of reformatories after at least half their sentence had expired. The effect of the Act of 1854 had been gradually to supersede Parkhurst, so that whereas in 1849 it had about 700 inmates, and in 1854 about 536, on the 31st December 1864 there were only 68; and it was therefore closed in that year. In the year 1866 the consolidated and amended act now in force was passed. It retained all the foregoing provisions.

A sentence to reformatory is restricted to those offenders who are under sixteen and not below ten years old, with the exceptions mentioned below. The sentence must be not less than two nor more than five years, but they must also be sentenced to ten days' previous imprisonment or more. A child under ten years may be sent to a reformatory only if he has been previously charged with an offence or sentenced by a judge or court of general quarter sessions. The reformatory to which a young person is to be committed is selected by the court which passes the sentence, but it must if possible be conducted according to the religious persuasion to which the child belongs, and there are securities for its being removed to such school if not originally committed to it. No school can be compelled to receive a child. The selection of the school is in practice generally a matter which the governor of the prison arranges with the managers after the sentence is passed, except when a local authority has a general agreement with some school.

A reformatory may be established wholly by private individuals, or by quarter sessions in counties, or by town-councils in quarter sessions boroughs, or by private individuals with contributions from these local authorities, but the state provides no reformatories, and the local authorities are not obliged to do so. Plans of any buildings proposed to be used as a reformatory must be submitted to and approved by the Secretary of State. The rules of reformatories are made by the managers, but must be submitted to and approved by the Secretary of State. The expenses of maintaining the reformatory are met partly by private contributions, partly from local rates, partly from funds provided by the Treasury, and partly by payments exacted from the parents or guardians. By the report for 1890 of the inspector it appears that there were fifty-five reformatory schools in Great Britain, including three ships. Of these ten were in Scotland. There were seven in Ireland.

The growth of the reformatory system in Great Britain is shown by the following figures. In 1854 twenty-nine children were committed to reformatory schools in England; in 1857, 1304; in 1877, the largest number recorded—viz. 1896; and in 1890, 1299. The total population of the reformatory schools in Great Britain seems to have risen gradually until 1881, when it attained its maximum—viz. 6738; since which it has fallen gradually, and on 31st December 1890 there were under detention 5031 males and 823 females, or together 5854, of whom 4164 males and 737 females were actually in the schools, the remainder being mostly on license, but 52 had absconded or were in prison. The cost of these schools in the latter year was £119,336, of which £78,862 was provided by the Treasury, £5488 by the parents, £24,055 by local rates, £2793 by subscriptions and legacies, £799 by voluntary associations, and £2619 interest on investments and sundries. This leaves a balance of expenditure over receipts of £5519; and, as the inspector's report shows that there was a profit on industrial operations of over £13,416, it is presumed that the deficiency was supplied from that source. The net cost per head in 1890 after deducting profits of labour may be put at about £19 per annum, for both boys and girls in England. In Scotland the boys cost about £17 and the girls over £22. Testing the result of the reformatories and industrial schools by the committals of juvenile offenders to prison, it appears that, taking for comparison the number so committed in 1856—viz. 11,808—there were up till 1873 or 1874 more years in which the number was above 8000 than below it. Since the latter year it has fallen, until in 1890 there were only 3456 boys committed to prison in England and Wales. The young persons who commit crimes needing the punishment of detention in a reformatory are therefore evidently largely diminishing, a result which corresponds with the diminution in adult crime, with which it is so closely connected.

The industrial schools may be said to have grown out of the reformatory schools—the first act relating to and recognising them having been passed in 1854, since which their history much resembles that of the reformatories, the consolidating act which now regulates them having with that for reformatories been passed in 1866. Subsequent acts have much extended their scope, especially those which followed the establishment of compulsory education, and encouraged or enjoined school boards to establish and make use of them. Industrial schools are intended for children who have not been convicted of crime, and this is their distinctive note as compared with reformatories. A child must be under fourteen, and cannot be detained above the age of sixteen. The circumstances which justify a magistrate committing a child to an industrial school are—if he has been found begging, wandering without settled abode or proper guardianship and visible means of subsistence; who is destitute, an orphan, or having a surviving parent in prison; whose mother has been twice convicted of crime; who frequents the company of thieves, &c. If a child under twelve is charged with a punishable offence, but has not previously been convicted of felony, he may be sent to an industrial school; so also may a refractory child on the application of its parent or guardian; a refractory pauper child, or one either of whose parents has been convicted, may also be sent to an industrial school. The Education Act, 1876, requires the school authority to take steps to send all children to industrial schools who are liable to be sent for the above reasons, unless it is in any case inexpedient, and further requires it to apply to justices for orders compelling the attendance at school of children over five and under fourteen whose education is habitually neglected by their parents, and authorises the committal of such children to an industrial school.

Day industrial schools, in which, as their name implies, children can be trained and fed, but not lodged, were authorised by the same act. The mode in which an industrial school may be established is substantially the same as has been described for reformatories, but in addition the school authority has the same power as the prison authority. The provisions to ensure proper buildings and suitable rules, and as to inspection, are also similar in the two cases, and a child may be licensed from an industrial school as from a reformatory. So also are the provisions for meeting the expenses of these schools. The report for 1890 of the inspector of reformatory and industrial schools shows that there are now in Great Britain 141 industrial schools, including 8 ships, 10 truant schools for school board cases, and 19 day industrial schools. Of these 7 are established by county authorities, 1 by the corporation of Birmingham, and school boards manage 8, besides the truant schools and day industrial schools.

The development of these schools is shown by the number under detention in each year to be in the direction of steady increase. In 1864, 1668 children were under detention; in 1890 this had risen to 22,735. These figures include the truant schools, but do not include the day industrial schools, which commenced in 1879 with 287 scholars, and in 1890 had 3698. The number of admissions corresponds in steadiness of increase with the foregoing figures. In 1861, 608 boys and 400 girls were admitted; in 1862, 422 boys and 169 girls; in 1866, the year of the consolidated act, the numbers rose to 1444 boys and 539 girls; and in 1890 there were 3483 boys and 849 girls, besides 1510 to truant schools, and 2517 to day industrial schools. (A small deduction should apparently be made from these figures for transfers.) The foregoing figures giving the number under detention in various years are apparently to be taken to mean that these numbers were all under order of detention at the same time.

The cost of ordinary industrial schools in 1860 was £58,701. The year of highest cost was 1885, when it rose to £386,400. In 1890 it was £360,947. This includes truant schools. Of this latter the Treasury contributed £194,403; the rates, £42,198; school boards, £67,936; the parents paid £16,656, and subscriptions provided £34,489. The cost of day industrial schools rose from £3272 in 1879 to £25,558 in 1890. Of this latter sum the Treasury found £6891; rates, £1071; school boards, £11,260; and parents, £3382. The total ordinary cost of a child in an industrial school ranges from £14 to nearly £18 per annum.

The statutes in force for regulating reformatory and industrial schools in Ireland differ somewhat from those in Great Britain, and in Ireland far more children in proportion to population are sent to industrial schools than in Great Britain, so that the Royal Commission in 1884 reported: 'It is certain that the certified industrial schools in Ireland are regarded as institutions for poor and deserted children rather than for those of a semi-criminal class, and the result of this feeling is that the managers of many of these institutions refuse to take children who have been found to have committed a criminal offence, and who might legally be convicted of that offence and sent to a reformatory. All taint of criminality having been removed from the schools, numbers of children are sent to them who do not always come under the provision of the act, and who are sent merely on the ground of destitution. There can be no doubt that many children are sent to the industrial schools in Ireland who would not be so sent in England; whilst in consequence of it it is to be apprehended that numbers of children who are proper subjects for these institutions are left on the streets as waifs and strays.' There were in Ireland, at the end of 1890, 816 children on the lists of the reformatory schools (a decrease as compared with the previous year), of whom 744 were actually in school. There were 8609 children on the rolls of the industrial schools (an increase on the previous year), of whom 7767 were actually in school—the remainder mostly on license. The reformatory schools in Ireland cost £17,190 in 1890, of which imperial taxes bore £11,890, local taxes £5518; and the industrial schools, £158,274, of which imperial taxes bore £95,842, local taxes £37,262, a decrease of cost compared with the previous year for reformatory schools, but an increase for industrial schools.

The most famous of the continental reformatories is that at Mettray, about 5 miles from Tours. The 'Colony,' as it is called, was established in 1839 by M. Demetz, a French magistrate and philanthropist, in conjunction with the Vicomte Bretignères de Courteilles. Its inmates, numbering 800—either orphans, foundlings, or delinquents—are taught and employed in agricultural and various industrial labours. The relapses into crime of those who have left the colony have amounted only to about 4 per cent. In the United States there are nearly fifty reformatories for juvenile offenders under the control of a state or city, with an average number of inmates exceeding 12,000; and the reformatory results attained are excellent. The New York House of Refuge, which dates from the year 1824, is the oldest in the country, and indeed was the first reformatory for juveniles in the world which was established by law and placed under legislative control. Destitute, abandoned, or neglected children, as well as delinquents, may be sent to the House of Refuge, and 'there be dealt with according to law'—i.e. detained, as a rule, until reformed or come of age. In American reformatories the inmates spend at least half their time in productive labour, but the whole course of treatment is distinctly educational. At Rochester, New York, the House of Refuge was in 1884 turned into a state industrial school, which proved so successful that it was gradually enlarged, and is now in effect a school of technology, where various trades are taught. The increased cost for each inmate is about $30 per annum.

Reform Club. See CLUBS, and L. Fagan's *Reform Club* (1887).

Reformed Churches, a term employed in what may be called a conventional sense, not to designate all the churches of the Reformation, but those in which the Calvinistic doctrines and still more the Calvinistic polity prevail, in contradistinction to the Lutheran (q.v.). The influence of Calvin proved more powerful than that of Zwingli, which, however, no doubt considerably modified the views prevalent in many of these churches. The Reformed Churches are very generally known on the continent of Europe as the *Calvinistic Churches*, whilst the name *Protestant Church* is in some countries almost equivalent to that of *Lutheran*. One chief distinction of all the Reformed Churches is their doctrine of the sacrament of the Lord's Supper, characterised by the utter rejection not only of transubstantiation, but of consubstantiation; and it was on this point, mainly, that the controversy between the Lutherans and the Reformed was long carried on. See LORD'S SUPPER, and SACRAMENT. They are also unanimous in their rejection of the use of crucifixes, and of many ceremonies retained by the Lutherans. Churches belonging to the Reformed group are those of England (in some respects) and Scotland, some churches of various parts of Germany, the Protestant Churches of France, the Netherlands, Switzerland, Hungary, Poland, &c., with those in America which have sprung from them.

See the articles CONFESSIONS OF FAITH, ARTICLES, PRAYER-BOOK, LUTHER, ZWINGLI, CALVIN, KNOX; and works on the distinctions between Lutheran and Reformed Churches by Schweizer (1856), Hagenbach (1857), Merle d'Aubigné (1861), Schneckenburger (1855).

Reformed Presbyterians. See CAMERONIANS.

Refraction. When a beam of light, travelling in a transparent medium, impinges obliquely upon the surface of another transparent medium, what occurs in the vast majority of cases is that a part of it is reflected (see REFLECTION) and a part of it enters the second medium, but in so doing is *refracted* or bent out of its former course. If, for example, the light travel in air and impinge obliquely upon glass, the course of the refracted portion is bent so that the refracted light travels more directly or less obliquely through the glass; and, conversely, if the light travel in glass and impinge upon an air-surface, the portion which is refracted into the air will travel through the air more obliquely with respect to the refracting surface than the original light had approached it. The law of refraction was discovered by Snell in 1621, and is the following: the refracted ray is in the same plane with the incident and the reflected ray, and is therefore in the *plane of incidence* (see REFLECTION); and the sine of the angle of incidence bears to the sine of the angle of refraction a ratio which remains constant, for any two media, whatever be the angle of incidence.

In fig. 1 a ray, AO, impinges on a denser medium at O; the angle of incidence is AON (ON being at right angles to the refracting surface); the refracted ray, instead of going on towards a', is bent so as to pass through A'. Draw a circle cutting AO and OA' in c and c'; draw cd and $c'd'$ at right angles to NN'; these lines, cd and $c'd'$, are, for the radius Oc, the *sines* of the respective angles AON and A'ON'. These sines bear to one another a certain proportion, ascertained by measurement; let it be 3 : 2; then Snell's law is that any other ray, say from B, will be so refracted that the sines, similarly drawn, will bear to one another the same proportion of 3 : 2. Between air and water the ratio of these sines is almost exactly 4 : 3; between air and crown-glass it is nearly 3 : 2. Now observation shows that light passing from water into crown-glass is so refracted that the sines have the ratio $\frac{3}{4} : \frac{2}{3}$, or 9 : 8, so that the rays are less bent than when they pass from air into any of these media.

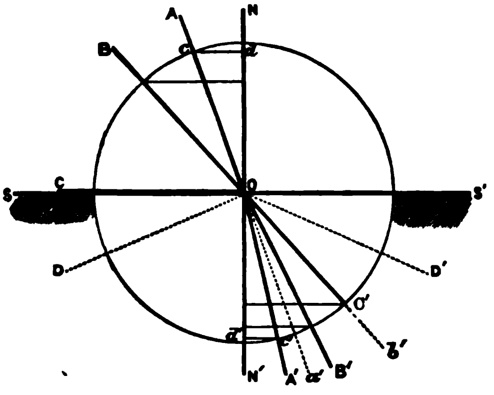


Fig. 1.

The ratio of these sines when *air* is one of the pair of media involved is called the *refractive index* of the other medium; thus, water has, for sodium monochromatic light and at 18° C., a refractive index of 1·3336, and crown-glass one of 1·5396; and the ratio of these refractive indices, ascertained with respect to air, governs the ratio of the sines, whether air be one of the pair of media experimented on or not. A direct consequence of this is that, if light pass successively, say, through air, glass, and water, the ultimate deviation will be the same as if the glass had been absent: and so for any number of intervening terms, it being always assumed that the bounding surfaces are parallel to one another; and if a parallel beam of light, passing through air, come to traverse any number of parallel refracting-surfaces, and if it regain the air, it will be found to travel parallel to, if not directly in, its original course.

The observed fact that light is differently bent in its course by different refracting media shows that there is a difference between bodies in their power of receiving light through their bounding surfaces. Newton, in accordance with his corpuscular theory (see LIGHT), interpreted this as showing that when the luminous corpuscles come very near the surface of a denser substance they are as it were jerked or made to swerve out of an oblique path and hurried in by the attraction of the denser substance so as to enter that substance more directly; and that when the light quits the denser substance it is retarded by a similar attraction. The consequence of this would be that light would travel in the denser medium perhaps not appreciably faster than in air, but with a mean velocity certainly not less. On the undulatory theory, however, refraction is a necessary consequence of a slower travel of ether-disturbances in the denser medium.

In fig. 2 A is a plane wave-front, advancing obliquely towards B, the surface of a denser medium. At the end of a certain time the wave-front is at A′; after an equal interval it is at A″. During the next equal interval a gradually diminishing breadth of the wave is traversing the original medium with the original velocity; but a steadily widening portion of the wave-front enters the denser medium and is there hampered. At the end of the interval the aggregate disturbance, that is to say, the wave-front, will be found to have swung round into the position and direction represented by *a*, just as a line of soldiers would tend to do on obliquely entering more difficult ground. During the next equal interval the wave-front advances parallel to itself, but traverses smaller distances in equal times, so that *aa′* is less than AA′. To this explanation it is essential that in optically denser media light should travel more slowly: and it has been absolutely established that this is the case. Optical density, so called, does not, however, always coincide with mass-density: bisulphide of carbon, which is lighter than glass, has for sodium light a refractive index of 1·63, while crown-glass has an index about 1·5, and flint-glass one about 1·6. If the course of any ray between any two points in the two respective media be studied, it will be found that no other path between the two points could have been traversed in so short a time.

If we go back to fig. 1, and assume the rays to pass from A′, B′, &c. towards O, we find the rays emerging from the denser medium more nearly parallel to SS′; a ray from C′, so far as it is refracted at all, emerges parallel to SS′; and for rays approaching O from points between C and S′ the construction for the refracted ray becomes impossible. The angle C′ON′ is the *critical angle*, beyond which there is no refraction, but total reflection (see REFLECTION). This angle is such that its sine is equal to $\frac{1}{\mu}$, where μ is the ratio between the refractive indices of the denser and the rarer medium. For water and air it is, for sodium monochromatic light, 48° 27′ 40″. Where this ratio μ (the 'relative index of refraction') is high, this critical angle is small and total reflection is well marked, as in the sparkle of the diamond.

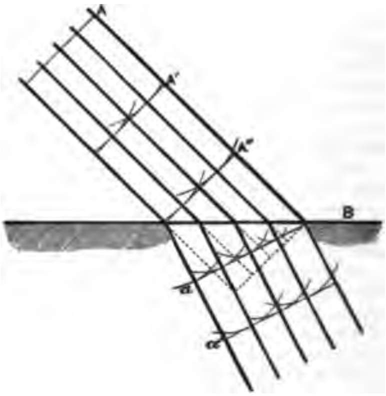


Fig. 2.

When a spherical wave impinges on a plane surface it is modified into a hyperboloid, the centre of curvature of the central portion of which is farther away than or nearer than the centre of the sphere in the ratio of the refractive index of the second medium to that of the first. An eye within a rarer medium will thus see the image of a point situated within the denser medium as if it were nearer than it really is; hence a stick appears bent when partly immersed obliquely in water; and, owing to differences in the amount of refraction at different angles, the bottom of a tank looked down upon appears sunk in the middle.

In fig. 3 light starts from a point X, and impinges directly upon a spherical surface of a denser medium; the centre of curvature of the spherical surface is at C. During a certain interval of time the front of the wave advances from A′ to A; during the next equal interval it would, but for the denser medium, have been at BRD. It has not, however, got so far as R in the time; the central part of the wave-front has only got as far as R′, where AR : AR′ :: μ : 1. Any non-axial ray, such as XP, which would have reached Q, can only have originated a disturbance at P, which would have travelled from P in some direction to a distance not equal to PQ, but to PQ reduced in the same ratio of μ : 1. We might then, knowing μ, the relative index of refraction of the denser medium, draw, with centre P and radius = PQ ÷ μ, an arc of a circle; the disturbance will have got to some point on that circle. Doing the same for all the P's, we have a series of circular arcs which may be connected by a line drawn so as to touch them all. This line will be a curve; and it will, for some distance from the axis, coincide very nearly with the arc of a circle whose centre is at X′, so that the wave-front will travel in the denser medium approximately as if it had originally come from X′. The relation between the distances AX, AX′, and AC is given by the formula $\mu_1/\mathrm{AX}' - \mu_0/\mathrm{AX} = (\mu_1 - \mu_0)/\mathrm{AC}$, where μ_0 is the refractive index of the original, and μ_1 that of the refracting medium. For example, let $\mu_0 = 1$ (air) and $\mu_1 = 1{\cdot}5$ (crown-glass); AC = 2 inches; AX = − 1 inch (i.e. the source of light is one inch to the *left* of A); then $1\frac{1}{2}/\mathrm{AX}' + 1/1 = \frac{1}{2}/2$; whence AX′ = − 2, or the light travels in the denser medium as if it had come from a point 2 inches to the left of A. If the wave-front be plane as it approaches A, that is equivalent to AX = − infinity or $\mu_0/\mathrm{AX} = 0$; whence AX′ is equal to + 6, or the light converges on a point in the denser medium 6 inches to the right of A. If, however, a plane wave-front approach A in the denser medium, that is equivalent to AX = + infinity; but, as the original medium is now the denser one, $\mu_0 = \frac{3}{2}$ and $\mu_1 = 1$; whence, by the formula, AX′ = − 4, and the convergence is on a point 4 inches to the left of A. These distances of the points of convergence for plane waves, at − 4 (= f) and + 6 (= f') from A, are the Principal Focal Distances for the curved surface and the media in question; and they bear numerically the same ratio to one another as the refractive indices do; from which, together with the previous equation, we get $-f/\mathrm{AX} + f'/\mathrm{AX}' = 1$; which shows, still keeping to our numerical example, that when the object lies at a greater distance than 4 inches to the left or 6 inches to the right of A, the image is a real one on the opposite side of A; whereas when it is at a less distance from A, X and X′ are on the same side of A, and the image is virtual. X and X′, thus determinable when one of them is known, are *conjugate foci;* and they are interchangeable, so that an object at either will produce an image, real or virtual as the case may be, at the other.

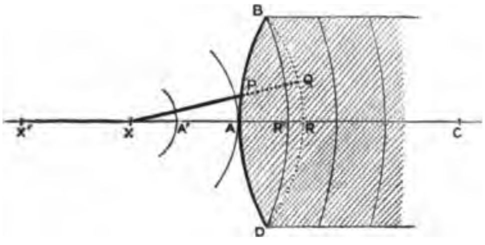


Fig. 3.

The refracting medium may not be of indefinite extent, but may be bounded in the path of the light by another surface. If this be symmetrical with respect to the first spherical surface we have a lens; and then, by repeating our calculations of the refraction at the second surface as if the image produced by the first were itself an object, we arrive at the formulæ given in the article on LENSES.

If a parallel beam of light enter one plane surface and be there refracted and emerge by another which is not parallel to the first, we have the essentials of a *Prism.* Assume the incident light to be monochromatic; then fig. 4 shows the incident beam SP taking the course SPQR. The elements of the problem are, μ being the relative index of refraction of the prism: (1) μ sin QPn' = sin SPn; (2) μ sin PQn' = sin RQm; (3) angles QPn' + PQn' = angle A, by the geometry of the figure; and (4) angles SPn + RQm = angles A + $mn'n$, this last being the *Deviation* produced by the prism. These four equations contain seven terms; and it is sufficient to measure three of these, say the angles A, SPn, and $mn'n$, in order to ascertain the rest, including μ, the relative refractive index of the prism for the particular monochromatic light employed. If, however, the light employed be not monochromatic but mixed, as ordinary daylight, we find that the prism sends each wave-length—each colour-sensation-producing component of the daylight (see COLOUR)—to a different place, and thus produces a Spectrum (q.v.). Each wave-length has its own μ and its own deviation; the more rapid, shorter waves being the more refrangible by a given piece of glass.

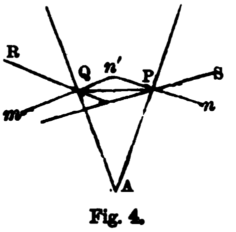


Fig. 4.

If in fig. 4 the prism be turned so that S and R lie symmetrically with reference to the angle A, the deviation is then a minimum; and in that position of minimum deviation a monochromatic beam, divergent from S, will come to focus at R. In examining the spectrum of light from a source S it is necessary to turn the prism so as to ensure sharpness by producing this minimum deviation for each part of the spectrum in succession. When the deviation is a minimum everything is symmetrical; SPn = RQm; QPn' = PQn': whence, by equations above, SPn = $\frac{1}{2}$(A + $mn'n$), and QPn' = $\frac{1}{2}$A; whence μ = {sin $\frac{1}{2}$(A + $mn'n$) ÷ sin $\frac{1}{2}$A}, which determines μ, when A (the angle of the prism) and $mn'n$ (the deviation) have been measured. The refractive indices of liquids and of gases are determined by enclosing them in hollow prisms of glass whose walls are made of truly parallel glass; the parallel glass produces no deviation. In liquids the angle of total reflection or 'critical angle' may also be readily measured; then the sine of this angle = $1/\mu$. The refractive index varies with changes of density, $\mu - 1$ being approximately proportional to the density: and it bears certain intimate relations with the molecular constitution of the refracting matter.

Why ether-disturbances of differing wave-lengths are differently refracted in such a medium as glass is not yet perfectly clear. The fact that ether-disturbances of greater frequencies are propagated more slowly through optically denser matter may be fairly inferred to arise from a mutual interaction of the ether, periodically stressed and released, and the matter amid whose molecules the disturbance is propagated. The question is complicated by the downright absorption or non-transmission of many particular wave-lengths, and by the peculiar behaviour of some particular transparent substances which produce *anomalous dispersion:* for example, iodine vapour refracts red light more than blue, and blue more than violet; and fuchsine refracts blue and violet light less than it does red, orange, and yellow, while it absorbs the rest. Further, it is found that in these cases of anomalous dispersion the substance generally has in the solid form a surface-colour different from that seen through its solution; and there are always absorption-bands, on the red side of which the refrangibility is increased, while on the other side it is diminished, as if the molecules themselves took up oscillations of particular periods and hurried on the propagation of slightly slower or retarded that of slightly more rapid oscillations of the ether. It appears as if this kind of action were never wholly absent; the spectrum produced by a prism never wholly coincides with the diffraction spectrum in which the deviation for each wave-length depends directly upon the wave-length itself; and the spectrum produced by a prism say of crown-glass does not exactly coincide in its visible distribution of colours with a spectrum of equal length made by a flint-glass prism. This is called the Irrationality of Dispersion. If now we take two prisms, such as C (crown-glass) and F (flint-glass) in fig. 5, and pass a beam of light through; then, if the angles of these prisms be suitable, the rays dispersed by the one will be collected by the other, and there will on the whole be deviation without dispersion; but not absolutely so, on account of the irrationality of dispersion of both prisms, the effect of which is that a calculated ratio of angles and refractive indices which will cause deviation without dispersion for any given pair of wave-lengths will, to a very slight extent in most cases, fail to do so for the other wave-lengths present in the mixed light transmitted through the system. By the use of three prisms three wave-lengths may similarly be achromatised.

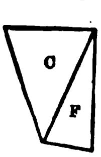


Fig. 5.

DOUBLE REFRACTION.—The wave-surface developed when a disturbance originates at a point in a homogeneous medium, like glass, is spherical in form. In uniaxial crystals (see CRYSTALLOGRAPHY) the disturbance travels with two wave-fronts, one spherical, the other ellipsoidal; and the two wave-fronts are coincident along the direction of the optic axis. Of such crystals some are *positive*, such as quartz and ice, and in these the sphere encloses the ellipsoid: in *negative* crystals, such as Iceland spar and tourmaline, the ellipsoid encloses the sphere. If then a beam of light, plane-fronted, fall upon a slice of Iceland spar, the disturbance at any point such as A (fig. 6) is transmitted from that point in two portions; one portion is refracted, according to the principles of fig. 2 in article REFRACTION, as an *ordinary* refracted ray, O; the other is refracted in a way determinable by using in the construction, instead of the spheroid or arcs of a circle, the corresponding ellipsoid, or arcs of the appropriate ellipse, and it gives rise to the *extraordinary* refracted ray, E. The radius of the smaller circle is to that of the greater as $1 : \mu$; the tangent to the greater circle, at right angles to XA, cuts SS′ in T; tangents TO′ and TE′ to the smaller circle and the ellipse are also drawn so as to pass through T; the ray XA is deflected so as to pass through the points at which these tangents touch these curves; and thus there are two refracted rays, and an eye towards OE will see two images of X. The light in the ordinary ray O is found to be polarised (see POLARISATION) in a plane containing both the incident ray and the crystalline axis: the extraordinary ray E is polarised in a plane at right angles to this. In binaxial crystals the three optical axes are dissimilar, and the wave-surfaces become complex: there are two refracted rays. If a doubly refracting substance be put between two crossed Nicol's prisms (see POLARISATION), light passes; and by this means it is found that many substances ordinarily not double refracting become so when exposed to unequal stress, as by pressure, heat, or rapid cooling.

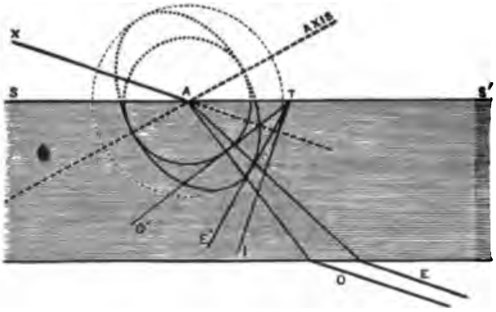


Fig. 6.

CONICAL REFRACTION.—In certain cases light, passing as a single ray through a plate of a biaxial crystallised body, emerges as a hollow *cone* of rays; and in others a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were *predicted* from the wave theory of light by Sir W. R. Hamilton (q.v.), and experimentally realised by Lloyd. See Preston's *Theory of Light* (1890).

Refrigerants 'are remedies which allay thirst and give a feeling of coolness,' although they do not in reality diminish the temperature of the body. The following are the refrigerants in most common use for internal administration: water, barley-water, dilute phosphoric or acetic acid, citric and tartaric acids taken in combination with bicarbonate of potash as effervescing draughts, ripe grapes, oranges, lemons (in the form of Lemonade, q.v.), tamarinds, chlorate of potash (ten grains dissolved in water, and sweetened with syrup, to be taken every third or fourth hour), and nitrate of potash, which may be taken in the same manner as the chlorate, or as *nitre-whey*, which is prepared by boiling two drachms of nitre in a pint of new milk; the strained milk may be given in frequent doses of two or three ounces.

Refrigeration. In refrigerating machines there is a transference of heat from the substance which is to be refrigerated to the cooling agent, which is evaporating fluid, expanding gas, or a material which promotes evaporation of the liquid to be cooled. If 80·025 pound-Centigrade units of heat be withdrawn from a pound of water at 0° C. it will become a pound of ice at the same temperature. If this heat be withdrawn from the water by an evaporating liquid there are two conditions which must be fulfilled; the evaporating liquid must evaporate very rapidly, and the latent heat of evaporation (i.e. the heat absorbed from outside during evaporation) must be as great as possible. Ether boils at 35·5° C. (95·9° F.), and has at 0° C. (32° F.) a vapour-pressure of 18·4 cm. (7·36 inches) of mercury; at 0° C. it requires 94 lb.-Centigrade units of heat to evaporate a pound of it; and at that temperature its evaporation ought accordingly to be able, if the whole of the heat required for evaporation were withdrawn from water, to freeze 94 ÷ 80·025 times its weight of water at 0° C., so that a ton of ice (2240 lb.) would be produced by the evaporation at 0° C. of a minimum of 1907 lb. of ether. Alcohol is more advantageous than ether in respect of its higher specific heat, but is preponderatingly less so in respect of its lesser volatility. Liquid ammonia boils at −35° C. (−31° F.), and has at 0° C. a vapour-pressure of 318 cm.

(127·2 inches), or more than four atmospheres: it is thus extremely rapidly volatilised at 0° C.; and, as its latent heat of evaporation is as much as 294, the production of a ton of ice would thus only demand the evaporation of a minimum of 610 lb. of liquid ammonia. Liquid sulphurous acid (boiling-point, – 10·8° C. or 12·6° F.; vap. pr. at 0° C., 116·5 cm. or 46·6 inches, or about 1½ atm.; lat. h. of evap. 94·56) is also a volatile liquid presenting considerable advantages. Machines for using ether have been constructed by Siebe, Siddeley and Mackay, Duvallon and Lloyd, Mühl, and others. The ether is caused to evaporate rapidly by an air-pump or pumps worked by steam; it cools brine or a solution of calcium chloride, and this cools the water to be frozen or the air to be refrigerated; the ether vapour is condensed by pressure and cold and used over again. Ammonia was first used by Carré in 1860; ammonia gas driven off by heat from its solution in water is condensed in a cooled vessel under its own pressure; the original ammonia vessel is now cooled, and the liquid ammonia rapidly evaporates (its vapour being absorbed), chilling its surroundings. Anhydrous liquid ammonia has been used by Reece and others. M. Raoul Pictet of Geneva has used sulphurous acid, the evaporation of which is hastened by an air-pump. The greatest difficulties in machines of this nature are (apart from chemical action of the liquid employed) the difficulty of making joints to withstand great pressures, and the cost of condensing the evaporated refrigerant. Messrs Tessié du Motay and A. I. Rossi have introduced a solution of 300 times its volume of sulphurous acid gas in ordinary ether; the sulphurous acid and the ether are readily evaporated off together by the air-pump, and on condensation the ether settles down first, absorbing the sulphurous acid; so that there are no pressures to deal with, and no sulphuric acid produced which may corrode the metal, but only ethyl-sulphuric acid, which does no great harm.

The air-pump or sulphuric acid has also been employed to promote the evaporation of the liquid itself which is to be refrigerated. In Mr A. C. Kirk's apparatus (British patent 1218 of 1862), and in the Bell Coleman apparatus, greatly employed for producing cold dry air for use in the refrigerating chambers of dead-meat-carrying steamers, the principle is that compressed and cooled air will, when allowed to expand against an external resistance, so that it does mechanical work during expansion, lose heat equivalent to the energy which it has expended. In the former the same air is alternately compressed in one place and expanded against some resistance in another.

Porous jars, used to keep water cool, are amongst the simplest kinds of refrigerating apparatus; the evaporation at the outer surface of the jar of the water passing through the porous earthenware taking latent heat from the water (see EVAPORATION).

For details as to refrigerating machines, consult Bondie's *Ice-making Machinery* (Spon, New York); Spon's *Dictionary of Engineering* ('Ice-making Machines,' p. 1996); Spon's *Encyclopædia of the Industrial Arts* ('Artificial Ice,' p. 1133). See also the articles COLD, FREEZING MIXTURES, ICE; and for the Refrigeration of the Earth, see EARTH, TEMPERATURE.

Refugee, a name given to persons who have fled from religious or political persecution in their own country, and taken refuge in another, especially to Flemish refugees during the persecution by Alva in the Low Countries, and to French Protestants who fled to England in or after 1685, when Louis XIV. of France revoked the Edict of Nantes. See HUGUENOTS, EXTRADITION, POLITICAL OFFENCES.

Regalbuto, a town of Sicily, 25 miles WNW. of Catania. Pop. 9610.

Regalia, the ensigns of royalty, including more particularly the apparatus of a coronation. The crowns are described at Vol. III. p. 589. The regalia, strictly so called, of England consist of the crown, the sceptre with the cross, the verge or rod with the dove, the so-called staff of Edward the Confessor (made in reality for Charles II.), the orbs of king and queen, the blunt sword of mercy called Curtana, the two sharp swords of justice, spiritual and temporal, the ampulla or receptacle for the coronation oil, the anointing spoon (probably the only existing relic of the old regalia), the armillæ or bracelets, the spurs of chivalry, and various royal vestments. All these, with the exception of the vestments, are now exhibited in the Jewel-room in the Tower of London. Their total value is estimated at £3,000,000. See BLOOD (THOMAS); and W. Jones's *Crowns and Coronations: History of Regalia in all Countries* (1883).

The proper regalia of Scotland consist of the crown, the sceptre, and the sword of state. For the crown, see Vol. III. p. 589. The sceptre is of the time of James V.; the sword was a present from Pope Julius II. to James IV. in 1507. During the Civil War the regalia were removed by the Earl Marischal for safe custody from the Crown-room of Edinburgh Castle, their usual place of deposit, to his castle of Dunnottar (q.v.); and from the Restoration to the Union the regalia continued to be kept in the Crown-room as formerly. From the Union till 1818 the regalia remained locked in a chest in the Crown-room away from public gaze; but in 1818, an order being obtained from the Prince-regent, the chest in the Crown-room was broken open, and the crown, sword, and sceptre were found as they had been deposited at the Union, along with a silver rod of office, supposed to be that of the Lord High Treasurer. They are now in the charge of the officers of state for Scotland, and are exhibited in the Crown-room. See Sir Walter Scott's *Account of the Regalia of Scotland* (1819).

Regality, BURGHS OF. See BOROUGH.

Regals. See ORGAN, Vol. VII. p. 639.

Regatta. See YACHT, ROWING.

Regelation. See ICE.

Regeneration is a theological expression denoting the spiritual change which passes on all men in becoming Christians. There are various interpretations of the mode and meaning of this change, but its necessity in some shape or another may be said to be admitted by all branches of the Christian church. By all man is supposed, as the condition of his becoming truly Christian, to pass from a state of nature to a state of regeneration, from a state in which he obeys the mere impulses of the natural life to a state in which a new and higher—a divine—life has been awakened in him. The words of our Lord to Nicodemus: 'Verily, verily, I say unto thee, except a man be born again, he cannot see the kingdom of God,' are accepted as the expression of this universal necessity by the Christian church. It may be further stated that every branch of the Christian church recognises, although under very different conditions, the Holy Spirit as the author of this change. The change in its real character is spiritual, and spiritually induced. According to a large portion of the Christian church, however, the change is normally involved in the rite of baptism. In the Catholic view baptism constitutes always a real point of transition from the natural to the spiritual life. The grace of baptism is the grace of regeneration; and among the direct effects of baptism are (1) the remission of all sin, original and actual; (2) the remission of the penalties due for sin both temporal and eternal; (3) the bestowal of sanctifying grace and the infused virtues; (4) the imprinting of an indelible 'character' on the soul; besides (5) making the recipient a member of Christ and the church, and qualifying to receive the other sacraments. The usual Protestant doctrine of baptism is explained at Baptism; and see also Gorham. Protestants hold for the most part that regeneration is a special, conscious process which takes place independently of baptism or of any other outward fact or ceremony. It implies a sensible experience—an awakening whereby men come to see the evil of sin, and the divine displeasure against sin, and, through the Holy Spirit, are born again, put away their former evil life, and begin to live a new divine life. Technically, Conversion (q.v.) is the action upon man, Regeneration the agency of God.

Regenerator Furnace. See Glass.

Regensburg. See Ratisbon.

Regent, one who exercises the power without having the name of a king. In a hereditary monarchy there are various circumstances which may necessitate the delegation of the sovereign power—as the devolution of the crown on a minor too young to be entrusted with the kingly office; the incapacity of the sovereign by illness, mental or bodily; and the case of absence from the realm. A regent under the title of Protector (q.v.) has often been appointed to exercise royal authority in the sovereign's minority, the latest instance in England being during the minority of Edward VI.; and regents and councils of regency have been sometimes named by the sovereign to provide for the probable nonage of his heir. During the frequent absences of the first two kings of the House of Hanover in their continental dominions it was the practice to appoint regents or Lords Justices (see Vol. VI. p. 379) to exercise the powers of sovereign. In 1788, when George III. became incapacitated from exercising the kingly office by insanity, it became a question whether his eldest son, then of full age, had a right to be regent, or whether the nomination rested with parliament. The chief political authorities of the time were divided in their judgment, but the king's recovery ended the discussion. On the return of the malady all parties were unanimous that the regency should be conferred on the Prince of Wales, and this was done by parliament. In 1830 a Regency Bill was passed, providing for the administration of the government, should the crown descend to the Princess Victoria before she attained eighteen years of age; and in 1840, one providing that the Prince Consort should be regent in the event of the demise of the Queen, her next lineal successor being under age. For university regents, see article Universities.

Reggio (anc. *Rhegium Julii*), a seaport of South Italy, stands on the Strait of Messina, 9 miles SE. of the city of Messina in Sicily. It is the seat of an archbishop, and has a fine cathedral. Manufactures of silks, scented waters, gloves, stockings, and caps—the last three made from the byssus of the Pinna (q.v.)—the cultivation of fruits, wine, and olives, and fishing are carried on. Pop. 23,853. The ancient *Rhegium* was founded by Greeks in the 8th century. It was taken and destroyed by Dionysius of Syracuse (387 B.C.), the Romans (270), Alaric (410 A.D.), Totila (549), the Saracens (918), and captured by Robert Guiscard (1060), Pedro of Aragon (1282), and the Garibaldians (1860). In 1783 it was ruined by an earthquake.—The *province* has an area of 1221 sq. m. and a pop. of 397,208.

Reggio, a city of Central Italy, stands on the ancient *Via Emilia*, 17 miles by rail SE. of Parma, and is still surrounded with walls. It has a good cathedral of the 15th century, one of the finest theatres in Italy, a model lunatic asylum, a natural history and an antiquarian museum, a library, &c. Pop. 18,634, who manufacture silk, hemp, turnery, leather, &c., and carry on considerable trade, especially in timber. Reggio is the birthplace of Ariosto. During the later middle ages it was an independent city, but was subject to the D'Estes from 1409 onwards. The bishopric was founded in 450.

Regiam Majestatem, a collection of ancient laws bearing to have been compiled by order of David I., king of Scotland. The authenticity of the work has been controverted, the prevalent opinion being that it is a compilation from Glanville's *Tractatus*. Some authorities attribute the collecting of it to a commission of Edward I., others to an unknown author after the war of independence (14th century).

Regicides, the men who were appointed on the parliamentary committee to try King Charles I., but in a narrower sense the men, sixty-seven in number, who actually sat in trial upon him. Of these only fifty-nine signed the death-warrant. After the Restoration the regicides were brought to trial on a charge of high-treason. Twenty-nine were condemned to death, but only ten were executed, nineteen, together with six others who were not tried, being imprisoned, most of them for life. More than twenty who were already dead were tried and condemned all the same, and Cromwell, Ireton, and Bradshaw, three of them, were exhumed and hanged at Tyburn, and then reburied at the foot of the scaffold. For regicides in a wider use of the term, see Assassination, and E. Régis' *Les Régicides dans l'Histoire et dans le Présent* (1890).

Regillus, Lake, lay in Latium, to the south-east of Rome, probably near the modern Frascati; it is celebrated in the semi-legendary history of Rome as the scene (496 B.C.) of a great battle between the Romans and the Latins, fighting on behalf of the banished Tarquin, in which the latter were entirely defeated.

Regiment, in most modern armies, is a tactical unit consisting either of four squadrons of cavalry, some six or seven Batteries (q.v.) of artillery, or three or four Battalions (q.v.) of infantry—the engineers and other troops being similarly grouped. In the British army the cavalry regiment consists of eight troops (four squadrons) having a war establishment of 666 of all ranks (32 being officers) and 614 horses. It is a tactical unit commanded by a lieutenant-colonel, with adjutant, quartermaster, paymaster, medical officer, veterinary surgeon, transport officer, band, and artificers.

As regards the infantry the regiment is not a tactical unit. The name is often still given to single battalions owing to the fact that previous to 1881 it was used indiscriminately for infantry corps whether they consisted of two battalions, as did the first twenty in the *Army List*, or of four, as did the 60th. But in that year 133 battalions of the line were reorganised to form 67 regiments, which should each consist of two battalions of line infantry, two or more battalions of militia, and whatever volunteer battalions there might be in the territory allotted to each regiment for recruiting purposes and called its *Regimental district*. The Cameron Highlanders are an exception, having still only one line battalion (the old 79th). It has been twice proposed to link them as a third battalion to the Scots Guards, but, owing to the strong opposition of the Camerons, the proposal had not been carried out up to 1891. Also the Guards retained their old organisation—viz. three battalions of Grenadiers, two of Coldstreams, and two of Scots Guards—and the 60th Rifles and Rifle Brigade, each of four battalions, are allotted to the regimental district at Winchester. The two West Indian regiments (single battalions) have since been formed into a regiment of two battalions. Like the regiments of the native armies of India, no militia or volunteer battalions are attached to it. A territorial regiment is therefore a purely administrative unit, and has no war establishment. It is commanded by a colonel, assisted by an adjutant and quartermaster, and its depôt companies, two for each line battalion, train recruits for the service companies.

The Royal Regiment of Artillery is also a purely administrative organisation, including all the horse, field, and mountain batteries and garrison companies of the regular army. The corps of Royal Engineers similarly comprises all the officers and men of that arm. Militia and volunteers are attached to each, and they are each represented at the War Office by a deputy-adjutant-general.

The word regiment began to be applied to bodies of British troops in Elizabeth's reign; regiments are spoken of at the time of the Armada, 1588, and as composing the force in Ireland, 1598. From that time forward the army and militia of Britain have been organised into regiments. Charles I. and the parliament each raised regiments, all of which were disbanded at the Restoration, with the exception of the Lord-general's Regiment of Foot and his Life Guard of Horse. These two were re-engaged (1661) and form the present Coldstream Guards and Royal Horse Guards. In the same year a Scotch corps of 1700 men, which had taken service in France in the time of James I., returned to England, and was included in the British army as the 1st Foot. See ARMY, Vol. I. p. 433. In 1693 was raised the 1st troop of Horse Grenadier Guards, and the 2d troop in 1702. These were re-formed in 1782 as the 1st and 2d Life Guards.

Regimental officers are those who are actually doing duty with a regiment, battalion, battery, or company as combatants, in contradistinction to those who may be on the staff or otherwise employed.

Regimental badges, mottoes, and *devices* are detailed in the Queen's Regulations, and emblazoned, with the battles and campaigns in which either of the battalions of the regiment has been engaged, on its colours or appointments.

Regimental pets are animals which accompany the troops on all occasions and have a recognised place on parade. Many infantry battalions have them—e.g. the Royal Welsh Fusiliers always have a white goat, which since the year 1844 has been regularly presented to them by the Queen.

For *Regimental Schools*, see ARMY, Vol. I. p. 439.

Regimental district (formerly brigade depôt) is the territory allotted to each infantry regiment of the British army. The localisation of the forces followed naturally on the adoption of a short service system. The increased number of recruits annually required necessitated the spreading of recruiting agencies over the country, and the desirability of obtaining men from a district to which they would afterwards return as reservists was obvious. The original scheme of 1873 has been modified in many ways, and may be briefly summarised as follows: For the purposes of command, the United Kingdom is divided into 14 districts—ten for England, one for Scotland, and three for Ireland (the Channel Islands command does not share in the localisation scheme), under general officers. Each of these districts has a floating body of regular troops, and is subdivided (with the exception of the Thames, Woolwich, and Aldershot districts) into a certain number of *regimental districts*—69 altogether.

To each of these regimental districts are assigned, normally: (*a*) Two line battalions—if possible one at home and one abroad (see, however, REGIMENT); (*b*) regimental depôts composed of two companies, under a major, two captains, and two subalterns, from each line battalion belonging to the district; (*c*) the militia and volunteer battalions of the district, as well as the infantry of the army reserve. The linked battalions of the line together with the militia battalions form a *territorial regiment*—to which the volunteer battalions are attached. If possible a territorial regiment draws its recruits from its own district, and the promotion of officers of the line takes place in the regiment and not in a particular battalion. Militia recruits are trained at the depôt, and every effort made to draw close the connection between the line and the militia. Each regimental district is in charge of a lieutenant-colonel, who superintends the recruiting of the district, and commands the auxiliary and reserve forces in it. His staff comprises an adjutant, quartermaster, paymaster, medical officer, and the usual non-commissioned officers.

Regina, capital of the Canadian province of Assiniboia and seat of government of the North-west Territories, 357 miles by rail W. of Winnipeg. The chief buildings are the lieutenant-governor's residence and the headquarters of the mounted police. Pop. 2000.

Regiomontanus, a German mathematician and astronomer whose name was Johann Müller, was born at Königsberg in Franconia, 6th June 1436. From his birthplace he called himself in the mediæval fashion Johannes de Monteregio; since 1544 Regiomontanus is the name by which he has been known. He was trained by the Austrian mathematician George Purbach (1423–61), studying under him at Vienna and elsewhere. In 1461 he accompanied Cardinal Bessarion to Italy in order to learn Greek. He sojourned in Rome, Ferrara, Padua, and Venice; returned for a time to Vienna, and was called by Matthias Corvinus to his court at Buda; but in 1471 he settled in Nuremberg, where a learned and wealthy citizen, Bernhard Walther, subsidised him so as to enable him to construct mathematical and astronomical instruments and found a famous printing-press. The two laboured together at the correction of the 'Alphonsine Tables,' and jointly published *Ephemerides 1475-1506* (1473), of which Columbus and other early navigators made much use. Regiomontanus not only worked at astronomy, but restored the study of algebra in Germany, extended the science of trigonometry, and published treatises on water-works, burning-mirrors, weights and measures, &c. He was summoned to Rome by Pope Sixtus IV. to assist in reforming the calendar, was made Bishop of Ratisbon, but died at Rome, 6th July 1476.

Among his works are *De Doctrina Triangulorum* (1463); *De Quadratura Circuli* (1463); *Calendarium* (1473); *De Reformatione Calendarium* (1484); *De Cometæ Magnitudine* (1531); *De Triangulis Omnimodis* (1533). See Ziegler, *Regiomontanus, ein geistiger Vorläufer des Kolumbus* (1874).

Register of Voice. See VOICE.

Registers, PARISH. The place which parish registers now fill was formerly, but only in very small part, supplied by monastic registers, which, however, as a rule registered only deaths of important persons, so as to be able to tell when masses became due, and were usually confined to the families of founders, benefactors, and the like. Entries were also sometimes made in the missals of parish churches, and the monastic chronicles often contain necrologies, whilst mortuary rolls were regularly sent round from monastery to monastery.

These were in effect the sole early public registers, but private necrologies were sometimes kept by the chaplains of great families—e.g. Friar Brackley has left one of the Pastons and Mawtbys—and Burn (*History of Parish Registers*) mentions several entered in the flyleaves of private books of devotion. But it is mainly to the monastic cartularies and to inquisitions *post-mortem* and proofs of age that we must go for information on births and deaths of the pre-Reformation times.

It is probable that the injunction of Thomas Cromwell in 1538, ordering parish registers to be kept under the system now in vogue, was intended, like Edward VI.'s scholastic foundations, to meet one of the immediate difficulties involved in the suppression of the monasteries. Had this injunction been strictly acted on we should now be in possession of complete registers from that date onwards. But, perhaps owing to the fall, soon after, of the author of the injunction or to the general laxity of the incumbents, very little heed was taken of it, and the evil which this neglect entailed became so crying that Elizabeth in 1597 issued a stringent order that not only should the registers be better kept, but copies of them should be yearly sent to the bishop of the diocese, an order which in 1812 was supplemented by an act enjoining the preservation, arrangement, and indexing alphabetically of the names on the registers. But nothing has been of much value against the incorrigible neglect of the incumbents and bishops. Early transcripts are practically non-existent, and even those of the 18th century are most imperfect. In the returns of the population abstracts in 1801 it was discovered that amongst 11,000 parishes in England 812 registers dating from 1538 alone existed, and later returns in 1834 showed that even that small number had decreased through the negligence of the clergy in the interval. These last returns give full details as to the date of the commencement of each register in England. The only hope in the future for the preservation of the remnant lies in the instant removal from the parish churches (or, as is too often the case, the incumbent's library) of the actual registers and of the transcripts from the bishops' registers to the Public Record Office or to some kindred institution, otherwise further loss must be expected in spite of the fact that many of the clergy are at last waking up to their duty in the matter and many have transcribed and indexed their registers, while some have been printed by the Harleian Society and by private individuals.

A full list of the printed registers was issued in 1891 by Dr G. W. Marshall. Other standard works on the subject are Bigland's *Observations on Parish Registers* (1764) and Burn's *History of Parish Registers* (1829; 2d ed. 1862), while *brochures* on the same subject have been printed by Mr Chester-Waters (1870; new ed. 1887) and Mr Taswell-Langmead.

From these works the reader may see how the registers often contain much valuable information as to the history of the parish, many incumbents slightly overstepping their strict duty by putting down noticeable and curious incidents which occurred from time to time. The proper fees for searching are one shilling for the first year (which includes births, marriages, and burials, though some clergymen try to charge them separately) and sixpence every subsequent year. It seems doubtful if the searcher may take general notes, but he may copy one entry per year without being compelled to pay the further fee of 2s. 7d. which is the clergyman's due if he is asked to give a certified copy. Most custodians of registers, however, are extremely liberal, and seldom take fees when the object of the search is a literary one.

Registration may be described as an account of certain transactions and legal facts inserted in a book called a register and kept at a public office. The purpose in view usually is to preserve an authentic and exact record of the transactions, to secure for them a means of publicity, or to simplify the methods of proving them. The practice of inscribing a copy of private documents in a public register seems to have been originally introduced by the Emperor Leo in reference to gifts—the object being to enable heirs to ascertain to what claims the estate was liable before deciding whether to accept the inheritance. A system of registration is now employed in many different departments and for very various purposes. The extent to which registration is carried varies very much in different countries; on the whole, however, it is more carefully enforced and more widely applied in continental states than in England or America. In France and Italy, for example, in almost all transactions parties resort to a notary, who draws up the documents relating to the business in hand. Such notarial transactions are to a certain extent public acts, and are presumed to be valid and binding, until they have been impeached and set aside by a separate proceeding instituted for that purpose. Further, in these countries all documents executed in the presence of a notary having any reference to certain subjects—for example, to the creation or transfer of an interest in land—are transcribed by him in a public register, and so become available for general information.

In England all judicial decisions and the whole proceedings of the higher courts in their various stages are registered; and with registrars attached to the Privy-council, the supreme court, and the county courts, affidavits, pleadings, &c. are filed. Probates of wills and letters of administration, both of which are really judicial proceedings, are registered either in the principal registry of the Probate Division in London, or in one of the district registries, which are situated at various places throughout the country. Land registries, for officially recording the title to, dealings with, and charges on land, are of two classes—viz. registries of title and registries of assurances. The former are authentic and self-explanatory records, behind which one cannot go except in case of fraud. The latter merely contain a statement of the existence of documents or assurances affecting the title to the land, giving an epitome of each document, and leaving the persons concerned to draw their own conclusions as to the effect of those documents on the title to the land. The whole subject of land registration has been much discussed of recent years in England, and several attempts to establish a system of registration have been made without much success. Lord Westbury's Act (25 and 26 Vict. chap. 53), establishing a general land registry for England and Wales, has notoriously proved a failure. The present statute regulating the general registration of land is the Land Transfer Act (38 and 39 Vict. chap. 87), which creates an office of land registry in London; but in the case of this act also practical results have been very small. The doubts and complications surrounding titles to land in England are so appalling that, though a compulsory system of registration is universally recognised to be expedient, parliament has not dared to enforce it. Bills of sale must be registered within seven clear days after execution, or, if executed out of England, then within seven days after their arrival in England; further, a bill, if still existing, must be re-registered every five years. Under the Merchant Shipping Acts every British ship must be registered, as also must all changes of ownership in a ship, whether by sale, mortgage, death, or bankruptcy; in the United

Kingdom the principal officer of customs at the port of registry is the registrar. Among the other principal registers are the register of joint-stock companies, established by the Companies Acts; the register of friendly societies; the registers of designs, copyrights, patents, and trade-marks; the registers of seamen, of newspapers, of solicitors, of petitions in lunacy, and so on.

In Scotland registration is an important feature in the administration of the law. It may be treated under two heads—viz. registration for preservation and execution, and registration for publication. Registration in order to execution—i.e. to enforce the performance of obligations, arose before the Reformation from the practice of churchmen, who, in order to bring the enforcement of ordinary contracts within their jurisdiction, procured the insertion in obligations of a solemn oath of performance and consent to excommunication in the event of failure. It is now an almost universal practice to insert a clause of registration in deeds stipulating for money payments, especially in bonds. A short clause of registration has been introduced by recent conveyancing acts, in these words: 'And I consent to registration hereof for preservation (or for preservation and execution);' and this clause, in any deed or writing whatsoever, is declared to import 'a consent to registration and a procuratory of registration in the Books of Council and Session, or other judge's books competent therein to remain for preservation; and also, if for execution, that letters of horning and all necessary execution shall pass thereon, upon six days' charge, on a decree to be interponed thereto in common form' (31 and 32 Vict. chap. 101, sects. 8, 138). Such registration for execution, which is in effect a short cut to a judgment without the formality of an action, may take place after the death either of the creditor or of the debtor. By special statutes the privileges of registration in order to diligence are extended to bills and promissory-notes, the acceptance and subscription of which implies a consent to registration for execution. The records now available for registering deeds for preservation or execution are these: (1) The Register of the Great Seal; (2) the Books of Council and Session, for all deeds and probative writs; (3) the books of any sheriff court; (4) the books of royal burghs, for instruments of protest on bills or notes; (5) the General Register of Sasines.

Registration for publication applies chiefly to writs connected with heritable rights. The present system owes its origin to the statute 1617, chap. 16, which established a general register in Edinburgh, and particular or local registers throughout the country, in which sasines and other writs affecting heritable property should be registered within sixty days of their date. The instrument of sasine and the whole ceremony of sasine are now dispensed with in the transfer of lands; by the Titles to Land Acts of 1858 and 1860, the recording of the conveyance itself, with warrant of registration thereon, now constitutes infeftment to the same effect as if an instrument of sasine had been expede and recorded at the date of recording the conveyance. Registration, however, operates as infeftment only in favour of the party expressed by the warrant. The registers for publication now subsisting are (1) the General Register of Sasines, divided into counties; (2) Register of Entails; (3) General Register of Inhibitions and Adjudications; (4) the Burgh Registers of Sasines for lands in each royal burgh in which such a register has been in use to be kept. The public registers of Scotland used to be under the charge of the Lord Clerk Register; but the duties of that functionary in this connection were by 42 and 43 Vict. chap. 44, sect. 5, transferred to the Depute-clerk Register. All the records are collected at the General Register House in Edinburgh.

In the United States, in order to be wholly valid, a deed or other instruments affecting the title to real estate must be recorded in the proper office for the registry of deeds, and this constitutes constructive notice of its contents. A chattel mortgage must be filed to be effective against third persons; but it is valid between parties without filing. In most of the states the effect of the filing continues only for a limited period, usually for a year, and the mortgagee must consequently refile within the prescribed time. The certificate of the recording officer is conclusive of the fact of filing. For a digest of the provisions of the different statutes as to the registration of deeds, see Stimson's *American Statute Law*, sect. 1610 *et seq.*

REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES is the name for the system of regulations providing for a record of these events. In England the first act on the subject dates from 1836. By it a general registry-office was provided at Somerset House, London, for England and Wales. But even before the new arrangement there had been long in operation an ecclesiastical mode of registration of marriages, baptisms, and burials in connection with each parish church, it being the duty of the officiating minister to keep such a register. See REGISTERS (PARISH). Also, since 1592, the compilation of weekly bills of Mortality (q.v.), containing particulars as to the death-rate of London, has gone on almost uninterruptedly. These modes of registration were found to be well-nigh useless for statistical purposes. Hence the systematic plan instituted in 1836, by the Acts 6 and 7 Will. IV. chaps. 85, 86, which have been since amended by subsequent legislation, the whole being entitled the Births and Deaths Registration Acts, 1836–74; the last and most important is the 37 and 38 Vict. chap. 88. There are special legislative provisions as to the registration of marriages. The acts provided that the head of the system should be the Registrar-general of births, deaths, and marriages in England. An annual abstract of the registrar's returns must be laid before parliament. Every poor-law union throughout the country is subdivided into districts, and in each district a locally-resident registrar is chosen. Superintendent-registrars are also appointed. The registrars make out their returns quarterly, and send them to the superintendent-registrar of the district, by whom they are transmitted to the general register-office. There they are preserved, and may be inspected or excerpted on payment of a small fee.

Births.—In the case of every child born alive, the father and mother, or, in their default, other specified persons, are to give notice of such birth to the district registrar within forty-two days after the occurrence. If this is not done he may require any of the defaulters, by notice in writing, to attend and inform him, within three months of the birth, with the particulars thereof. Special provisions are made for the case of foundlings, children born at sea, &c. It is the duty of the registrar to acquaint himself with all births in his district, and register the same within three months free of charge. After three months the birth can only be registered with certain formalities, including payment of a small fee, and after twelve months only with the written consent of the Registrar-general. The particulars to be registered are the place and date, sex of child, its name and that of the mother and the father, with the calling of the latter. The signature and description of informant are also noted. The date of registration and signature of registrar complete the entry.

Marriages.—These may be religious or civil. In the first case they may be performed according to the rites of the Church of England, of the general body of Nonconformists, of the Society of Friends, or of the Jews. The Registrar-general must send marriage register-books to the minister of every church and registered chapel, and to each registering officer in England of the Society of Friends or Quakers, and every secretary of a synagogue in England. In each case, the official to whom the book is sent must register in two of the books in duplicate the particulars of the marriage. One of these books when full is sent to the superintendent-registrar, and a quarterly return is also furnished to him. In the case of Nonconformists other than Jews and Quakers, the registrar attends at the registered building, and registers the marriage himself, as he also does when it is a purely civil ceremony taking place at his office. The particulars entered are date of marriage and name, age, condition, calling, residence, father's name and calling of both parties.

Deaths.—Much of what has been said about registration of births applies to registration of deaths, but the following points are to be noted. Notice must be given within five days of the occurrence by the nearest relative of the deceased present; if he does not, the duty falls on other specified persons. A notice preliminary to registration may be sent, and this extends the time to fourteen days. In default of action of others, the registrar ought to require the person liable to appear before him before twelve months from the death have elapsed, and supply him with the statutory particulars. After the lapse of twelve months there must be written authority of the Registrar-general before the entry can be made. There are special provisions for inquest cases, &c. The particulars of registration are date, place, name, sex, age, calling, cause of death, name of certifying medical man, name and description of informant, date of registration, and signature of registrar. Provision is made for sending notice of the death of medical practitioners, &c. to special registrars, in order that their names may be struck off special lists.

All the registers since 1836 and a number of the older irregular ones are preserved in Somerset House. The registrars are bound to permit, on payment of a fee, a search of such recent registers as are in their possession. There are thirty-nine acts on the subject. They are from the 52 Geo. III. chap. 146 to the 50 and 51 Vict. chap. 71. In Ireland the system of registration, introduced in 1863, is almost exactly the same as in England. There is a Registrar-general and a general register-office at Dublin. In the case of Roman Catholic marriages, a registrar's certificate must be obtained and produced before celebration. The officiating clergyman then fills it up; it is returned to the registrar, who enters the particulars in the proper books. Other religious marriages are registered in the same manner as Church of England marriages are in England. There are fifteen acts dealing with the subject, the first being the 7 and 8 Vict. chap. 81, the last the 43 and 44 Vict. chap. 13.

Although the law in Scotland on this subject is much the same as in the rest of the United Kingdom, some points of difference are to be noted. The general register-office is at the Register House, Edinburgh. The office of Registrar-general is held by the Deputy-clerk Register. Notice of a birth is given in twenty-one days; after three months a declaration must be made before the sheriff by the informant of the particulars proposed to be registered. Provision is made for correction of the register in the case of children legitimated *per subsequens matrimonium*. Notice of death is to be given within eight days of the event. In the case of regular religious marriages a statutory schedule is produced to and filled up by the officiating minister. It is then sent to the registrar, who enters the necessary particulars in his book. The registrar is bound, when required, to be present at a marriage, and register the same. The statutory fee for this is 20s., and he is entitled to the same sum for registration after conviction or decree of declarator of an irregular marriage. There are ten acts dealing with the subject, the first being the 10 Anne, chap. 10, the last the 48 and 49 Vict. chap. 61, sect. 5. It will be understood that penalties of varying degrees of severity are enacted against breakers of the Registration Acts. See Flaxman's *Registration of Births and Deaths in England, Wales, and at Sea* (1875).

REGISTRATION OF VOTERS.—It is a condition precedent to the exercise of the right to vote in parliamentary elections that the name of the voter should be upon the register—a preliminary requisite first introduced when the franchise was remodelled in 1832. In England the process of registration, as settled by the last Registration Act (48 and 49 Vict. chap. 15), is as follows: On the 15th of April in each year a precept, containing a description of the qualifications which entitle persons to be registered as voters, is sent by the clerk of the peace in a county, or by the town-clerk in a borough, to the overseers of every parish or township. Before the 31st of July the overseer must make out a list of occupiers, whom he has ascertained to be qualified —persons who have paid their rates, and who are not disqualified by receipt of parochial relief—and a list of lodgers, who have sent in their claims to vote in respect of their lodgings. By the 20th of August all new claims have to be sent in, and the lists, together with notices of objections, have to be published on the door of every church or public chapel in the parish. These lists of occupiers and of claims and objections are then sent by the overseer to the clerk of the peace in a county, and to the town-clerk in a borough. In September the revising barrister comes round and adjudicates upon disputed claims and objections; from his decision an appeal lies on a case stated by him to the Queen's Bench Division of the High Court. After this revision the register is finally made out. If it is for a county, there are three lists—lists of ownership, occupation, and lodger voters; if it is for a borough, there are two lists—the ownership list being omitted in boroughs.

In Scotland the system of registration is carried on largely by means of the machinery introduced, for the valuation of land, by the Valuation Act (17 and 18 Vict. chap. 91). The valuation roll, annually made up under the Valuation Act, is the basis of the register of voters; a new form of this valuation roll was provided in the Registration Act of 1885, each dwelling-house in the county or burgh being now specified in the roll. The duties of assessor for registration purposes are performed by the valuation assessor of each burgh, or county, or division of a county; he may not be a sheriff-clerk, or collector of poor-rates, or employed as a factor or land agent in the county or burgh for which he is assessor. Every year, on or before the 15th of September, the assessor makes out a list of voters, arranged alphabetically according to wards or parishes and polling districts, and publishes the list by affixing it to the town-hall, the parish church, or other conspicuous place. Any person whose name is on the list may object to any other person as not having been entitled, on the last day of July preceding, to have his name inserted, by giving notice in a form prescribed, on or before 21st September, to the assessor and to the person objected to; similarly, any person whose name has been omitted may claim to have it inserted, by notice to the assessor. Between 25th September and 16th October sheriffs hold open registration courts for the purpose of revising the lists of voters and disposing of claims and objections. The revised list is delivered by the sheriff to the town-clerk or the sheriff-clerk, and, being printed, constitutes the register of persons entitled to vote at any election before the 1st of November in the succeeding year. Appeals in registration cases are carried to a special court, constituted by the Reform Act of 1868, consisting of three judges of the Court of Session, one judge from each division of the Inner House, and one from the Lords Ordinary.

See works by G. L. Broune (1878), Cox and Grady (new ed. 1880), F. E. Davis (new ed. 1880), F. N. Rogers (14th ed. 1885), J. H. Saint (1885–87), and M. Mackenzie (1888).

Regium Donum (Lat., 'royal gift'), an annual grant of public money formerly received by the Presbyterian and other Nonconformist ministers in England, Scotland, and Ireland. It began in 1672, when Charles II. gave £600 of secret-service money to be distributed annually among the Presbyterian clergy in Ireland, on hearing that they had been loyal to him, and had even suffered on his account. The grant was discontinued in the latter part of the reign of that monarch, as well as in the time of James II., but was renewed in Ireland by William III. in 1690, who increased it to £1200 a year. It was further augmented in 1723 by George I., in consequence of the Presbyterians having supported the House of Brunswick, and raised by £2200 in 1784, and again by £5000 in 1792. The amount of the Irish grant for 1868 was £45,000. The propriety of receiving the Regium Donum was of late years much disputed by those of the same persuasion in England and Scotland. The Irish Regium Donum was withdrawn by the Act of 1869, which came into force in 1871, disendowing the Irish Episcopal Church. Compensation was made of life interests; and the ministers were allowed to commute on the same terms as the clergy of the Church. In 1874 it was reported that the commutation money paid had amounted to £579,762. The Regium Donum in England was enjoyed by the three denominations, Presbyterians, Independents, and Baptists, from 1723 till 1851. The amount required, £1695 per annum, was annually voted by parliament till July 17, 1857. The Scotch Episcopalians also enjoyed for a time a small part.

See Reid's *History of the Irish Presbyterian Church;* and for the English Regium Donum, Stoughton's *History of Religion in England,* Skeat's *Free Churches,* and Dr Edmund Calamy's *Account of his own Life.*

Regnard, Jean François, French comic dramatist, was born at Paris in 1656. A rich shopkeeper's son, he found himself at twenty master of a considerable fortune, and at once set out on his travels. In Italy he gave himself up to gambling, but, strange to say, increased rather than diminished his means. In his autobiographical romance, *La Provençale,* we read, but somewhat dubiously, of the passion of himself as Zelmis for a young Provençal wife (Elvire), his voyaging back to France with her and her husband, their capture and sale as slaves by Algerian pirates, how he made himself pleasing to his master by skill in cookery, was carried by him to Constantinople, and, at the end of his two years' captivity and many strange adventures, was ransomed, together with the lady, for 12,000 crowns. Her he was next about to marry when the husband reappeared, and sent the lover off again on aimless wanderings through Holland, Denmark, and Sweden, to Lapland, and back by Poland, Turkey, Hungary, and Germany. From his return to Paris (1683) he gave himself to letters, and found his true vocation in the success of *Le Divorce* at the Théâtre Italien in 1688. Eight years later his fine comedy, *Le Joueur,* achieved success at the Théâtre Français. Its successors were *Le Distrait* (1697), *Le Retour Imprévu* (1700), *Les Folies Amoureuses* (1704), *Les Ménechmes* (1705), and his masterpiece, *Le Légatoire Universel* (1708). He died before his time, and so suddenly as to originate various contradictory reports, 4th September 1709. Regnard was an indifferent poet, but he was a master of dramatic situation and of comic dialogue, if not of verisimilitude or reality. To this day the reader endorses Boileau's judgment, expressed once when some one charged Regnard with mediocrity—'Il n'est pas médiocrement gai.' 'Qui ne se plaît point à Regnard,' said Voltaire, 'n'est pas digne d'admirer Molière.'

There are editions by Didot (1820), Michiels (1854), and Fournier (1875). See the study by Mahrenholtz (Oppeln, 1887), and *Bibliographie* by Marchéville (1877).

Regnault, Alexandre Georges Henri, painter, was born in Paris, 30th October 1843, the son of Henri Victor Regnault (q.v.). His aptitude for drawing manifested itself very early, and he was continually sketching the animals in the Jardin des Plantes. After an excellent career in the Lycée Napoléon, he left school in 1859, and studied art under Lamothe and Cabanel; and, after two unsuccessful attempts, gained the *prix de Rome* in 1866. Reaching Rome early in the following year, he executed there a remarkable portrait of Madame Duparc, and his historical subject of 'Automedon breaking the Horses of Achilles,' and drew on wood illustrations for Way's *Rome.* He next passed to Spain with his friend Clarin; and here, as afterwards in Tangiers, he found subjects of that wildly picturesque character which best suited his genius. In 1869 he painted his powerful equestrian portrait of General Prim, now in the Louvre, and his 'Judith,' and in 1870 contributed his 'Salome' to the Salon. In 1870 was also painted, at Tangiers, his terrible picture, 'The Execution without Judgment under the Moorish Kings of Granada'—a work now in the Louvre. In the same year he returned to Paris on the outbreak of the Franco-Prussian war; and though, as a *prix de Rome,* he was exempt from military service, he volunteered as a private soldier, and on the 19th January 1871 was slain on the field of Buzenval, in his twenty-eighth year. As an artist he had by no means fully expressed himself; but he had produced much that was marked by great energy and power, that caught in a peculiarly vivid way the splendid and barbaric life of the East—a life, in the words of the painter himself, 'at once rich and great, terrible and voluptuous.' A monument to Regnault, sculptured by Henri Chapu, has been erected in the École des Beaux Arts, Paris.

See the Lives, in French, by Cazalis (1872) and Marx (1887), and his *Correspondance,* ed. by Duparc (1873).

Regnault, Henri Victor, chemist and physicist, was born at Aix-la-Chapelle, 21st July 1810. A shopman in a Paris bazaar, he made such good use of his scanty leisure as to qualify himself for admission (in 1830) to the École Polytechnique, and, after the two years' course, came out as a mining engineer. He became a professor in Lyons, whence, in 1840, he was recalled to Paris as a member of the Academy of Sciences, in consequence of some important discoveries in organic chemistry. Having filled chairs in the École Polytechnique and the Collége de France, he became in 1854 director of the imperial porcelain-manufactory of Sèvres. He devoted himself to the determination of important physical data, such as the laws of expansion of gases, the measurement of temperature, latent and specific heats, and especially the numerical data bearing on the working of steam-engines, for which the Royal Society of London awarded him their Rumford medal. He also received the Copley medal (1869) of the Royal Society, and was one of its foreign members. In addition to numerous papers in the *Annales de Chimie*, &c., he published a *Cours Elémentaire de Chimie* (4 vols. 14th ed. 1871). He died 20th January 1878. See the *Éloge Historique* by Dumas (1881).

Regnier, MATHURIN, a great French satirist, was born at Chartres, 21st December 1573. His father was a well-to-do citizen; his maternal uncle was the Abbé Desportes the poet. The boy was tonsured at nine, but grew up dissipated and idle. In early youth he seems to have visited Italy in the suite of the Cardinal de Joyeuse, and is supposed later to have transferred his services to Philippe de Bethune, who went as ambassador to Rome in 1601. He obtained a canonry at Chartres, and enjoyed the favour of Henry IV. and his court. But his follies sapped his health, and he died an untimely death, 13th October 1613. His first collection of satires had appeared in 1608. Regnier's whole work together scarce exceeds 7000 lines—sixteen satires, three epistles, five elegies, and some odes, songs, epigrams, and miscellaneous pieces—yet it is enough to place him high in the order of merit among the poets of France. He is greatest in his satires, written in the usual Alexandrine couplet, and admirably polished, yet vigorous and original. They touch social and moral questions only, and consequently are not of merely ephemeral interest, as political satires most often are; and, what is rare in French satire, they mostly escape the fault of handling abstract types instead of actual concrete embodiments of the type. Breadth, force, and reality characterise them all, but these merits together reach their highest point in the thirteenth, *Macette*, a satire on a hypocritical old woman who corrupts the hearts of the young around her by her cynical views of life. Regnier imitated indeed the satire of Juvenal and Horace, yet he did not copy it, and he threw his own heart into the form he borrowed. He was the last of the great poets of the 16th century: after him was to follow a period of barrenness, alike from the poverty of nature and the sterilising influences of the traditions of Malherbe and his school. It was against the attacks of Malherbe that Regnier championed Ronsard, and later he himself was defended by Boileau.

Editions are by Brossette (1729), Lenglet Dufresnoy (1733), Prosper Poitevin (1860), M. de Barthélemy (1862), and E. Courbet (1875). See Cherrier's *Bibliographie de Regnier* (1889).

Regrating. See ENGROSSING.

Regular Canons. See CANON.

Regulars. See CLERGY.

Regulus, a term in Metallurgy, which is now used in a generic sense for metals in different stages of purity, but which still retain, to a greater or less extent, the impurities they contained in the state of ore. When, for example, the ore known as the sulphide of copper is smelted, the product of the different furnaces through which it passes is called regulus until it is nearly pure copper. The name, which signifies 'little king,' was first given by the alchemists to the metal antimony, on account of its power to render gold brittle.

Regulus. See GOLDEN-CRESTED WREN.

Regulus, MARCUS ATILIUS, a favourite hero with the Roman writers, was consul for the first time in 267 B.C., and for his military successes obtained the honour of a triumph. Chosen consul a second time (256), he was sent along with his colleague Manlius at the head of a navy of 330 ships against the Carthaginians, and encountering the enemy's fleet off Heraclea Minor he totally defeated it. The Romans then landed near Clypea, where for some time Regulus was victorious in every encounter, but at last (255) suffered a total defeat and was taken prisoner. He remained in captivity for five years, but when fresh reverses induced the Carthaginians to solicit peace Regulus was released on parole and sent to Rome in company with the Punic envoys. It is related by the Roman poets and historians, as an instance and a model of the most supreme heroism, how Regulus at first refused to enter Rome since he was no longer a citizen; how, after this conscientious scruple was overcome, he declined to give his opinion in the Senate till that illustrious body laid upon him its commands to do so; how he then earnestly dissuaded them from agreeing to any of the Carthaginian proposals, even to an exchange of prisoners; and how, after he had succeeded by his earnest appeals in obtaining the rejection of the Carthaginian offers, he resisted all persuasions to break his parole, though conscious of the fate that awaited him, and, refusing even to see his family, returned with the ambassadors to Carthage, where the rulers, maddened by the failure of their schemes through his instrumentality, put him to death by the most horrible tortures. The common story is that he was placed in a cask or chest stuck full of nails, also that, with his eyelids cut off, he was exposed to the glare of the African sun. Unfortunately this noble tale of heroic patriotism and unflinching fortitude is unhistorical, or at least unsupported by any good authority.

Regulus, or RULE, ST, according to legend, a monk of Constantinople or bishop of Patras who in 347 A.D. came to Muckross or Kilrimont (afterwards St Andrews), bringing relics of St Andrew to Scotland from the East. The adoption of St Andrew as the national patron saint appears to belong to the first half of the 8th century; and for the possible identification of St Regulus with an Irish St Riagail of the 6th century, see Skene's *Celtic Scotland* (vol. ii. 1877).

Regar, the rich, black cotton soil of India. It is the result of the long-continued growth and decay of vegetation—the organic residue being commingled with the disintegrated and decomposed debris of the subjacent rocks.

Rei. See MILREI.

Reichenbach, a manufacturing town of Saxony, 11 miles SW. of Zwickau, produces woollen fabrics—merinoes, flannel, shawls, quilts, cashmere—and has wool-spinning, dyeing, and calico-printing works. Pop. (1890) 21,496.

Reichenbach, a town of Prussian Silesia, 46 miles by rail SE. of Liegnitz. Pop. 7368.

Reichenbach, HEINRICH GOTTLIEB LUDWIG (1793–1879), a botanist and zoologist, from 1820 a professor at Dresden.—His son, HEINRICH GUSTAV (1824–89), was also a botanist, a professor at Hamburg from 1862. He was famous in connection with orchids.

Reichenbach, KARL, BARON VON, naturalist and technologist, was born at Stuttgart, 12th February 1788, and educated at Tübingen. After a short political imprisonment at the instigation of the French authorities, he studied the industrial arts, and in 1821, in connection with the Count of Salm, he commenced a number of manufactories of different kinds at Blansko in Moravia, which he managed with great success, retiring with a fortune. He devoted much study to the compound products of the distillation of organic substances, and he succeeded in bringing to light a number of compounds of carbon and hydrogen not previously known; among these were creasote (1833) and paraffin. Studying with enthusiasm the subject of animal magnetism, he discovered, as he thought, a new force in nature, which he called Od (q.v.), and conceived to be intermediate between electricity, magnetism, heat, and light, and recognisable only by the nerves of sensitive persons. His chief works are *Geologische Mittheilungen aus Mähren* (1834), *Untersuchungen über die Dynamide des Magnetismus* (1847–49), several works on 'odic force' (1852–58), *Aphorismen* (1866), *Die Odische Lohe* (1867). Several of his works have been translated. He died at Leipzig, January 19, 1869. See biographical works by Schrötter (1869) and Fechner (1876).

Reichenberg, the chief seat of the cloth manufacture in North Bohemia, stands on the Neisse, 86 miles by rail NE. of Prague. Apart from the principal industry, in which, in the town and neighbourhood, some 10,000 workmen are employed, cotton and woollen fabrics, machinery, and leather are manufactured. The cloth industry was established here in the 16th century. There is an important industrial school. Pop. (1890) 31,033.

Reichenhall, an Alpine spa in the extreme south-east of Bavaria, 10 miles SW. of Salzburg. It was almost wholly consumed by fire in 1834, and has been handsomely rebuilt. It is the chief centre of the Bavarian salt-works, and in the manufacture of salt (11,800 tons annually) its 3436 inhabitants are for the most part employed, though the delightful air of the valley in which it stands, and its saline springs, attract about 6000 visitors every summer. The salt-springs are fifteen in number, and lie at a depth of 80 feet; two of them yield 25 per cent. of salt. A brine conduit, 75 miles in length, conveys the water of the salt-springs from Berchtesgaden, through Reichenhall, over mountain 1150 feet high, to Traunstein and Rosenheim, in the vicinity of which abundant timber for fuel is procurable.

Reichstadt, DUKE OF. See NAPOLEON II.

Reichstag. See GERMANY, Vol. V. p. 178.

Reid, CAPTAIN MAYNE, writer of boys' stories, was born in County Down in 1818, and at twenty emigrated to America, where he led a roving and adventurous life, served in the United States army during the Mexican war of 1847, and distinguished himself especially in the storm of Chapultepec. The Hungarian struggle, in which he had meant to take part, was at an end before he reached Europe, whereupon he settled down to a literary life, first at London, next in Buckinghamshire. He died October 22, 1883. His vigorous style and the profusion of hairbreadth 'scapes he provided delighted his breathless readers, who did not stop to notice the truthfulness of his scenery and the occasional excellence of the narrative style. Among his best books were the *Boy Hunter* (1853), the *Bush Boys* (1856), and the *Boy Tar* (1860), the *Scalp Hunters* (1847), the *Rifle Rangers* (1850), the *War Trail* (1857), and the *Headless Horseman* (1865). See the Memoir by his widow (1890).

Reid, GEORGE, P.R.S.A., was born at Aberdeen, 31st October 1841. After having been trained as a lithographer, he studied art in the Trustees' Academy, Edinburgh, under Mollinger at Utrecht, under Yvon in Paris, and with Israels at the Hague. He was elected A.R.S.A. in 1870, and R.S.A. in 1877, and succeeded Sir W. F. Douglas as P.R.S.A. in 1891. He is most widely known by his portraits, which are distinguished by unflinching verisimilitude, vigorous handling, and thorough modelling. His half- and full-lengths are remarkable for their individuality of attitude, for the insight with which, in each case, the characteristics of the sitter are expressed by the entire figure, as well as by the face. Among his more important portraits are 'Lord President Inglis,' in the Scottish Parliament House; 'H. Wellwood Maxwell of Munches;' and 'John Mackenzie.' He has also produced many rich, freely painted flower-pieces, as well as landscape work of a delicate and quiet charm; and his book illustrations prove him one of the most accomplished of living draughtsmen.

Reid, THOMAS, head of the Scottish school of Philosophy, was born on the 26th April 1710, at Strachan, a country parish in Kincardineshire, where his father was minister. His mother belonged to the well-known family of the Gregorys (q.v.). Reid began his education at the parish school of Kincardine, and at the age of twelve he became a student of Marischal College in Aberdeen. He took his degree of M.A. in 1726, and continued to reside in Aberdeen as college librarian, his chief studies being mathematics and the natural philosophy of Newton. In 1736 he left Aberdeen, and went to England, where he was introduced to the most distinguished men in Oxford, Cambridge, and London. In the following year he was presented by the senatus of King's College to the parish church of New Machar in Aberdeenshire. The parishioners were bitterly opposed to his appointment, but his conduct and manner gradually won them over. It is said that, from distrust of his powers, instead of composing for the pulpit himself, he preached the sermons of Tillotson and other English divines. In 1739 Hume's *Treatise on Human Nature* appeared, the perusal of which gave the impulse that determined Reid's future philosophical career. He had fully adopted the idealism of Berkeley, but was now revolted by the conclusions drawn from it by Hume, and in consequence was led to seek a new foundation for the common notions as to a material world. In 1748 he contributed to the Royal Society of London a short essay on *Quantity*. In 1752 he was appointed one of the professors of Philosophy in King's College, Aberdeen, the senatus being the patrons of the chair. Here he followed the established course of teaching in three successive years to the same students mathematics, natural philosophy, and moral philosophy. He was the founder of a Literary Society in Aberdeen, which enrolled among its members Campbell, Beattie, and other men of ability; to this society he submitted his first draft of the *Inquiry into the Human Mind*. In 1763 he was chosen to succeed Adam Smith as professor of Moral Philosophy in the university of Glasgow. In 1764 he published his *Inquiry*. His thirst for general science never left him; at the age of fifty-five he attended Black's lectures on Heat. He continued in the duties of his chair till 1781, when he retired to devote his remaining strength to the publication of his works on the mind. In 1785 the *Philosophy of the Intellectual Powers* appeared, and in 1788 the *Active Powers*—together forming a systematic work on the science of the human mind. In 1774 he had contributed his account of Aristotle's logic to Lord Kames's *Sketches*. The publication of the *Active Powers* was the close of his career as an author, although to the end of his life he kept up his bodily and mental vigour and his interest in science. He was taken ill suddenly in the autumn of 1796, and died on the 7th October.

Like Kant, Reid was roused to metaphysical research by Hume, and became the chief of a school whose aim was to deliver philosophy from scepticism, and to do so by resting finally on principles of intuitive or *a priori* origin. The Scottish philosophy, dominant till Sir W. Hamilton's time in Scotland, and influential in France (see ROYER-

Collard), found a zealous defender in M'Cosh (q.v.).

See the article Common Sense; the Life by Dugald Stewart prefixed to Reid's works (4 vols. 1803); the edition by Sir William Hamilton (1853); vol. ii. of Ferrier's *Lectures* (1866); and M'Cosh's *Scottish Philosophy*.

Reigate, a thriving market-town of Surrey, pleasantly situated at the southern base of the North Downs, 21 miles S. of London. Of the castle of the Earls of Warrenne little remains save a grassy mound, with large vaults or caverns beneath it. The church, with Transition Norman piers, but mainly Perpendicular, contains the grave of Lord Howard of Effingham, and a library (1701) with some curious MSS. and many of Evelyn's books. Other buildings are the public hall (1861) and the grammar-school (1675). Foxe the martyrologist is claimed for a resident; and Archbishop Usher died here. Till 1832 Reigate returned two members to parliament, and then one till 1867. It was incorporated as a municipal borough in 1863. Pop. (1851) 4927; (1881) 18,662; (1891) 22,646.

Reign of Terror. See Danton, Robespierre.

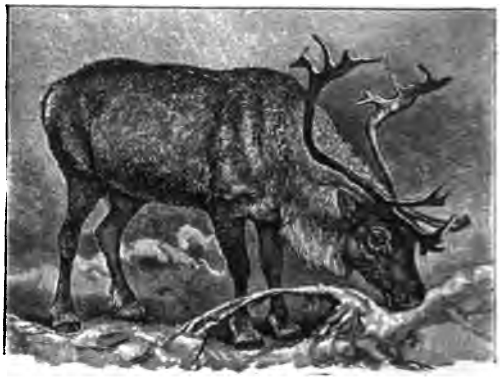
Reikiavik. See Iceland.

Reima'rus, Hermann Samuel, scholar and theologian, was born 22d December 1694, at Hamburg. He studied at Jena and Wittenberg, travelled afterwards in Holland and England, and was on his return elected rector of the school at Wismar, and subsequently professor of Hebrew and Mathematics at the gymnasium of Hamburg. He died there, 1st March 1768. He is the author of the so-called 'Wolfenbüttelsche Fragmente eines Ungenannten,' first published by Lessing in 1777. These 'Fragmente,' up to that time only known in MS. by a few of Reimarus' most intimate friends, produced the profoundest sensation throughout Germany: since in them the author, in the boldest and most trenchant manner, denied the supernatural origin of Christianity. Another work in the same direction is his *Vornehmste Wahrheiten der Natürlichen Religion;* of a miscellaneous character are his *Primitia Wismariensia, De Vita Fabricii,* and his edition of *Dio Cassius.* See the monograph by D. F. Strauss (1860; 2d ed. 1878).

Reims. See Rheims.

Rein. See Bridle, Riding and Driving.

Reindeer, or Caribou (*Rangifer tarandus*), a species of deer, the only representative of the genus. It is a native of the northern parts of Europe, Asia, and America, and was introduced into Iceland in 1770. In Caithness it existed till the middle of the 13th century (Harting's *Extinct British Animals,* 1880). It is by far the most valuable of the deer, for not only are the flesh and skin of much use, but the animal has long been domesticated in Scandinavia, especially among the Laplanders. The wild reindeer of Lapland is almost equal in size to the stag, but there are great differences of size in different districts, the largest size being generally attained in the polar regions. The domesticated animal is never so large as the wild one; but that of Siberia is, like the wild one, much larger than that of Lapland. The reindeer is strong, somewhat heavily built, but yet very swift. The hair is longer in winter, and is gray or brownish in colour. The legs are short and thick, and the broad main hoofs spread out as the animal speeds over the snow. Besides the main hoofs, there are two accessory lateral hoofs. The head is carried horizontally, not erect as in other deer. The muffle of the nose is hairy. The antlers are large and are unique in being possessed by both sexes. Moreover, they begin to appear at an early stage in life, within a few weeks after birth, and at the same time in both sexes, whereas in the other deer, in which only the males have antlers, they do not appear before nine months or more after birth. In the female the antlers are somewhat smaller, thinner, and less branched than in the male, and are retained through the winter until the breeding season in spring, after which they are cast. 'The male, on the other hand,' Darwin notes, 'casts his horns much earlier, towards the end of November.' There is great variability in the antlers; 'there is a "bez tine" as well as a "brow tine," which are peculiar in being either branched or palmate.' In summer the Lapland reindeer feeds chiefly on the shoots of willow and birch, while in winter it depends mainly on lichens such as the so-called reindeer moss. It seems that they use both their antlers and their hoofs in removing the snow which hides their food. The animals run swiftly, but not gracefully, taking long sliding strides, and their hoofs snap together as they run. In their natural life the reindeer are gregarious. They migrate from the mountains to the lowlands in winter, and return again in spring, a change in part dependent on the food-supply. Moreover, by leaving the lowlands in spring they free themselves from the gnats and gad-flies, which trouble them very seriously. It is said that the Lapps have to move their herds near the coast in the summer if the health of their stock is to be preserved, and sometimes an immense herd will rush in a headlong race to the sea.



Reindeer (*Rangifer tarandus*).

In North America and elsewhere the reindeer is hunted for the sake of its flesh, fat, and hide. They are shot or trapped in snow pits. The flesh and fat are used in a fresh state or made into pemmican. The skin is used in many ways—for clothing, bedding, and the like. To the Laplanders 'the reindeer serves as a substitute for horse, cow, sheep, and goat,' but its domestication is not very complete. It constitutes the chief part of the Lapp's wealth, and some possess tame herds of two thousand or more, which feed chiefly in the mountainous regions in summer and in the lower grounds in winter. The animal can maintain a speed of nine or ten miles an hour for a long time, and can easily draw a weight of two hundred pounds besides the sledge. Almost every part of the dead animal is used in some way. The reindeer also yields excellent milk.

Reindeer Moss (*Cenomyce rangiferina* or *Cladonia rangiferina*), a lichen of great importance to the Laplanders and other inhabitants of the northernmost regions of Europe and Asia, as forming the chief winter food of the reindeer. It is found in almost all parts of the world, but is most abundant and luxuriant in the Arctic regions.

It is common in Britain, growing in moors and on mountains. It covers extensive tracts in Lapland and other very northern countries, making them even in summer as white as snow, and often thus occupies the ground in pine forests. When pine forests are destroyed by fire it soon springs up in its greatest luxuriance. It is a very variable plant, but always consists of a much-branched erect cylindrical tubular thallus, with small perforations in the axils. It attains a height of two inches and upwards. The branches of plants which grow together usually mix very intricately into one mass. The importance of this lichen was first brought into notice by Linnæus in a beautiful passage of his *Flora Lapponica.* The reindeer reach it by scraping, even when it is covered with very deep snow. It is capable of being used for human food, and was recommended for this purpose in times of dearth by an edict of Gustavus III. of Sweden. Its taste is pleasant, although attended with a slight pungency or acridity. It is generally boiled in reindeer milk. Its nutritious qualities depend chiefly on the Lichenin (q.v.) which it contains.

Reineke Fuchs. See REYNARD THE FOX.

Relapsing Fever (also known as *famine-fever* and *seven-day fever*) is one of the three great species of continued fever, the two others being typhus and typhoid. It was first definitely discriminated from these diseases by Dr Henderson of Edinburgh and other Scottish physicians about 1842, but it can be traced back with certainty in the records of disease a century farther, when it was prevalent in Ireland and Scotland. During the 19th century it has been met with in those countries, in England, in central and eastern Europe, the countries surrounding the Levant, North Africa, India, China, and, though never extensively, in North America. Relapsing fever usually begins suddenly with rigors, a sense of chilliness, and frontal headache. Febrile reaction soon sets in, with a temperature of 104° or more, and pulse usually over 100 per minute; the tongue is coated with a thick moist whitish fur; and the skin is often jaundiced (a phenomenon that never occurs in typhus or typhoid fever). There is severe aching pain in the joints and muscles, and great sleeplessness; but delirium, if present at all, usually comes on only towards the end of the first week. After the above-described symptoms have lasted for a period varying from five to eight days, generally on the seventh day, a sudden change takes place. This *crisis* commences with a copious perspiration, which is followed by a rapid falling of the pulse and temperature to or below the normal, and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence a sudden relapse occurs, and all the primary symptoms return; these often run a rather shorter course than before, and again terminate in sweating and in a second convalescence, which is in most cases permanent. The relapse sometimes, however, occurs three or even four times. Death is a rare termination of relapsing fever; and when it does occur, it is usually before the seventh day of the disease. No important anatomical lesion is constantly observed in the bodies of those who succumb to this disease, except enlargement of the spleen. One form of the disease, however, is much more severe, and very often fatal. It was originally described as a distinct disease under the name of *bilious typhoid,* and is characterised by more marked implication of the digestive organs, by the constant presence of jaundice, and by absence or incomplete development of the crisis and intermission. It has now been shown to be really identical with relapsing fever proper. Relapsing fever is generally met with among those living under unfavourable hygienic conditions; it is specially apt to attack a population suffering from insufficient nourishment (hence the name famine-fever), and is seldom met with among the upper classes, or among Europeans residing in the tropics, unless they are brought closely in contact with the sick. At the same time it is very infectious, spreading either directly from the patient to doctors, nurses, &c., or from clothes and bedding to washerwomen, who have suffered severely in some epidemics. It was shown by Obermeier of Berlin in 1873 that an organism (Spirillum, q.v.) is constantly present in the blood of those suffering from the disease, and his results have been confirmed by numerous other observers. Moreover, a similar disease has been produced in monkeys by inoculation with the organism, which has also been found in their bodies after death. There can be no doubt, therefore, that this spirillum is the cause of the disease (see GERM THEORY OF DISEASE). Though relapsing fever has been abundantly proved to be distinct from typhus, they are often associated in a curious way; epidemics of the two diseases have frequently been observed to occur in the same place either simultaneously or successively.

Treatment.—The patient, as in other febrile diseases, must be kept in bed; an emetic at the commencement of the attack is often useful, and aperients may be required; a light but liberal diet should be given. Opiates are frequently necessary to relieve the pain and sleeplessness. No means have yet been discovered for cutting short the disease or preventing relapses.

Relations, MAINTENANCE OF. According to English law, a husband is bound to maintain his wife; if he refuses or neglects to do so, or makes it impossible for her to live with him, she has an 'authority of necessity' to pledge his credit for the necessaries of life. Under the statutes relating to the poor a husband may be punished for deserting his wife, and compelled to provide for her maintenance; the husband of a lunatic wife may be compelled to contribute to her maintenance in an asylum. Under the Married Women's Property Act, 1882, a woman who has property may be compelled to contribute to the maintenance of her husband. At the common law a parent is not legally bound to maintain a child; but he may be indicted for not supplying an infant child with necessaries. In like manner a child is not bound at common law to maintain his parents. But the poor-law of 1603 imposes a direct liability on the father, grandfather, mother, grandmother, or children of any person not able to work; and by a subsequent act a man who marries a woman having children (legitimate or illegitimate) must maintain such children. Bastard children are to be maintained by the mother; but the father may be summoned before justices and ordered to pay a weekly sum to the mother, or to a person appointed by the justices. A grandchild is not liable to maintain a grandparent, nor can a man be required to maintain persons related to him only by affinity (as e.g. a son's wife), or a collateral relation (as e.g. a brother or nephew). In Scotland the father, and failing him the mother, is bound to maintain children until they are old enough to earn a livelihood; a father refusing to provide for his child is punishable by fine or imprisonment. Parents have a claim on their children, and a husband is bound to maintain the indigent parents of his wife during the subsistence of the marriage. The father of an illegitimate child is bound to support it, and if the child is unable to earn a livelihood the obligation may last throughout its life. A husband is, of course, bound to support his wife; if he refuses to do so she may sue for aliment, and he is liable to her creditors for alimentary debts. In the United States the laws of the states vary; but the duty to support wife, children, and parents is generally recognised, and it is usually made a penal offence to abandon wife or children.

Relative Keys. See SCALE.

Relative Rank. See RANK.

Relativity of Knowledge. The doctrine of the relativity of knowledge is almost a commonplace in some philosophical schools, and is as strenuously denied by others. It is connected primarily with the contrast between the absolute and the relative, or the noumenon and phenomenon, and is one phase of the great discussion as to the relation of knowledge to reality. In its modern form the doctrine has obtained currency chiefly through the speculations of Kant, Hamilton, and Mr Herbert Spencer. Knowledge evidently implies a knower and a relation between the knower and the object known. Hence it is argued that the object is conditioned by the relation into which it is brought; merely by becoming an object the thing as it is in itself undergoes a change or accommodation. Our knowledge therefore can never yield us the reality of things—the noumenon or thing-in-itself—but only the phenomenon, the thing as it appears to us. Or, as it is otherwise expressed, in being known the object must conform to the nature of the knowing faculty, the mental constitution or organisation of the knower; we cannot, therefore, conclude, says Hamilton, that the properties of existence are known 'in their native purity and without addition or modification from our organs of sense, or our capacities of intelligence.' Hamilton's general conclusion is: 'Of things absolutely or in themselves, be they external or be they internal, we know nothing, or know them only as incognisable; and we become aware of their incomprehensible existence only as this is indirectly or accidentally revealed to us, through certain qualities related to our faculties of knowledge. All that we know is therefore phenomenal, phenomenal of the unknown.' This is adopted by Mr Spencer, and made the basis of his theory of knowledge, or rather of what Ferrier would have called his agnoiology, his doctrine of our necessary ignorance: 'The reality existing behind all appearances is, and must ever be, unknown.' In Kant a similar doctrine is associated with the asserted subjectivity of the forms of space and time; but it is also based upon the broader consideration that perception can give us 'only the relation of an object to the subject, not the inward essence which belongs to the object in itself.' The empirical schools, which resolve our knowledge into impressions of sense manipulated according to the laws of association, likewise accept in its widest sense, as J. S. Mill points out, the doctrine of 'the entire inaccessibility to our faculties of any other knowledge of things than that of the impressions which they produce in our mental consciousness.' But, inasmuch as they in many cases profess a sceptical idealism which denies, or leaves doubtful, the existence of any reality beyond the states of consciousness, their views are less usually associated with the term.

The starting-point of the above argument must be conceded by all. Knowledge obviously implies relation; it exists only through the duality of knower and known, this duality being as necessarily present in the case of what is called self-knowledge as in the case of knowledge by self of independent objects. But the upholders of the doctrine of relativity proceed to convert this essential feature of intelligence into a proof of the 'impotence' of our faculties. For the term is used in such a way as to imply a taint or defect in our knowledge. Our knowledge is condemned because it fails to realise a certain ideal. The question arises, however, whether the ideal proposed is in any sense legitimate or possible. What is this 'reality existing behind all appearances,' this thing in itself that so persistently evades our grasp? The answer of a sound philosophy would seem to be that this unknown essence or noumenal reality is a fictitious entity of our own creation. The essence or nature of a thing is expressed in its qualities or action; the noumenon reveals itself in the phenomenon. The relativists are in the habit of saying that 'we know only phenomena,' thus making our knowledge of phenomena the ground of our ignorance of the corresponding noumena. But, strictly speaking, it is a misuse of language to say that we know phenomena; the phenomenon is our knowledge of the noumenon. To say that we know phenomena is therefore only a roundabout way of saying that we know, and what we know is the noumenon or thing-in-itself. Of course the contrast between knowing and being is not abolished according to this view; in human knowledge, at all events, the existence of objects is independent of our knowledge of them. It is this contrast between the thing as existent and the thing as known that lends plausibility to the doctrine of relativity. But the contrast only justifies us in saying that knowing a thing is not the same as being that thing; whereas the relativistic doctrine says that, *ipso facto*, to know a thing is not to know the reality of the thing. Knowledge, in this view, infallibly cuts us off from knowing.

Apart from this general line of thought, the doctrine is frequently based upon the large extent to which sensation enters into all our knowledge. In the structure of their sense-organs different living creatures differ appreciably, and there will be a corresponding difference in the image of the world which they make to themselves. The knowledge of every being, it is argued, is thus inevitably conditioned by its organisation, and there is no possibility of arriving at an objective criterion. Man, in the Protagorean formula, is the measure of all things; but he measures them only as they seem to him. Such a formula may be interpreted either in a sensationalistic and individualistic fashion, as seems to have been done by Protagoras, or in a rationalistic and humanistic fashion, as is seen in Kant. The former interpretation leads to a sceptical dissolution of knowledge, for it leaves no common ground on which individuals might meet. Kant, by making space and time, if not the categories also, forms peculiar to the human intelligence, but common to all men, provides for objective truth between man and man, but insists on the merely human and relative character of such truth. Apart from the assertion of the merely subjective character of space and time, which Kant can hardly be said to have proved, it is evident that the relativist argument applies with most force to what are called the secondary qualities, such as tastes, smells, sounds, and colours. But when we consider the elevated pleasures of which the last two, at all events, are the source, we may well hesitate about pressing the relativistic argument too far. Things do not exist on their own account as bald brute facts, on which intelligence afterwards supervenes, to make what use of them it can. It seems truer to believe that to be known and enjoyed by spiritual beings is the purpose of their existence. The relativity of the world to the human senses and intellect would then form no ground for believing that the image of the world thus obtained was in any sense distorted or untrue. We may rise to higher insight and more perfect æsthetic appreciation, but that our knowledge is finite and subject to revision does not deprive it of validity or objective truth in its own time and place. The case for the relativity of knowledge will be found strongly put in Sir W. Hamilton's *Discussions* and *Lectures on Metaphysics*, in Dean Mansel's Bampton Lectures, and in Mr Herbert Spencer's *First Principles*.

Relics (Gr. *leipsana*, Lat. *reliquiæ*, 'remains'), personal memorials of those among the dead who have been distinguished during life by eminent qualities: especially, in the history of the church, objects which derive their value from their connection with our Lord and with the saints; as, for example, fragments of our Lord's cross or crown of thorns, portions of the dust, the bones, the blood, the instruments of torture, the chains, &c. of the martyrs, the mortal remains, the clothes, the books, and other objects of personal use of the other saints. With them may be grouped objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead, as by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, &c. Reverence for relics developed with the increasing honour paid to Martyrs (q.v.).

The earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom were regarded by their fellow-Christians, and for which Catholics profess to find warrant in many passages of the Old and of the New Testament, as Ex. xiii. 19; 2 Kings, xiii. 21, and xxiii. 16–18; Matt. ix. 20–22; Acts, v. 12–16, and xix. 11, 12. The letter of the Church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's *Life of Cyprian* tells of their stealing the martyr's body, and carrying it away by night in holy triumph. The Apostolical Constitutions bear witness to the honours paid. Miracles, too, are described as connected with relics. Thus, Ambrose tells of a blind man's sight restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen, Chrysostom, and Leo the Great; so that the possession of relics of the martyrs, and even the occasional touching of them, was regarded as a special happiness. According to Theodoret, even cities were content to share with each other portions of the sacred treasure. Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the relics; and especially there is ascribed by Chrysostom, Basil, Theodoret, and other Fathers, to prayers offered before the relics, a virtue in dispelling or warding off sickness, diabolical machinations, and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that relics were invariably placed on the altars, wherever erected; insomuch that the Trullan Council ordered the demolition of all altars in which no relics had been deposited. Far more sacred than the relics of martyrs was the cross of our Lord, which was believed to have been discovered at Jerusalem by Helena (q.v.), mother of the Emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalem, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. According to Rohault de Fleury's *Memoire sur les Instruments de la Passion*, 'the total cubic volume of all the known relics of the True Cross is about 5,000,000 cubic millimetres, whereas a cross large enough for the execution of a man must have contained at least 180,000,000 or thereby.' The practice of relic-worship, and the feeling on which it was founded, were not suffered to pass without a protest. At quite an early period many abuses and superstitions had crept in, which even the Fathers who admit the worship do not fail to condemn; and Vigilantius, in a treatise now lost, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. He had so few followers, however, that were it not for the refutation by Jerome of his work against relics we should have no record of his opposition to the popular view; and it is urged by Catholics, as a proof of the universal acquiescence of the church of the 4th century in the practice of relic-worship, that it was not even found necessary to call a single council to condemn Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephraem the Syrian, of Gregory the Great, and others are full of examples of the miraculous virtue ascribed to relics, and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the Incarnation agreed with Catholics and with one another on this subject, and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the Crusades a fresh impulse was given to the worship of relics in the West by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders, by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Catholics that at this period many false, and perhaps even absurd and ridiculous relics were introduced, and were successfully commended to the veneration of individuals or individual churches in the West; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorised worship of the church. Nevertheless, with the exception of the Waldenses, Wyclif, and a few isolated individuals, the practice remained unchallenged till the 16th century, when, in common with many other doctrines and practices of the Church of Rome, it was utterly repudiated by the Reformers. Catholics, however, allege that the practice, as sanctioned by the church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Roman Catholic use of relics, as authorised by the church, is to serve as incentives to faith and piety, by recalling vividly to men's minds the lives, and, as it were, the corporeal presence and the earthly converse of the saints, and thus placing before them, in a more touching manner, the virtues which, in the examples, are held up for men's imitation. The decree of the Council of Trent connects the subject of relic-worship with the general question of saint-worship, and regards the relics of the saints not as possessing intrinsic virtue, but only as instruments 'through which God bestows benefits on men.' The Fourth Lateran Council (1215) forbade the sale or veneration of relics until their authenticity had been approved by the authorities; the Council of Trent renewed the prohibition. In the pastoral of the Bishop of Treves, inviting pilgrims to the exhibition of the Holy Coat (1891), it is expressly stated that 'the authenticity of no relic, be it the most eminent of the oldest church of Christendom, falls under any precept of Catholic faith.' Relics are usually venerated in costly cases or 'reliquaries' set on the altar; they are also carried in procession, and the faithful are blessed with them.

The Greek and other Oriental churches, and most of the Oriental sects, agree with Roman

Catholics in the practice of relic-worship. On the contrary, the Reformed churches, without exception, have rejected the usage; though non-religious relic-worship is rife enough, in the form of swords of Wallace and Bruce, locks of Prince Charlie's hair, &c. The practice of relic-worship forms a notable feature of the Mohammedan usage of pilgrimages, and is an even more important feature of Buddhism.

Relief, as distinguished from 'sculpture in the round,' is one of the oldest forms of mural decoration, and in many cases is a subordinate department of architectural art rather than a branch of sculpture proper. It is low relief (bas-relief, basso-rilievo), middle (mezzo-rilievo), and high relief (alto-rilievo) according as the carved figures project very little, in a moderate degree, or in a very considerable degree from the background. The ancient Egyptians practised a peculiar kind of low relief and intaglio combined (see EGYPT, Vol. IV. p. 237). The wall-sculptures of Assyria (q.v.) and Babylonia (q.v.) are mostly in very low relief. The Elgin Marbles (q.v.), from the Parthenon of Athens, are the most notable example of high relief. See SCULPTURE.

Relief Churches. See UNITED PRESBYTERIAN CHURCH.

Relieving Officer. See POOR-LAWS.

Religion. The term has since the 16th century become naturalised in most European languages. It has even in the Teutonic tongues taken the place of the native terms formerly in use. As to its etymology, the derivation from *relinquere* is universally recognised to be inconsistent with phonetic laws; the necessity for assuming the existence of a lost transitive verb *ligere*, 'to look,' has not been made out; and the derivation from *relegere* (Cicero, *Nat. Deor.* ii. 28), which implies *carefulness and attention* to what concerns the gods to be the primary signification of the word, is better than that from *religare* (Lactantius, *Inst. Div.* iv. 28), which refers the origin of religion to a sense of *dependence on or connection with Deity by the bond of piety*, inasmuch as the latter does not accord with the way in which the ancient Romans used the terms *religens* and *religiosus*, and supposes in them a higher conception of religion than they are likely to have possessed. The Lactantian derivation, however, has not been shown to violate any known linguistic law; and the reason which Professor Max-Müller gives (*Natural Religion*, p. 35) as 'the real objection' to it does not apply to it at all. It is *not* 'the fact that in classical Latin *religare* is never used in the sense of binding or holding back.' Binding or holding back, or behind, or fast, is its common meaning in classical Latin; it is its meaning in Cæsar, Cicero, Suetonius, Virgil, Horace, and Ovid. Its only other meaning is to *unbind*.

General terms equivalent in meaning to religion are not to be found even in such languages as Chinese, Sanskrit, Hebrew, or Arabic, and need not of course be looked for in the languages of uncultured peoples. There is no definition of religion in the Bible, nor any designation or description of it which applies to the heathen religions. The Fathers and Schoolmen attempted only to give a definition of *true* religion. The difficulty of framing a correct definition of religion is very great. Such a definition ought to apply to nothing but religion, and to differentiate religion from everything else, as, for example, from imaginative idealisation, art, morality, or philosophy. It should apply to everything which is naturally and commonly called religion; to *religion* as a subjective spiritual state, and to all *religions*, high or low, true or false, which have obtained objective historical realisation. And it should neither expressly nor by implication exclude any essential element of religion, but express in a general way all that is necessarily included in its nature, indispensable to its notion. Since the need for definitions of this kind was felt—i.e. since the comparative study of religions began to be cultivated—numerous attempts to supply it have been made, but few, if any, of the definitions of religion as yet proposed fulfil all the requirements. Those of Kant, Fichte, Schleiermacher, Hegel, Strauss, Wundt, Pfleiderer, Herbert Spencer, Matthew Arnold, Tylor, John Caird, and Max-Müller have attracted most attention.

The classification of religions also presents great difficulties. To distribute them into (1) true and false religions, or (2) natural and revealed religions, or (3) natural and positive religions, or (4) religions of savage and of civilised peoples, or (5) book-religions and religions not possessed of sacred books, or (6) individual religions (i.e. founded by great individual teachers) and national or race religions (i.e. the collective products of peoples or races, the growth of generations), must obviously be scientifically inadequate and unsatisfactory, although some of the classifications thus obtained may not be without truth or interest. Max-Müller holds that 'the only scientific and truly genetic classification of religions is the same as that of languages,' and Maurice Vernes that they must be classified according to races. And there can be no doubt that, if religions, languages, and races are properly classified, the classifications will, on the whole, correspond or coincide. Still they ought to be classified independently, from a study of their own proper natures, and a complete accordance of their classifications is not to be looked for. The fact, for instance, that there are universal religions, religions not limited by language or race, must not be ignored or depreciated. Hegel's classification is very ingenious and suggestive. He distributes religions into religions of nature, religions of spirituality, and the absolute or Christian religion, answering respectively both to the chief stages of the historical realisation of religion, and to the childhood, youth, and manhood of humanity. The religions of nature are represented as including (1) immediate religion (sorcery and fetish-worship); (2) pantheistic religion, which comprehends the religion of measure (China), the religion of phantasy (Brahminism), and the religion of being-in-itself (Buddhism); and (3) religion which tends to freedom, and which is exemplified in the religion of the good or of light (ancient Persian), the religion of sorrow (Syrian), and the religion of mystery (Egypt). The religions of spirituality are held to be these three—the religion of sublimity (Hebrew), the religion of beauty (Greek), and the religion of the understanding (Roman). The classification of Von Hartmann is of the same character, being very ingeniously conformed to the needs of his own philosophy, and yet not conspicuously inconsistent with the facts. The classifications of Lubbock, Tylor, Spencer, Reville, and D'Alviella deserve attention as being based on an extensive and close study of religions, including those vague and rude religions to which it is especially difficult to assign appropriate places in a natural and comprehensive scheme of distribution. No general agreement, however, has been as yet reached either in determining the species of these religions or the order of their succession.

Professor Tiele classifies religions as follows: I. Nature religions, which comprehend (*a*) Polydæmonistic magical religions under the control of animism; (*b*) Purified or organised magical religions—Therianthropic polytheism, (1) unorganised and (2) organised; (*c*) Worship of manlike but superhuman and semi-ethical beings—Anthropomorphic polytheism. II. Ethical religions, which are either (*a*) National nomistic (nomothetic) religious communities — Taoism, Confucianism, Brahminism, Jainism and Primitive Buddhism, Mazdaism, Mosaism, and Judaism; or (*b*) Universalistic religious communities—Islam, Buddhism, Christianity.

Religion is virtually universal, although, of course, neither the possibility nor the existence of atheism can be reasonably denied. The instances which Büchner, Lubbock, and others have adduced to prove that there are whole peoples destitute of religion will not stand the test of examination (see Flint, *Antitheistic Theories*, Lecture vii. and Notes xxv.-xxxi., and Roskoff, *Religionswesen der rohesten Naturvölker*). Not one adequately attested case of the kind has yet been produced; and even if such a case were established it would go only a very little way towards proving that man is not naturally and normally a religious being.

The starting-point of religious development has been variously represented as fetichism (De Brosses, Comte, Tylor), belief in ghosts (Spencer, Caspari, Le Bon), polytheism (Hume, Voltaire, Dupuis), pantheism (Tholuck, Ulrici, Caird), henotheism (Schelling, Max-Müller, Von Hartmann), and monotheism (Creuzer, Professor Rawlinson, Canon Cook). All these representations are conjectural. The present state of our knowledge does not enable us to decide what the primitive religion was. Historical research does not take us back to it. Nor does it show us what stages of religion intervened between it and the earliest known historical religions. The ways in which the ruder phases of religion are represented by anthropologists and comparative theologians as having succeeded one another are merely more or less suggestive hypotheses, founded on data both insufficient and ambiguous. All serial arrangements of the kind ought to be regarded as of a merely logical, non-historical character, although they may, perhaps, aid in leading to a discovery of the historical order of development. Hence the best mode of arranging the ruder religions may be that which begins with the logically simplest phase of religion, and assigns the others a place in the order of their logical dependence and complexity. Adopting this principle, Naturism, the worship of natural objects regarded as powers or agents will come first, implying as it does no original or special faculty or tendency, and being the direct and natural interpretation of physical facts. It may have many forms corresponding to the differences of the natural objects, and these forms may imply very different degrees of intellectual capability and very different qualities of disposition in the worshippers, although they have certainly not been shown to be successive stages of religious development. Nature-worship affords a basis for all other forms of religion and worship, and in most of them its presence as a constituent is obvious. It is difficult, if not impossible, to conceive how men could have risen to any higher stage of religion except by means of it; or how they could have failed to enter it unless raised above it by a special revelation. And the notion of a special revelation to men who had not by natural means acquired any belief in or thought of deity is scarcely conceivable. Animism comes next as a natural result of the growth of the idea of soul. It is often indistinguishable or difficult to distinguish from nature-worship, which is, as it were, *implicit* animism, while animism is *explicit* nature-worship. When man has drawn a distinction between body and life or soul, it is natural that he should work it out in regard to himself, and then judge of other things by himself; and the phenomena of sleep and dreams, of swooning, apoplexy, ecstasy, insanity, and death, all contribute to mould his thoughts when once they have been turned in this direction. Hence a third phase of religion, Spiritism, in which the souls worshipped are human, or conformed to the human type and conceived of according to human experience, but affected and modified by physical impressions and analogies. The hypothesis of Mr Spencer that religion begins at this stage, the first deities being deceased ancestors, and the first worship funeral rites, takes no account of a vast mass of philological evidence which establishes that the names of the oldest known gods were descriptive of natural phenomena, and of historical evidence which shows that ancestor-worship has been grafted in various localities on an older nature-worship. It also rests on a very improbable assumption as to savage man's mode of viewing natural objects worshipped, and fails to explain the common features, similarities, and analogies in the various mythologies, the transformations of the *ghosts* into *gods*, the inferior position of properly ancestral gods, and especially the characteristics of nature-worship. The fourth phase of religious development is Polytheism in the special sense of the term, anthropological mythology, the worship of divine individualities, generally in origin nature-gods, but transformed by imagination operating under the belief that beings analogous to the human rule the course of things. The fifth phase is that in which polytheism is subordinated to, or reduced under, a Dualistic or Monistic conception of the divine. The conception may be mainly reached either by speculative or ethical thought. The sixth phase is represented by the Monotheistic religions—the Jewish, Christian, and Mohammedan. These religions all claim to rest on special revelation. In them only is belief in a plurality of gods entirely transcended. Philosophical monism in a religion does not cast out polytheism. Fetichism, image-worship, totemism, shamanism, and sorcery probably should be regarded not as distinct phases or natural logical stages of religious development, but as adjuncts and incidental perversions of religion which presuppose its normal or logical phases or stages. An adequate proof of this view would necessarily dislodge and destroy a number of current hypotheses.

The theories regarding the psychological origin and the essence of religion are numerous and divergent. It was common among the atheists of the 18th century to speak of religion as the invention of individuals desirous of deceiving their fellow men in order to further their own selfish and ambitious views. Feuerbach, Lange, Spencer, and others account for its appearance by imagination, illusion, or the misinterpretation of ordinary or exceptional phenomena. Some zealous supernaturalists have argued that it must have originated in a primitive revelation. It may be referred exclusively to the intellectual province of human nature. This mistake, however, is too gross to have been often committed, and is sufficiently refuted by the obvious consideration that the measure of religion is not the measure of intelligence or of knowledge. Hegel did not, as is often said, fall into the error of identifying religion with thought, but only emphasised strongly the importance of thought in religion. Peschel regards the principle of causality, and Max-Müller the perception of the infinite, as the roots of religion. And it may well be admitted that without both of these intellectual principles religion would be impossible. But are they more than merely *conditions* of its appearance? The origin of religion is, of course, referred to intellect by those who hold that God is known intuitively, perceived directly, apprehended without medium; but both psychology and history, both internal analysis and external observation, seem to disprove this hypothesis. Religion has often been resolved into feeling or sentiment. Thus Lucretius, Hobbes, and Strauss have traced it mainly to fear; the followers of Ritschl to a desire to secure life and its goods amidst the uncertainties and evils of earth; the disciples of Schleiermacher to a feeling of absolute dependence, of pure and entire passiveness; and others—e.g. Brinton and Newman Smyth—to the religious feeling regarded either as a distinct primary feeling or a peculiar compound feeling. Kant represented religion as essentially a sanction for duty, and Matthew Arnold has defined it as 'morality touched by emotion,' 'ethics heightened, enkindled, lit up by feeling.' This great diversity of views of itself indicates what investigation is found to confirm—viz., that religion is a vast and complex thing, an inexhaustible field for psychological study. Almost all the views referred to have some truth in them, and most of them are only false in so far as they assume themselves to be exclusively true. The whole nature of man has been formed for religion, and is engaged and exercised in religion. Every principle of that nature which has been singled out as the root of religion has really contributed to its rise and development. The study of religion as a process of mind, and of the factors which condition and determine its development, is the special task of the psychology of religion, a department of research to which many contributions have been made since Hume initiated it in his *Natural History of Religion* (1759) by showing the importance of the distinction between the *causes* and the *reasons* of religion.

A religion is a group or whole of religious phenomena—of religious beliefs, practices, and institutions—so closely connected with one another as to be thereby differentiated from those of any other religion. Each religion has had a history, and its rise and spread, formation and transformations, as a religion can only be truly traced by being historically traced. Also religions are historically connected, are related to one another, and have influenced one another, in ways which may be discovered, and can only be discovered, by historical research. Hence the History of Religions is also the history of religion, not an aggregation of the histories of particular religions, but a truly general history. Like the histories of art, industry, science, and society in general, it is found on examination to have been a process of development in which each stage of religion has proceeded gradually from antecedent factors and conditions. The precise nature of the development can only be ascertained by investigation of the history itself. No hypothesis of development should be assumed as a presupposition of such investigation. Naturalistic apriorism is as illegitimate in historical inquiry as theological or metaphysical apriorism. The history of religion is not only of great importance in itself, but indispensable to the right understanding of general history, of the history of art, of philosophy, &c. It has been studied with more zeal and success during the 19th century than in all the preceding ages. The history of religious beliefs is, of course, only a part of the history of religions. It is, however, distinguishable, although inseparable, from it, and is often and conveniently designated Comparative Theology. It comprehends comparative mythology and the history of doctrines, myths being beliefs which are mainly the products of imagination and doctrines of reflection.

The Psychology of Religion, the History of Religions, and Comparative Theology are clearly distinct, and ought not to be confounded. At the same time they are closely connected. They agree in that they are alike occupied with religion as an empirical fact. Hence they may be regarded as parts of a comprehensive science, to which it might be well to confine the designation 'Science of Religions,' instead of using it in the vague and ambiguous way which is so common. Thus understood, the Science of Religions may be said to deal with religion as a phenomenon of experience, whether outwardly manifested in history or inwardly realised in consciousness; to seek to describe and explain religious experience so far as it can be described and explained without transcending the religious experience itself. Its students have only to ascertain, analyse, explain, and exhibit experienced fact. Were religion a physical fact, to study it merely as a fact would be enough. The astronomer, the naturalist, the chemist have no need to judge their facts; they have only to describe them, analyse them, and determine their relations. But it is otherwise with the students of religion, of morality, of art, of reasoning. They soon come to a point where they must become judges of the phenomena and pronounce on their truth and worth. Experience in the physical sphere is experience and nothing more; experience in the spiritual sphere is very often experience of what is irreverent and impious, immoral and vicious, ugly and erroneous, foolish or insane. Has the mind simply to describe and analyse, accept, and be content with such experience? Even the logician and the æsthetician will answer in the negative, will claim to judge their facts as conforming to or contravening the laws of truth and the ideals of art. Still more decidedly must the moralist and the student of religion so answer. Religion, then, is not completely studied when it is only studied historically. Hence it must be dealt with by other sciences or disciplines than those which are merely historical. What these are, and how they are related to religion, the writer has elsewhere endeavoured to show.

All the particular theological sciences or disciplines treat of particular aspects of religion or of religion in particular ways. Their relationships to one another can only be determined by their relationship to it. They can only be unified and coordinated in a truly organic manner by their due reference to it. When religion is studied not merely in particular aspects and ways, but in its unity and entirety, with a view to its comprehension in its essence and all essential relations, it is the object of the Philosophy of Religion. Although a distinct and essential department of philosophy, and the highest and most comprehensive theological science, the philosophy of religion could only appear in an independent and appropriate form when both philosophy and theology were highly developed. It is, therefore, of comparatively recent origin, and indeed has been chiefly cultivated in Germany during the 19th century.

The *Hibbert Lectures* of Max-Müller, Renouf, Kuenen, Rhys Davids, Sayce, and Rhys; Max-Müller's *Natural Religion* and *Physical Religion*; Tiele's *Outlines of the History of Religion*, and art. 'Religions' in *Ency. Brit.*; De La Saussaye's *Lehrbuch der Religionsgeschichte*; A. Lang's *Myth, Ritual, and Religion*; Reville's *Religions des Peuples non-civilisées*, &c., treat of the history of religion. Alliott's *Psychology and Theology*, Newman Smyth's *Religious Feeling*, Brinton's *Religious Sentiment*, D. Greenleaf Thompson's *Religious Sentiments of the Human Mind*, Happel's *Anlage des Menschen zur Religion*, and Ulrici's *Gott und Mensch* deal with the psychology of religion. There are two valuable works on the history of the philosophy of religion—Pfleiderer's (trans. by Stewart and Menzies) and Pünjer's (trans. in part by Hastie); also treatises on *Religionsphilosophie* by Hegel, Krause, Ohlert, Taute, Apelt, Stöckl, Hartmann, Teichmüller, and Rauwenhoff. Of works in English, see Morell's *Philosophy of Religion*, Caird's *Introduction to the Philosophy of Religion*, Morris' *Philosophy and Christianity*, and Lotze's *Outlines of the Philosophy of Religion*. There are, besides the relevant paragraphs on religion in the articles on Assyria, Babylonia, Egypt, Etruria, Greece, India, Japan, Rome, &c., separate articles on the various religions of the world, sects Christian and other, and religious doctrines throughout this work, including those on

Agnosticism.
Ancestor-worship.
Animal-worship.
Animism.
Anthropomorphism.
Apologetics.
Auguries.
Buddhism.
Confucius.
Copts.
Divination.
Fetichism.
Fire.
Idolatry.
Inspiration.
Magic.
Materialism.
Mohammedanism.
Mormons.
Mythology.
Pantheism.
Parsees.
Plant-lore.
Positivism.
Rationalism.
Sacrifice.
Secularism.
Serpent-worship.
Spiritualism.
Theism.
Theology.
Theosophy.
Transmigration.
Witchcraft.
Zend-Avesta.
Zoroaster.

Remainder is a term much used in the law of England. Thus, if the owner of the fee-simple, or freehold of lands, give them by will or deed to A for life, and after his decease to B and his heirs, the interest of B is called the remainder, because, after deducting A's life estate, all that remains belongs to B. A remainder is distinguished from a reversion in this, that in the latter case the land returns or reverts to the owner himself. Remainders are used in settlements for the purpose of fixing the succession and tying up the property, so far as the law will permit. See PERPETUITY.

Remak, ROBERT (1815–65), physician and physiologist, became a professor in Berlin, and distinguished himself by microscopic work in pathology and embryology, and by the medical application of electric currents. He wrote works on the development of the vertebrates and on the medical uses of electricity.

Rembang, a town on the north coast of Java, capital of a residency that has an area of 2896 sq. m. and a pop. of 1,176,580. Pop. 10,000.

Remembrancer, KING'S or QUEEN'S, an officer of the old Exchequer of England, whose duty it was to remind the judges of that court at the proper times that such and such things had to be attended to, and also to keep certain records and make out processes. Since the constitution of the Supreme Court (q.v.) the queen's remembrancer has been at the head of a department of the central office of that court. The Scottish exchequer is still presided over by the queen's and lord treasurer's remembrancer.

Rembrandt. The name 'Rembrandt' was a baptismal name only, which occurs in various forms. Rembrandt's initials were R.H.—i.e. Rembrandt Harmenszoon, or son of Harmen, and his father's full name was Harmen Gerritszoon van Rijn, or Harmen the son of Gerrit, living on Rhine-side. The local indication, van Rijn, is used in deeds after 1600 A.D. Rembrandt is now often called Van Rijn, but never Harmenszoon. At the time of the artist's birth his family was of the lower middle class, and in prosperous circumstances, living at Leyden, and holding property there. From the register of marriages and from a date on an etching, Vosmaer accepts July 15, 1607, as the true birth date. Rembrandt's father was a miller, and his mother, Neeltjen van Suydtbrouck, a baker's daughter. They had seven or eight children, of whom two died young, Rembrandt being the youngest but one. All the boys were brought up to trade except Rembrandt, whose father wished to give him a classical education; but he had no taste for Latin, so he went to learn painting in the studio of Van Swanenburch, probably in his twelfth or thirteenth year. Orlers says that he worked with Van Swanenburch three years. This master came of a good family, and had visited Italy. Rembrandt's next master was Pieter Lastman, but he stayed with Lastman only six months. He probably returned to his father's house about 1623, and stayed there till 1630. Already he had begun to paint old age; there are several pictures of that date representing old people, as well as careful studies. He began his career as an etcher very early, and etched beggars and picturesque heads, including his own, also a first biblical subject, 'Jesus presented in the Temple.' There are no less than thirty etchings for the year 1630, when the artist was only twenty-three. In the same year he migrated from Leyden to Amsterdam, then a picturesque city of 100,000 inhabitants, and there he set up a studio and took pupils. Already one of the most industrious and productive artists that ever lived, Rembrandt found time to paint several biblical subjects, besides a number of portraits, and to etch forty plates in the year 1631, whilst his progress in art was so rapid that he painted one of his most important masterpieces, 'The Anatomical Lesson,' in 1632, at the early age of twenty-five. He married Saskia van Ulenburgh in June 1634. She was of a good family, twenty-one years old, and the youngest of nine children. The pair settled in a large house in the Breedstraat in Amsterdam. There is good evidence that the marriage was happy, and we know Saskia by the portraits her husband made of her. After marriage he continued to be very industrious, even the year of marriage having a harvest of several religious pictures and many portraits, as well as fifteen etchings. The artist was also in the habit of producing many sketches and drawings. Vosmaer observes that these are either studies from nature or notes taken rapidly, or else embryos of ideas caught as they formed themselves, with a rude pen and a wash, or a few strokes of black stone.

Rembrandt had a daughter, Cornelia, born in July 1638, but she died the month following. A second Cornelia was born in 1640, who also died young, and a son, Titus, in 1641. His father died about 1632, and his mother about 1640, after having been frequently portrayed by her son both in painting and etching. Saskia died prematurely in 1642, after only eight years of marriage. Between the death of his mother and that of his wife, Rembrandt's activity developed itself in three branches, portrait, small biblical or genre pictures, and large canvases with figures the size of life. The year of Saskia's death is also that of the famous picture known as the 'Night Watch.' An important branch of Rembrandt's artistic production from 1643 to 1650 was landscape, which he continued to practise more or less till 1659, both in etching and painting. After the death of Saskia the domestic life of the artist becomes obscure. In 1654 his servant Hendrickie Jaghers had a child by him baptised as Cornelia, and after his death one Catherina van Wijck is mentioned in the register as his widow, but it is unknown whether she was a second or a third wife, and at what date her marriage took place. It is not precisely known what were the causes of Rembrandt's bankruptcy in 1656. He was an ardent collector, willing to give high prices, and as his family fell into embarrassed circumstances, it is likely that he helped them. His art, too, became unfashionable; but he did not relax his diligence. His collection fetched only 5000 florins at the sale. Vosmaer believes, however, that he had found evidence of a return to partial prosperity, and that Rembrandt was able at least to rent a commodious and handsome house near the Rozengracht. After continuing to work with constant energy and undiminished power, he died October 8, 1669, following his son Titus, who died a year earlier. Titus left a posthumous daughter, Titia, and Rembrandt was present at the baptism. He was spared the pain of losing this grandchild, whose death occurred thirteen days after his own. Rembrandt left two children, names unknown.

The genius of Rembrandt has been the subject of much controversy, but his fame has increased, notwithstanding unintelligent censure and praise often equally unintelligent. Rembrandt was not blind to the merits of Italian art, as we know by his collection, but his own practice was founded on the direct study of the nature he saw around him both in human life and landscape. It is a mistake, however, to suppose that he copied nature slavishly, that he was a sort of photographer. Far from that, he was so imaginative that he transmuted everything. He had an equal power of expressing mass and rendering detail both in painting and etching. His technical force in both arts has only been rivalled in other styles, and it has never been surpassed. The common admiration for his chiaro-oscuro is, however, misplaced. The chiaro-oscuro of Rembrandt is often false and inconsistent, and, in fact, he relied largely on public ignorance. But though arbitrary it is always conducive to his purpose. In etching the effect of it was often heightened by an intentionally unequal distribution of finish. No artist ever combined more delicate skill with more energy and power. His treatment of mankind is full of human sympathy for all ages and conditions, but his especial study was old age. In his interpretation of the Scriptures he did not seek to give dignity by a factitious magnificence, or by elevating personages above their social rank, but by inspiring respect for them, and interest in them, as they were. At the same time his artist-faculty of idealisation acted in its own way by giving sublimity. Of the great artists Rembrandt is not the most perfect, but he is the most interesting, and his work is full of variety, both in subject and in technical methods. He was a great draughtsman, in his own way, and often a fine colourist as well as a great executive virtuoso both in painting and etching.

Rembrandt had much personal influence as a teacher, and many of his pupils became known. His life seems to have been absorbed in work, and he avoided fashionable society, keeping to the two classes of burghers and artists to which he belonged.

See the Life by Vosmaer (Paris, 1877); also the study by Emile Michel (Eng. trans. edited by Wedmore, 1893). The first catalogue of the etchings of Rembrandt is the incomplete one by Gersaint, published after his death in 1751. Peter Yver of Amsterdam supplemented this, and Daulby of Liverpool published a translation in 1796. Adam Bartsch followed at Vienna in 1797. De Claussin published in 1824 an edition of preceding catalogues. Wilson (Lond. 1836) issued a new catalogue with original observations. That by Charles Blanc, in two vols. (Paris, n.d.), includes both pictures and etchings, that by Mr Middleton (Lond. 1878) gives the etchings only, and a catalogue privately printed for the Burlington Club in 1877 gave the etchings in chronological order. Vosmaer gave catalogues at the end of his biography, both chronological and classified. Mr F. S. Haden's monograph on the etchings (Lond. 1879) proves that some of the plates attributed to Rembrandt were executed by other hands, probably by pupils. The best existing catalogues of Rembrandt's works give about 500 pictures, 600 drawings and studies, and 353 etchings. The bent of his mind may be judged of by the choice of subject. Out of the general total of about 1450 works 136 are from the Old Testament, 255 from the New, 22 from classical mythology, and only 12 from history. There are about 440 portraits and 100 landscapes, besides some sketches of animals and many studies not classed. With the single exception of the Bible, Rembrandt got little from books, and his house, so rich in works of graphic art, contained barely twenty volumes.

Remijia, a genus of Cinchonaceæ (see CINCHONA), valuable as a source of Quinine (q.v.). There are no less than thirteen species found in Brazil. The name comes from that of the Brazilian physician Remijo.

Remington, PHILO, inventor, was born at Litchfield in New York on 31st October 1816. He entered the small-arms factory of his father, and for twenty-five years superintended the mechanical department. The perfecting of the Remington breech-loading rifles and of the Remington type-writer was largely due to his inventive skill. In 1886 he withdrew into private life.

Remiremont, a town of France (dept. Vosges), stands on the Moselle, 17 miles by rail SE. of Épinal. The remains of an abbey, founded in 620, are the finest building in the town. The abbess was a princess of the empire down to 1566; the nunnery was suppressed at the Revolution. Muslin, cotton, leather factories, and sawmills exist here. Pop. 8447.

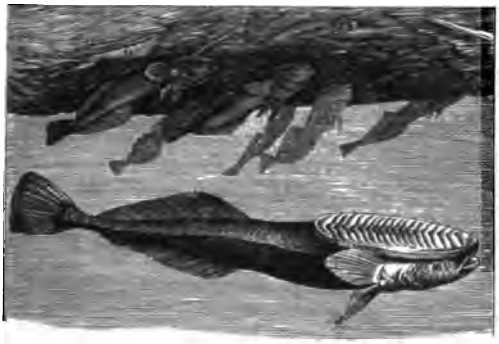
Remittent Fever is one of the varieties of fever arising from malaria or marsh-poison—one being Intermittent Fever, or Ague (q.v.). In its milder forms it scarcely differs from severe intermittent fever; while in its more serious form it may approximate closely to yellow fever. As the nature of the poison on which it depends is sufficiently noticed in the article MALARIA, we shall at once proceed to describe the most characteristic symptoms. The attack may be either sudden or preceded by languor, chilliness, and a general feeling of *malaise*. Then comes a cold stage, usually of short duration. This is followed by a hot stage, in which the symptoms are commonly far more intense than those exhibited in the worst forms of ague. Giddiness proceeding to delirium is not uncommon, and is a bad symptom; while in other cases drowsiness or lethargy is one of the most marked symptoms. There is often great tenderness or pain in the region of the stomach, and vomiting—the vomited matter frequently containing bile or blood. A remission of these symptoms occurs, in mild cases, in six or seven hours; but in severe cases the paroxysm may continue for twenty-four hours or longer. The remission is sometimes, but not always, accompanied with sweating. The duration of the remission is as varied as that of the paroxysm, varying from two or three to thirty hours, or even longer. The fever then returns with increased severity, and without any cold stage; and then the paroxysms and remissions proceed, most commonly according to no recognisable law, till the case terminates either fatally or in convalescence. In favourable cases convalescence is usually established in about a week. The severer forms of this fever are often accompanied with more or less jaundice, and hence the disease has received the name of bilious remittent fever. It is also known as jungle-fever, lake-fever (from its prevalence on the border of the great American lakes); and the African, Bengal, Levant, Walcheren, and other similar local fevers are merely synonyms of this disease. In England the disease is very rare; and when it occurs it is usually mild. The disease is most severe in southern Asia, western Africa, Central America, and the West India Islands.

The first object of treatment is to reduce the circulation during the hot stage. This is done by a dose of five grains each of calomel and James's powder, and, after an interval of three or four hours, by a sharp cathartic—as, for instance, the ordinary black draught. On the morning of the following day the remission will probably be more complete, when quinine should be freely and repeatedly administered. A mixture of antimonial wine with acetate of potash should also be given every two or three hours, so as to increase the action of the skin and kidneys. The patient must be carefully watched during the period of convalescence. A timely removal from all malarious influence, by a change of climate or a sea-voyage, is of the highest importance.

Remonstrance, THE, a detailed statement of all the king's illegal and oppressive acts, and a vindication of the rights of parliament, laid before the House of Commons by Pym, and carried by 159 votes to 148, after a stormy debate lasting from noon till after midnight, November 22 and 23, 1641. On the question as to its being printed the debate began anew with such extraordinary exasperation that an actual conflict on the floor of the House was saved only by the calmness and tact of Hampden. On a division a majority of 23 left the publication free and restrained the printing only until further order. The adoption of the Remonstrance was felt on both sides to be a crisis in the struggle between Charles I. and the parliament. It kindled afresh the enthusiasm of the country, and hurried the king into more violent and fatal measures. 'The turning-point of freedom or despotism,' says Forster, 'for two more centuries in England was probably passed that night.'

Remonstrants. See ARMINIUS (JACOBUS).

Rem'ora, or SUCKING-FISH (*Echeneis*), a genus of fishes sometimes classed not far from mackerels among the Acanthopterous Teleosteans, or referred to a special sub-order Discocephali. The great peculiarity is the suctorial disc on the dorsal surface of the head. It is formed from a modification of the first dorsal fin, whose spines have become cleft. The sucking-fishes fix themselves very firmly to sharks, sword-fish, turtles, and even to ships. So firmly do they adhere that they are sometimes used in fishing. A line is fixed to the tail; the fish is set free; it discovers a turtle or fish and fastens itself. The fishermen dive after the line if the remora has fastened on to a turtle, or may in other cases simply haul it up. Columbus, or one of his companions, described how the 'Guaican' shoots 'like an Arrow out of a Bowe towards the other fish, and then, gathering the bag on his head like a purse-net, hold them so fast that he lets not loose till hal'd up out of the water.' More precise details have been furnished by other travellers. Several species of Echeneis or remora are known from Zanzibar, Cuba, New Guinea, &c. The remora of the Mediterranean was well known to the ancients, and was credited with many feats, such as that of detaining Antony's ship from the battle of Actium. The fish is palatable, and is sometimes eaten after its day's work of fishing.



Remora (*Echeneis remora*).

Removal of Goods. See LANDLORD AND TENANT.

Remscheid, a town of Rhenish Prussia, 6 miles S. of Elberfeld-Barmen, carries on extensive manufactures of iron wares, cutlery, &c. Pop. (1871) 22,017; (1880) 30,029; (1890) 40,371.

Rémusat (JEAN PIERRE), ABEL, Chinese scholar, was born at Paris, 5th September 1788, studied medicine, and took his diploma in 1813; but as early as 1811 he had published an essay on Chinese literature. In 1813 he was compelled to serve as hospital surgeon, but in 1814 he was made professor of Chinese in the Collége de France. Of the numerous works that he wrote subsequent to this period we may mention *Recherches sur les Langues Tartares* (1820), a work in some sort preparatory to his great *Éléments de la Grammaire Chinoise* (1822). He wrote also on the origin of Chinese writing (1827), on Chinese medicine, on the topography and history of the Chinese empire, and *Mélanges* (published in 1843). Rémusat was the first to make known in Europe the life and opinions of Laou-Tsze. In 1818 Rémusat became one of the editors of the *Journal des Savants*; in 1822 he founded the Société Asiatique of Paris; and in 1824 he was appointed curator of the Oriental Department in the Bibliothèque Royale. He died of cholera at Paris, 3d June 1832, at the early age of forty-four.

Rémusat, CHARLES (FRANÇOIS MARIE), COMTE DE, a French politician and *littérateur*, born at Paris, 14th March 1797, the son of Augustin Laurent, Comte de Rémusat (1762–1823), who was successively chamberlain to Napoleon and a prefect under the Restoration. His mother (*née* Claire Elizabeth Jeanne Gravier de Vergennes) was born in 1780, married in 1796, became *dame du palais* to Josephine, and died in 1821. Young Rémusat early developed Liberal ideas, and took eagerly to journalism. He signed the journalists' famous protest against the Ordinances of Polignac which brought about the July revolution, and was in October elected deputy for Toulouse. He now allied himself with the Doctrinaire party, and in 1836 became under-secretary of state for the interior. In 1840, when the government passed into the hands of Thiers, Rémusat was made minister of the Interior, but soon resigned the office. He was exiled after the *coup d'état* of Louis Napoleon, and henceforward devoted himself to literary and philosophical studies, till, in August 1871, M. Thiers called him to hold the portfolio of Foreign Affairs, which he retained until 1873. He died June 6, 1875. Rémusat was long a well-known contributor to the *Revue des Deux Mondes*.

Among his writings are his *Essais de Philosophie* (1842); *Abélard* (1845); *L'Angleterre au XVIII*^{e} *Siècle* (1856); studies on *St Anselm* (1853), *Bacon* (1857), *Channing* (1857), *John Wesley* (1870), *Lord Herbert of Cherbury* (1874); *Histoire de la Philosophie en Angleterre de Bacon à Locke* (1875); and posthumously two philosophical dramas, *Abélard* and *La Saint Barthélemy* (1878), and *Correspondance pendant les premières années de la Restauration* (6 vols. 1883–87).

His mothor's *Mémoires* (3 vols. 1879–80) and *Lettres* (2 vols. 1881), both of which have been translated into English, proved to be of the greatest interest, and threw a flood of light on the strange society of the First Empire and the character of Napoleon.

Remy, ST (Lat. *Remigius*). See RHEIMS.

Renaissance is a comprehensive name for the great intellectual movement which marks the transition from the middle ages to the modern world; a movement including a very marked change in attitude of mind and ideal of life, as well as in philosophy, art, literary criticism, political and religious thought. Substantially a revolt against the barrenness and dogmatism of Mediævalism, the new spirit claimed the entire liberation of reason, and, passionately recognising and studying the rich humanity of Greece and Rome, aimed at a complete rehabilitation of the human spirit with all the free activities and arts and graces which invested the classical age. It was an escape —at first hesitating, then triumphant—from a life regulated and confined on all sides by ecclesiastical tradition and intellectual tyranny into joyous freedom and unfettered spontaneity. Zeal for the *Litteræ Humaniores* brought forth a new ideal of culture, and the new view of life for which the name of Humanism (q.v.) is used. Renaissance, re-birth, was originally used as synonymous with the Revival of Letters, the revived study in a new spirit of the classical languages and classical literatures of Greece and Rome in all their depth and breadth, interpreted in their own spirit, and divested of the narrow traditional limitations. Greek in especial was practically a new discovery, and a vastly important one; but the knowledge of the classics was only one side of the movement which permeated and transformed philosophy, science, art, and religion. The new spirit powerfully aided in weakening the power of the papacy, in the establishment of Protestantism and the right of free inquiry. Under its impulse astronomy was eventually reformed by Copernicus and Galileo, and science started on its modern unfettered career; by it, too, feudalism was abolished, and the demand for political liberty began to be raised. Reverence for the Holy Roman Empire and for its ancient rival the papacy was alike decaying; a new sense of nationality was springing up, and national languages began to flourish. To the same general impulse, as causes or effects, belonged also the invention of printing and multiplication of books, new methods of paper-making, the use of the mariner's compass, the discovery of America, and the exploration of the Indian Sea. The fall of the Eastern Empire in 1453 sent swarms of Greek scholars to promote the revival of scholarship already in progress in western Europe. From the nature of the case, it is impossible to fix a definite date for the beginning of the Renaissance; long before the close of the dark ages there were isolated scholars and thinkers who anticipated the new light. In its main elements, however, the movement originated in Italy towards the end of the 14th century, and, attaining its full development there in the earlier half of the 16th, the Renaissance communicated itself throughout the whole of the rest of Europe; France, Germany, England, and other countries participating later in the movement, which in each of them took a somewhat different shape. But Italy was specially the nursing-mother of the Renaissance.

For the first herald of the Renaissance we may go as far back as Dante (1265–1321), who, with all his mediævalism of conception, yet by the pristine energy and fullness of his poetry was no unworthy follower of his chosen master, Virgil. The first positive impulse, however, in that direction was imparted by Petrarch (1304–74). Besides suggesting in his Italian *Rime* the old Roman grace, he awoke enthusiasm for the classics by his Latin epic *Africa* and numerous epistles and dissertations. In his old age he tried to imbibe a little Greek at the extremely sorry sources within his reach, and on receiving Homer from Constantinople urged Boccaccio to translate the supreme poet into Latin. Boccaccio did not rest till he had piously, though very imperfectly, rendered into Latin both the *Iliad* and *Odyssey*. A secretary of Petrarch, Giovanni Malpaghino, commonly called da Ravenna, was the most accomplished Latinist of his day, and, wandering as he did all over Italy, communicated the new impulse to distinguished pupils, Barbaro, Strozzi, Poggio, Bruni, who in their turn propagated it anew from Venice, Rome, Mantua, and elsewhere. Luigi Marsigli's house became a private academy of the new doctrine, a resort of all the promising neophytes of Florence. Caluccio de Salutato, who translated Dante into Latin, having been made chancellor of Florence in 1375, introduced into public documents the stately sonorous periods of the classic style, and so rendered it imperative on all princes and popes of the next age to have trained stylists as their secretaries. A like classic transformation was effected in epistolary correspondence by Gasparino da Barzizza, who made a special study of Cicero's letters. The glory of having been the first Florentine to visit Byzantium for the sake of learning the sacred Greek belongs to Giacomo da Scaparia. To Salutato and Palla degli Strozzi is due the foundation of a Greek chair at Florence; and in 1396 Manuel Chrysoloras, a genuine Greek in the flesh, began his instructions from the Greek chair. Chrysoloras planted schools also at Rome, Padua, Milan, and Venice. In the earlier period of the Renaissance Florence leads the van. The president of the republic, Cosimo de' Medici, himself a scholar, theologian, philosopher, musician, financier, a connoisseur in painting, sculpture, and architecture, figures as the magnificent Mæcenas of the new learning, founding the Platonic academy, and opening his hospitable house to all the wits at home and all the distinguished visitors attracted thither. The son of his physician, Marsilio Ficino (q.v.), Cosimo educated for the express purpose of interpreting Plato. Strozzi, perhaps the richest after Cosimo of the merchant-princes of Florence, sent to Greece for countless volumes of MSS., and constantly kept copyists employed. Niccolo de' Niccoli spent his whole fortune in buying MSS. or procuring copies. Poggio Bracciolini, one of the most eminent of the scholars of his time, rescued Quintilian from a 'foul prison' and transcribed him, and copied with his own hand MSS. of Lucretius and Columella, while he also unearthed Italicus, Manilius, and Vitruvius. Though for fifty years chancellor in the Roman Curia, he directed the most poignant satires against the church. Vespasino da Bisticci (1421–98) was perhaps the last of the mediæval scribes, and the first of modern booksellers; he was agent of Cosimo, Nicholas V., and Frederick of Urbino, supplier of MSS. to Hungary, Portugal, Germany, and England, and the largest employer of copyists in Europe, whom, too, he personally superintended.

The second period in the history of the Renaissance is distinguished by indiscriminate avidity for everything classic. As its most representative scholar may be cited Francesco Filelpho (1398–1481). Having studied rhetoric and Latin at Padua, he learned Greek at Constantinople, became professor at Venice, Bologna, and Florence, and gained the admiration of all Italy for erudition. In the third period of the Renaissance the leading figures are Lorenzo de' Medici and Politian at Florence, Boiardo at Ferrara, and Sannazaro at Naples. President of Florence from 1469, and himself of the most versatile talent, Lorenzo de' Medici was, like his grandfather Cosimo, his son Giovanni (Leo X.), and his nephew Giulio (Clement VII.), a munificent patron of learning. By the consent of all, the most consummate of the humanists is Politian, whose *Manto*, *Ambra*, and *Nutritia* display almost as spontaneous a command of the classic languages as do his *Orfeo*, *Stanze*, and *Rime* of his native Italian. Towards the end of the 15th century mere erudition began to sink in credit, and the accomplished personages who adorn the fourth period are of a somewhat more independent type —the historians, Guicciardini and Machiavelli, the handsome Bembo, the splendid Alberti, Castiglione, the author of *Il Cortegiano*, and Ariosto, author of *Orlando Furioso*, the *Cinque Canti*, and the polished cynical *Satires*.

Some of the faults of the Renaissance clung to it in all its periods. At one time pedantry threatened to check originality and spontaneity; the worst ancient works were prized more than the best written in any new European tongue. Petrarch valued himself mainly for his Latin works, and thought lightly of his Italian poems. The tendency was established to regard the classics as the one standard of learning and the one instrument of education. A worse fault was it that the revolt against mediæval religious tradition was accompanied to a very large extent by absolute and anti-Christian immorality and license. Literary and artistic refinement placed no check on brutal lusts and savage passions; though in a few men of high character, Michelangelo, Raphael, Pico della Mirandola, Marsilio Ficino, and others, in whom Humanism did not extinguish the principles of Christianity and morals, a singularly noble and complete humanity was displayed. The culmination of the Renaissance in Italy may be regarded as having fallen within the half century 1456–1500; and its close for the land of its birth may be fixed at the sack of Rome in 1527 by the Constable de Bourbon, followed by the transference of Humanism in its later developments to France, England, and the rest of Europe.

In Germany the change was as marked as in Italy, but the Humanism of Germany and the Low Countries was very different in spirit from that of Italy. Not less tinged by a revived love for ancient learning, it was never divorced from morality nor hostile to Christianity; and its most important direct outcome was the Reformation. Biblical and Oriental studies were strenuously cultivated. Amongst the noted leaders were Erasmus, Melanchthon, Reuchlin, and Von Hutten. In the Netherlands and Flanders the new school of painting was a notable development. In France the movement had rich results in art and letters. Villon, Marot, Ronsard, but above all Rabelais are types of the French Renaissance in pure literature; while within the sphere of scholarship and religious reform we have here the names of the Scaligers, Dolet, Muretus, Cujacius, Salmasius, Casaubon, Beza, Calvin.

In England Wyclif and Chaucer may be regarded as the forerunners of the Reformation and the Renaissance; but the main streams of both these movements reached England contemporaneously. In scholarship the great names are Grocyn, Linacre, Colet, Ascham, and More; but the fullest English outcome of the Renaissance was the glorious Elizabethan literature, with Spenser and Shakespeare, and in philosophy Bacon, as its most noted representatives.

Renaissance, in Architecture, the style which succeeded the Gothic, and preceded the rigid copyism of the classic revival in the first half of the 19th century. Under the heading Italian Architecture we have traced the rise and progress of the Renaissance in the country of its birth. The spread of classical literature during the 15th and 16th centuries created a taste for classic architecture in every country in Europe. France, from her proximity and constant intercourse with Italy, was the first to introduce the new style north of the Alps. Francis I. invited Italian artists to his court during the first half of the 16th century. The most distinguished of these were Leonardo da Vinci, Benvenuto Cellini, Primaticcio, and Serlio. These artists introduced Italian details, and native architects applied them to the old forms to which they were accustomed, and which suited the purposes of their buildings, and thus originated a style similar to, though diverse from, that of Italy.

The Italian buildings, besides many palaces and domestic structures, comprised a large number of churches, St Peter's being the great model. In France (as in the other countries north of the Alps) the stock of churches was greater than was required. The grand domestic buildings of Florence and Rome were constructed for defence externally, and were founded in design on the old mediæval castles, which the nobles occupied within the cities. The domestic architecture of France is rather taken from the luxurious residences of the monks, and the pleasant open villas in the country; so that, although very graceful in outline and in detail, its buildings want the force and grandeur of the Italian palaces.

In the French Renaissance so much are the old Gothic forms and outline preserved that the buildings of Francis I. might at a short distance be mistaken for Gothic designs, although on nearer approach all the details are found to be imitated from the classic. Such are the palaces of Chambord (q.v.) and Chenonceaux (q.v.) on the Loire, Fontainebleau, and many others. The churches of this period are the same in their principles of design. Gothic forms and construction are everywhere preserved, while the details are as nearly classic as the designers could make them. St Eustache, in Paris, is one of the finest examples of this transitional style.

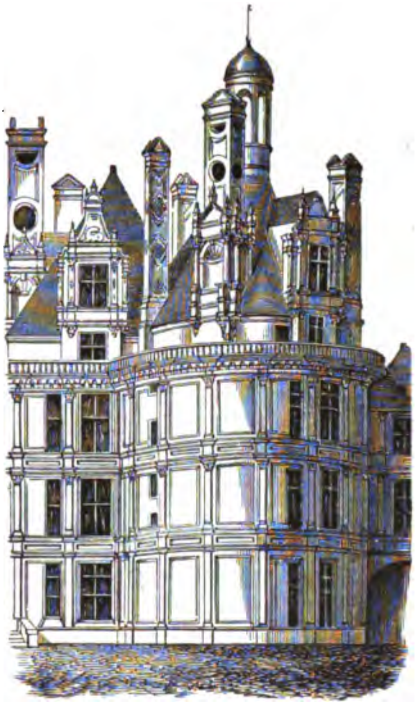


Fig. 1.—Château of Chambord.

From the middle of the 16th to the middle of the 17th century a style prevailed which may be said to exhibit all the varieties of the Renaissance. This style, usually known as that of the time of Henry IV., may be distinguished by the constant use of pilasters, broken entablatures, curved and contorted cornices, architraves, &c., all applied so as to conceal rather than to mark and dignify the real uses of the features of the buildings. The Tuileries, wrecked by the Commune, showed all these defects.

Many of the features of this period are imitated in the so-called 'Queen Anne style' of the present time (see below). From this debased style architecture gradually recovered, and during the 18th century a style more becoming the dignity and importance of the *Grand Monarque* was introduced. The classic element now began to prevail, to the entire exclusion of all trace of the old Gothic forms. Many very large palaces are built in this style; but, although grand from their size, and striking from their richness and luxuriance, they are frequently tame and uninteresting as works of art. The palace of Versailles (q.v.) is the most prominent example. The two Mansards, one of whom designed Versailles, had great opportunities during this extravagant epoch. Their invention of giving a row of separate houses the appearance of one palace, which has ever since saved architects a world of trouble, was one of the most fatal blows which true street-architecture could have received. The east front of the Louvre, designed by Perrault, is one of the best examples of the style of the age. Many elegant private hôtels and houses in Paris were erected at this period. A peculiarity of the style of Louis XIV. is the ornament then introduced, called Rococo (q.v.).

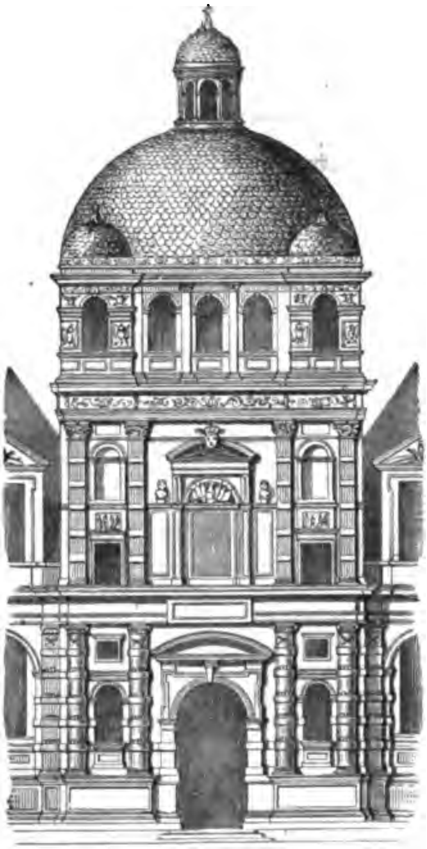


Fig. 2.—Central Pavilion of the Tuileries: as designed by De Lorme.

The classic Renaissance was completed in the beginning of the 19th century by the literal copying of ancient buildings. Hitherto, architects had attempted to apply classic architecture to the requirements of modern times; now they tried to make modern wants conform to ancient architecture. In the church of the Madeleine, Paris, for instance, a pure peripteral temple is taken as the object to be reproduced, and the architect has then to see how he can arrange a Christian church inside it! Many buildings erected during the time of the Empire are no doubt very impressive, with noble porticoes, and broad blank walls; but they are in many respects mere shams, attempts to make the religious buildings of the Greeks and Romans serve for the conveniences and requirements of the 19th century. This has been found an impossibility—people have rebelled against houses where the window-light had to be sacrificed to the reproduction of an ancient portico, and in which the height of the stories, the arrangement of the doors, windows, and, in fact, all the features were cramped, and many destroyed, in order to carry out an ancient design. The result has been that this cold and servile copyism is now entirely abandoned. The French are working out a free kind of Renaissance of their own, which promises well for the future, and is, at the present moment, as the streets of Paris testify, the liveliest and most appropriate style in use for modern street-architecture.

In Spain the Renaissance style early took root, and, from the richness of that country at the time, many fine buildings were erected; but it soon yielded to the cold and heavy 'Greco-Romano' style, and that was followed by extravagances of style and ornament more absurd than any of the reign of Louis XIV. The later Renaissance of Spain was much influenced by the remnants of Saracenic art which abound in that country.

In England, as in the other countries of Europe, classic art accompanied the classic literature of the period; but, the fountain-head being at a distance, it was long before the native Gothic style gave place to the classic Renaissance. It was more than a century after the foundation of St Peter's that Henry VIII. brought over two foreign artists—John of Padua and Havenius of Cleves—to introduce the new style. Of their works we have many early examples at Cambridge and Oxford, in the later half of the 16th century. Longleat, Holmby, Wallaton, and many other country mansions, built towards the end of the 16th century, are fine examples of how the new style was gradually adopted. The course of the Renaissance in England was similar to its progress in France; it was even slower. Little classical feeling prevailed till about 1620. The general expression of all the buildings before that date is almost entirely Gothic, although an attempt is made to engraft upon them classical details. The pointed gables, mullioned windows, oriels and dormers, and the picturesque outlines of the old style are all retained long after the introduction of quasi-classic profiles to the mouldings. This style, which prevailed during the later half of the 16th century, is called Elizabethan (q.v.), and corresponds to the somewhat earlier style in France of the time of Francis I. This was followed in the reign of James I. by a similar but more extravagant style called Jacobean, of which Heriot's Hospital at Edinburgh is a good example; the fantastic ornaments, broken entablatures, &c., over the windows, being characteristic of this style, as they were of that of Henry IV. in France.

The first architect who introduced real Italian feeling into the Renaissance of England was Inigo Jones. After studying abroad he was appointed superintendent of royal buildings under James I., for whom he designed a magnificent palace at Whitehall. Of this only one small portion was executed (1619–21), which still exists under the name of the Banqueting House, and is a good example of the Italian style. Jones also erected several elegant mansions in this style, which then became more generally adopted. In the later half of the 17th century a splendid opportunity occurred for the employment of the Renaissance style after the great fire of London. Sir Christopher Wren rebuilt an immense number of churches in that style, of which St Paul's (q.v.) was the most important. The spire of Bow Church and the interior of St Stephen's, Walbrook, are also much admired.

During the 18th century classic feeling predominated, and gradually extended to all classes of buildings. In the early part of the century Vanbrugh built the grand but ponderous palaces of Blenheim and Castle Howard, which have a character and originality of their own. To these succeeded a vast number of noblemen's mansions, designed by Campbell, Kent, the Adamses, and others. Many of these, like the contemporaneous buildings of France, are of great size and magnificence; but they are usually tame and cold in design, and a sameness pervades them all. They generally consist of a rustic basement-story, with a portico over the centre, and an equal number of windows on either side. The portico is considered essential, and, although it is perfectly useless, the light and convenience of the house are invariably sacrificed for it.

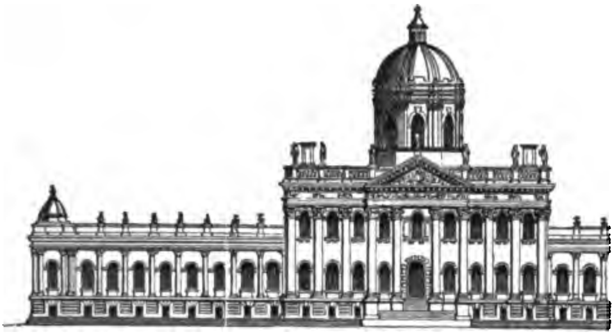


Fig. 3.—Park Front of Castle Howard.

The further study of the buildings of Greece and Rome led, in the beginning of the 19th century, to the fashion of reproducing them more literally. All important public buildings were now required to be absolute copies of ancient buildings, or parts of them, or to look like such, and then the architect had to work out the accommodation as best he might. St Pancras' Church in London is a good example. It is made up of portions from nearly every temple in Greece! Many really successful buildings, such as St George's Hall, Liverpool, the High School and Royal Institution in Edinburgh, have been erected in this style; but they owe their effect not to their being designs well adapted to their requirements, but to the fact that they are copies from the finest buildings of antiquity. We have thus two different styles included under the head of Renaissance—viz. one in which the classic elements are subordinated to the Gothic dispositions, and which is now generally understood by the expression 'Renaissance;' and the other that in which the classic elements distinctly predominate, and which is commonly known as 'Classic.'

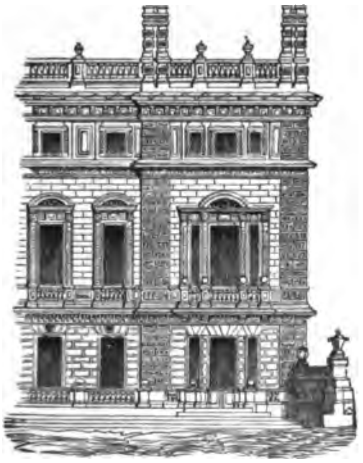


Fig. 4.—Portion of Façade of Bridgewater House.

Sir Charles Barry was the first to break away from this thraldom, and to return to the true system of designing buildings—namely, by so arranging their general features as not only to express the purposes they are intended to serve, but in so doing to form the decorative as well as the useful elements of the edifice. The Travellers' Club-house and Bridgewater House in London are admirable specimens of his design. There are no superfluous porticoes or obstructive pediments, but a pleasing and reasonable design is produced by simply grouping the windows, and crowning the building with an appropriate cornice.

As already noticed, a similar style of domestic architecture is now being worked out in France; but both there and in England there was a reaction against everything classic, and a revival of mediæval architecture superseded that of classic, especially in ecclesiastical buildings. The most magnificent examples of this style are the Palace or Houses of Parliament at Westminster, and the new Law Courts.

The so-called Queen Anne style, common in recent years, is supposed to be founded on the class of design prevalent at the beginning of the 18th century. The buildings erected at that period were of a very plain and simple order, with classic cornices and details, and frequently with large windows, sometimes divided by mullions. There is occasionally a certain picturesqueness in the arrangements which has been made the most of in the modern revived style. The latter, although taking the name of Queen Anne, is far from adhering to the style of her reign, but is rather a free use of the elements of the early Renaissance or Elizabethan style. It thus combines much of the freedom of the late Gothic with classic detail, to which is added a copious use of features borrowed from the Renaissance of France and Germany. Many large structures have been erected in this style, such as the Royal Colonial Institute in London, and the new Law Courts at Birmingham. In these buildings the peculiar features of the style are visible—viz. large windows, divided by plain mullions, and a mixture of classic details and Gothic forms. The style adapts itself well to villas and smaller structures, in which the curved gablets of the dormers form prominent features.

In Germany, Russia, and every country of Europe the Renaissance came to prevail in a manner similar to that above described in other countries. The picturesque castle of Heidelberg is an early example, and the Zwinger and Japanese palace at Dresden are edifices of the beginning of the 18th century. In the domestic buildings of Nuremberg, Dresden, and other towns of the north of Germany many instances occur of the picturesque application of classic detail to the old Gothic outlines. One of the most striking examples of the revival of classic art occurred in Bavaria during the first half of the 19th century, under the auspices of King Louis. He caused all the buildings he had seen and admired in his travels to be reproduced in Bavaria. Thus, the royal palace at Munich is the Pitti Palace of Florence on a small scale; St Mark's at Venice is imitated in the Byzantine Chapel Royal; and the Walhalla, on the banks of the Danube, is an exact copy (externally) of the Parthenon. The finest buildings of Munich are the Picture-gallery and Sculpture-gallery by Klenze, both well adapted to their purpose, and good adaptations of Italian and Grecian architecture. In Vienna and Berlin there are many examples of the revived Classic and Gothic styles, but the Germans have always understood the former better than the latter. The museums at Berlin, and many of the theatres of Germany, are good examples of classic buildings. The domestic architecture of Berlin is well worthy of notice, many of the dwelling-houses being quite equal in design to those of Paris. Of the other countries of Europe the only one which deserves remark for its Renaissance buildings is Russia. St Petersburg is of all the cities of Europe the one which best merits the title of a city of palaces. From the date at which the city was founded, these are necessarily all Renaissance in character. They are nearly all the works of German or Italian architects, and are unfortunately, for the most part, in the coldest and worst style. The ornaments of the palaces are chiefly pilasters running through two stories, with broken entablatures, &c., and ornaments of the flimsiest rococo. The New Museum, by Klenze, is, however, a marked exception. In America nearly all the new buildings of importance are carried out in the Renaissance style. Many of these are of great size and striking design. The town-hall of Boston may be referred to as one of the most imposing and effective. Another conspicuous example is the new city hall of Philadelphia (q.v.).

Along with architecture, during the period of the Renaissance Painting and Sculpture and all the other arts took their models from the classic remains which were so carefully sought for and studied. All ornamental work, such as carving, jewellery, and metal-work of every kind, followed in the same track. Mediæval niches and pinnacles gave place to the columns and entablatures of the classic styles, and the saints of the middle ages yielded to the gods and goddesses of ancient Rome.

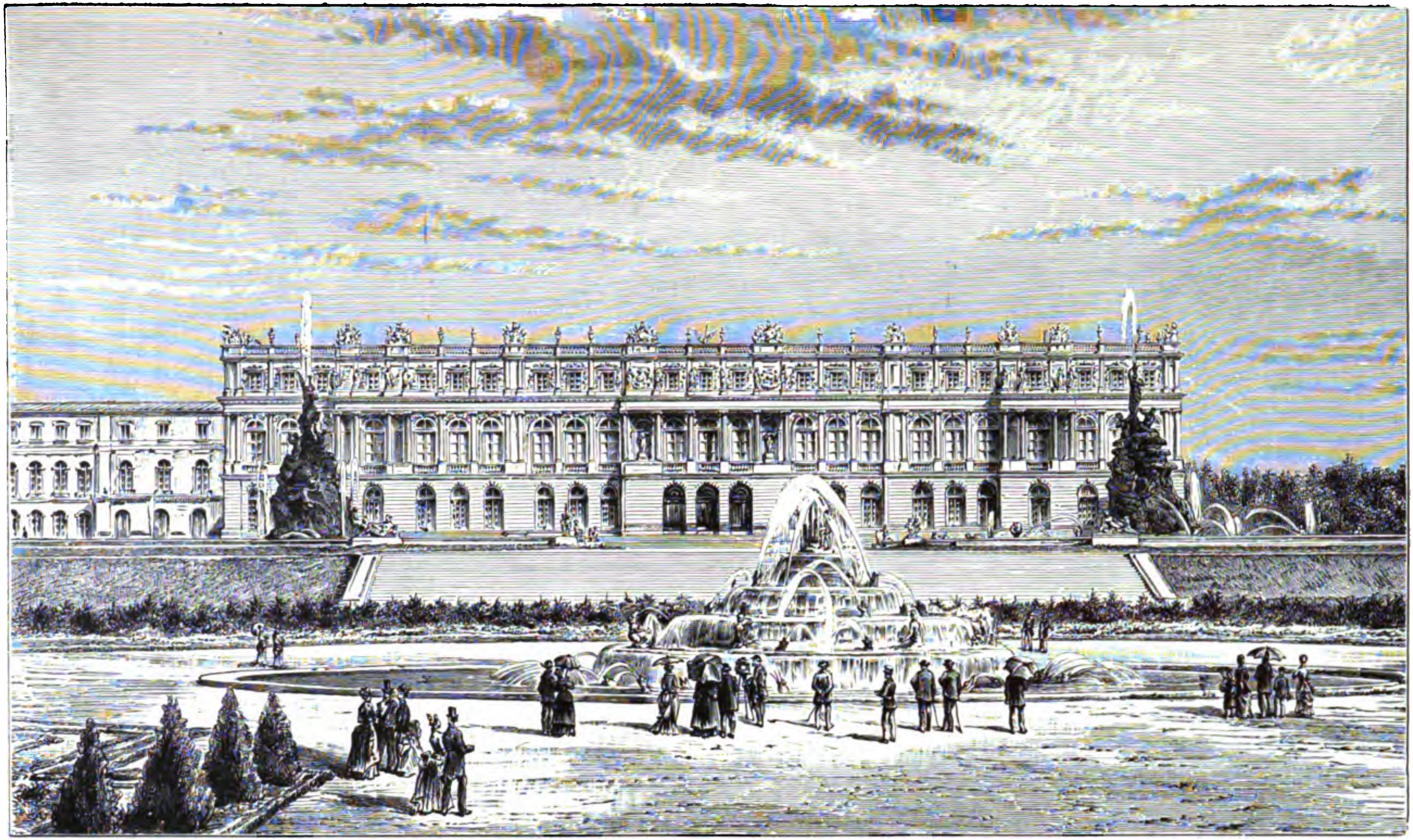
See Burckhardt, *Civilisation of the Period of the Renaissance in Italy* (Eng. trans. 1878; new ed. 1890); Pater, *The Renaissance: Studies in Art and Poetry* (1873; new ed. 1888); Michelet's 'Renaissance' (*Histoire de France*, tome ix.); Symonds, *The Renaissance in Italy* (7 vols. 1875–86); Voigt, *Die Wiederbelebung des Klassischen Alterthums* (1859; 2d ed. 1881); Ludwig Geiger, *Renaissance und Humanismus* (1881); Villari's *Machiavelli* (Eng. trans. 1890) and *Savonarola* (Eng. trans. 1889); Lecky's *History of Rationalism* and his *European Morals*; Draper's *Intellectual Development of Europe*; Guizot's *History of Civilisation*; Lady Dilke, *The Renaissance of Art in France* (1879); Vernon Lee, *Euphorion* (1884); Leader Scott, *The Renaissance of Art in Italy* (1883); Müntz, *La Renaissance en Italie et en France à l'Époque de Charles VIII.* (1886); F. A. Gotch, *Architecture of the Renaissance in England* (1891 *et seqq.*); and the articles REFORMATION, HUMANISTS, PAINTING, ITALIAN ARCHITECTURE, and works there cited; as also those on BOCCACCIO, BRUNO, CAMPANELLA, ERASMUS, MACHIAVELLI, MEDICI, PETRARCH, POLITIAN, RABELAIS, RAPHAEL, SAVONAROLA, &c.

Renaix, a town in the Belgian province of East Flanders, 25 miles by rail S. by W. of Ghent, carries on brewing and dyeing, and manufactures cotton and woollen fabrics, hats, and tobacco. Pop. (1890) 17,129.

Renan, ERNEST, was born at the little town of Tréguier, in the department of Côtes-du-Nord (Brittany), on the 27th February 1823. In his *Souvenirs d'Enfance* he has sought to mark the various influences that wrought in him during his childhood and early youth. He was a Breton Celt by his father's ancestry, a Gascon by his mother's; and all his critics have agreed with himself in recognising in his moral and mental habit the blended characteristics of this double descent. The centre of the life of Tréguier (originally a monastic village) is its minster, and to this atmosphere of the place Renan attributes in large measure his early bent to those studies which he unceasingly pursued for more than half a century. His father, who was a sailor, died while Ernest was still a child, leaving his widow in straitened circumstances, with the care of one daughter and two sons. To his mother and sister Renan owed a special debt which he has expressly acknowledged in his Memorials of his childhood. It further deepened the religious influences of his native village that he remained there till his sixteenth year as a pupil in its school. All his teachers were priests, and he himself describes them as men of primitive piety and simplicity, but wholly unacquainted with the movement of things outside their own parish. The education they gave was that which had been the tradition in the church for the preceding two centuries. 'They taught Latin in the old fashion, but above all they sought to turn out good men.'

The young Renan gave early promise of his future distinction, and in 1836 he was one of the lads chosen by the Abbé Dupanloup for a place in the Catholic seminary of St Nicolas du Chardonnet, in Paris, conducted by himself on methods entirely his own. The feelings of the boy on this change from the simple life of his Breton village were what might be those 'of a Mussulman fakir suddenly transported into a crowded *boulevard*.' The one aim of the Abbé Dupanloup in the training of the youth under his charge was to turn out priests with the accomplishments and temper of mind that would render them effective men of the world, able to serve the church in spheres where her interests could best be furthered. Dupanloup was respected and beloved by all his pupils; but, according to the most distinguished of them, whom he afterwards came to regard as a viper he had nursed in his bosom, his system was 'too little rational and too little scientific.'

The boy had from the first been destined for the church, and he proceeded regularly along the course it prescribed. After three years 'rhetoric' at St Nicolas du Chardonnet he was entered as a student of St Sulpice, the great seminary of the diocese of Paris. But before entering that seminary itself and beginning his theology proper he had to complete a two years' course of philosophy in a school at Issy, which formed a branch of the great seminary of St Sulpice. His next two years, therefore, were spent at Issy near Paris, in the study of such philosophical teachers as the church had stamped with its approval. Descartes adapted to Catholic orthodoxy, and the Scotch philosophy as taught by Reid, were the main subjects of study. At the conclusion of his course at Issy he was in all things, personal habits and temper of thought, a docile son of the church; though one of his teachers had already divined the essential tendency of his mind, and had plainly told him 'that he was not a Christian.' But it was the last stage of his novitiate that was to show what direction he was eventually to take. At St Sulpice his attention



THE CASTLE OF HERRENCHIEMSEE, BUILT BY LOUIS II. OF BAVARIA: PRINCIPAL FACADE.

Vol. VIII., page 644.

was mainly turned to the study of Hebrew, and to this study, of his own accord, he added that of German. As the result of these combined studies (for Renan is careful to state that his questionings first came to him from historical and philological, and not from metaphysical considerations) the traditional construction of Christianity had become impossible for him. Quitting St Sulpice in 1845, he finally abandoned all thoughts of the church as a profession. At this crisis of spiritual struggle and general anxiety regarding his future, his sister Henrietta, to whom Renan has paid the highest tribute of brotherly affection, proved his invaluable friend and consoler. By her assistance and counsel he was placed in a position in which he could follow out that purpose which had been gradually shaping itself in his mind—a life of study untrammelled by creeds or formularies.

Thenceforward Renan's life was the uneventful one of the scholar. In 1848 he became *agrégé de philosophie*, and thus attained a distinct academic status. In 1850 he was appointed to a post in the department of manuscripts in the Bibliothèque Nationale in Paris. By the publication of successive *mémoires* his name became known in connection with Oriental studies, and in 1860 he was made one of a commission sent by the government of Louis Napoleon to study the remains of Phœnician civilisation. In 1861 he was chosen by the professors of the Collége de France to fill the vacant chair of Hebrew in that institution. As his views on traditional Christianity, however, were now notorious, the emperor, inspired by the clerical party, refused to ratify his appointment; and it was not till after the fall of the imperial government (November 1870) that he was actually established in possession of the chair. Travels in Italy, in Scandinavia, and the East, all in connection with special departments of research, were only a component part of a career exclusively that of a student and writer of books. In 1878 he was chosen member of the French Academy. Renan married a niece of the famous painter Ary Scheffer.

Of the long series of Renan's works, which by their combined learning and literary power made him the first man of letters in Europe, we can here note only those which call for special mention in a summary account of his career. His work as an author began with a paper *Sur les Langues Sémitiques* (1847), afterwards developed into his *Histoire Générale des Langues Sémitiques* (1854). Checked and supplemented as it has been by subsequent scholars, this treatise is still regarded by specialists as having made an epoch in the history of Oriental studies. In his *Averroès et l'Averroïsme* (1852) he gave one proof among many others of his familiarity with the life and thought of the middle ages. In addition to these and other works dealing at length with special themes he wrote frequent essays, afterwards collected in his *Études d'Histoire Religieuse* (1856) and *Essais de Morale et de Critique* (1859), which arrested wide attention by their grace of style and originality of suggestion. His European reputation, however, dates only from the publication of the *Vie de Jésus* (1863), which one of his most discerning critics has described as 'one of the events of the century.' With the *Vie de Jésus* also began what its author regarded as the special work of his life, the *Histoire des Origines du Christianisme*. In Renan's conception the history of Christianity, in the true sense of the term, is possible only from the close of the 2d century after Christ. Previous to that period materials do not exist for an adequate narrative based on data that justify a dogmatic construction of the development of Christianity. The tracing of the Christian origins, therefore, must be a work essentially tentative, and one that, justifying conjecture, calls for the finest critical faculty in him who attempts it. It was with this conception of his task that Renan wrote the ten volumes, the labour of nearly thirty years, in which he embodied his construction of the evolution of the Christian religion and theology. Among works of its kind it stands alone in literary value, though many of its large generalisations have not commended themselves to severer scholars. Of all the volumes that have appeared none excited the extraordinary interest of the first. In the *Vie de Jésus* the combined weakness and strength of Renan's method were exaggerated to caricature on a subject of supreme and universal interest, and one, moreover, which even from the boldest critics had hitherto exacted the tacit admission of its special place in the heart of humanity. Few readers, even in France, received it without large reserves on the score of good taste and right feeling, while in Britain its preciosity of sentiment and effeminate exquisiteness of manner jarred even on those who were at one with the writer in his general point of view. Of the volumes that followed the *Vie de Jésus*, that on St Paul and that entitled *Marc-Aurèle et la Fin du Monde Antique* are specially noteworthy, the one as assigning to the apostle a much inferior place in the history of the Christian church to that which Protestants at least have assigned him, the other for its brilliant delineation of the last stages in the life of paganism. In completion of the task he had set before him, Renan undertook what, as he has himself told us, should have been the natural beginning of his work, the history of the people of Israel. Three volumes of this history appeared between 1887 and 1891, and a fourth completing the work in 1893.

Besides this main product of his genius and industry, Renan from time to time published other volumes, in which he expounded his views on the current questions of the day, as well as on the profounder questions of human life and destiny. In his *Questions Contemporaines* and his *La Réforme Intellectuelle et Morale* he expressed his opinions on the tendencies of modern France, and indicated in what lies her hope for the future. As it was his deepest conviction that all dogmatism is out of place in the discussion of absolute questions, he chose the form of dialogue as the most fitting vehicle of his philosophical speculations. The *Dialogues Philosophiques* and the *Drames Philosophiques* are attempts in this kind to express the many-sided aspects in which life presents itself to different minds.

In 1883 Renan published *Souvenirs d'Enfance*, in which he traced in his most delicate vein of humour and sentiment the early influences from persons and things amid which his childhood and youth were formed. As a supplement to this volume he also published *L'Avenir de Science* (1890), conceived and written in 1848, and expressing the views he then entertained regarding the tendencies of modern thought. Taken with its preface, written in 1890, this book throws a vivid light at once on the history of its author's opinions and on that double nature he inherited from his Celtic and Gascon ancestry. In his earlier work sentiment is often strained beyond the limit of virile feeling, while his later productions often reveal the Gascon by their unseasonable *persiflage* and epicurean suggestion.

Whatever may be the judgment of time on the intrinsic value of Renan's contribution to the sum of knowledge, he can never lose his place among the few great names in the history of letters. His only predecessor in universality of contemporary fame, in combined erudition and special endowment, is Erasmus, to whom, moreover, both in traits of talent and by the times of dissolution in which they exercised their function as general critics and scholars, he suggests an interesting and evident parallel. Both gave their best years to the work of expounding Christianity; the one vies with the other in the long series of volumes which make the record of their life's labours; the scholarship of both was called in question by their contemporaries; both living in an age of religious revolution were accused by extremer men of undue concession to traditional opinion; and in the work of both it is the element of a many-sided and elusive personality that distinguishes it from the other work of their time. Died October 2, 1892.

Renan's *Histoire des Origines du Christianisme* consists of the following volumes: *Vie de Jésus* (1863), *Les Apôtres* (1866), *Saint Paul* (1867), *L'Antechrist* (1873), *Les Évangiles et la Seconde Génération Chrétienne* (1877), *L'Église Chrétienne* (1878), *Marc-Aurèle et la Fin du Monde Antique* (1880), *Index général* (1883); its great complement, *Histoire du Peuple d'Israël* (5 vols. 1887 *et seq.*). Other writings are: *Le Livre de Job* (1859); *Le Cantique des Cantiques* (1860); *L'Ecclésiaste* (1882); *Histoire Générale des Langues Sémitiques* (1854); *Mission de Phénicie* (1865–74); *Études d'Histoire Religieuse* (1856); *Nouvelles Études d'Histoire Religieuses* (1884); *Averroès et l'Averroïsme* (1852); *Essais de Morale et de Critique* (1859); *Mélange d'Histoire et de Voyages* (1878); *Questions Contemporaines* (1868): *La Réforme Intellectuelle et Morale* (1871); *De l'Origine du Langage* (1863); *Dialogues Philosophiques* (1876); *Drames Philosophiques*, including *Caliban*, *L'Eau de Jouvence*, *Le Prêtre de Nemi*, *L'Abbesse de Jouarre* (1888); *Souvenirs d'Enfance et de Jeunesse* (1883); *Discours et Conferences* (1887); *L'Avenir de Science* (1890); the Hibbert Lectures (1880) delivered in London, on *The Influence of the Institutions, Thought, and Culture of Rome on Christianity*; and, with Victor Leclercq, the *Histoire Littéraire de France au XIVe Siècle*.

For critical estimates, see Sainte-Beuve, *Nouveaux Lundis* (tome ii.); Scherer, *Études sur la Littérature Contemporaine* (tome viii.); F. W. H. Myers, *Modern Essays*; G. Saintsbury, *Fortnightly Review* (vol. xxxiii.).

Rendsburg, a town of Sleswick-Holstein, stands on the North Sea and Baltic Canal, 19 miles W. of Kiel, and has manufactures of cotton, machinery, and chemical products. It has played a prominent part in the history of Holstein. Pop. (1890) 13,195.

René I., surnamed 'the Good,' titular king of Naples and Sicily, the son of Louis II., Duke of Anjou and Count of Provence, was born in 1409 at Angers. He failed in his efforts to make good his claim to the crown of Naples, gave his daughter in marriage to Henry VI. of England (1445), and ultimately devoted himself to Provençal poetry and agriculture at Aix in Provence, where he died regretted in 1480. See ANJOU.

Renegade is defined as one who renounces his religious faith and adopts another creed, more particularly one who renounces Christianity and becomes a Moslem; but in a wider sense the word is practically synonymous with traitor—that is, one who deserts to the enemies of his country. A few of the more notorious renegades of history may be named. Hippias, son of Pisistratus, fought with Sparta against his country Athens, and later joined the Persians. Onomacritus, the editor of Homer, another Athenian, added his persuasions to those of Hippias to induce Xerxes to invade Greece. Coriolanus led the Volscian armies against his native city Rome. Julian the Apostate was of course a renegade from Christianity. The Templars were accused, amongst other things, of being virtually renegades from their faith. The Algerine pirates surnamed Barbarossa (q.v.), who in the first half of the 16th century kept the Mediterranean coasts in a state of perpetual terror, were by birth Greek Christians of Mitylene. Henry of Navarre, fourth king of that name in France, renounced the Protestant creed after he ascended the throne. During the Thirty Years' War there was a prominent renegade leader on each side: Count Mansfeld (II.) deserted the emperor and the Catholic cause because the former treated him ill; Pappenheim, the commander of the celebrated dragoons and principal author of the sack of Magdeburg, went over from the Protestants to the Roman Catholics. Archibald Campbell, seventh earl of Argyll, was in 1619 declared a rebel for having entered the service of the king of Spain, a Roman Catholic prince at war with Britain. The 'pirate' Paul Jones, who during the war of American Independence ravaged the coasts of Scotland, was by birth a Scotsman. Mazeppa, the Cossack chief, fought against his sovereign at Pultowa in the army of Charles XII. of Sweden. The Duke of Riperda, who won his laurels in the service of Spain (18th century), though he was by birth a Dutchman, is said to have embraced Islam and led the armies of Morocco against the Spaniards. Omar Pasha, who distinguished himself against the Russians in the Crimean war, was born a Christian in Croatia, but fled to the Turks and embraced Islam. Another pasha, Emin, the hero of the Equatorial Province of Africa, is a German Jew, who has become a Mohammedan. The redoubtable Osman Digna, who has occasioned so much trouble as the Mahdi's lieutenant between Nile and Red Sea, is stated to be the son of French parents, his birthplace Rouen, his real name George Nisbet (Scotch?). In literature, besides plays and novels and poems dealing with personages already named, Massinger's *Renegado* and Byron's *Siege of Corinth* may be quoted as works in which renegades play important parts.

Renfrew, an ancient royal, parliamentary, and municipal burgh, the county town of Renfrewshire, stands on the south bank of the Clyde, 6 miles below Glasgow. Its charter of regality dates from 1396, but it was a burgh at least as early as the reign of David I. (1124-53). A knoll called Castlehill commemorates the site of Renfrew castle, the original seat of the royal house of Stewart. Anciently the chief port on the Clyde, it has still a small wharf, but the trade is unimportant. The principal industries are shipbuilding and weaving. It forms one of the Kilmarnock group of burghs, which return one member to parliament. Pop. (1841) 2013; (1881) 5503; (1891) 6756.

Renfrewshire, a county in the south-west of Scotland, bounded on the N. by the river and firth of Clyde, on the E. by Lanarkshire, and on the S. and W. by Ayrshire. Though only twenty-sixth of the Scottish counties in regard to size, it stands fifth in population. It is 31 miles long by 13 broad, and contains 254 sq. m. or 162,428 acres, of which 5642 are water and foreshore. Pop. (1801) 78,056; (1851) 161,091; (1881) 263,374; (1891) 290,790. The surface is irregular: besides the low lands fringing the Clyde, there are three principal valleys, those of the Gryfe, the Black Cart, and the White Cart, with upland pastures and ranges of hills, the highest point being the Hill of Stake (1711 feet) on the borders of Ayrshire.

Agriculture and the breeding of horses and cattle are carried on with success; dairy-farming is largely practised, owing to the proximity of large towns. Rather less than two-thirds of the whole extent is arable, mainly in pasture or grass crops. The minerals are coal, iron-stone, shale, and lime; copper occurs at Gourock and Lochwinnoch; and in the latter parish barytes is wrought. Besides mining and agriculture, numerous industries flourish in various parts of the county, the principal being the manufacture of thread, cotton, and chemicals, print and bleach works, shipbuilding, engineering, and sugar-refining. Renfrewshire is well supplied with roads and railways, and has two considerable ports—Greenock and Port-Glasgow. It is divided for administrative purposes into two wards, Upper and Lower, with sheriff-substitutes at Paisley and Greenock. There are two parliamentary divisions, eastern and western, each returning one member. Till 1889 part of the southern suburbs of Glasgow was reckoned within the county. The chief towns, besides those mentioned, are Renfrew, the county town and only royal burgh, Pollokshaws, Johnstone, and Barrhead. Renfrewshire, or at least the western portion, was anciently called Strathgryfe, and it was the chief patrimony of the house of Stewart. In 1404, not long after the accession of that family to the crown, the title of Baron of Renfrew (still borne by the Prince of Wales) was conferred by Robert III. on his son James; and about the same time Renfrew was disjoined from the sheriffdom of Lanark and made a separate county.

See Crawford's *History of the Shire of Renfrew* (1716), and *Historical Collections of the County* (Paisley, 1885; not completed).

Reni, a town of Bessarabia, at the confluence of the Pruth and the Danube. Pop. 6000.

Reni, Guido. See Guido.

Renmark, an irrigation settlement on the Murray, 135 miles ENE. of Adelaide, engaged in grape-growing and other fruit-culture. Pop. 800.

Rennell, James, geographer, was born near Chudleigh, in Devonshire, 3d December 1742, and served first in the navy and then as an officer of engineers in the East India Company's army, rising to be major. As surveyor-general of Bengal he prepared a *Chart of the Banks and Currents at the Lagulhas* (1778); and, having retired (1782), he wrote various works on India, including *Memoirs of a Map of Hindustan* (1783). In 1788 he was elected an F.R.S., in 1792 published a *Memoir of the Geography of Africa*, and in 1798 he aided Mungo Park in the arrangement of his travels, illustrating them by a map. Perhaps his most famous work was his *Geographical System of Herodotus Examined and Explained* (1800). In 1814 appeared his *Topography of the Plain of Troy*, and in 1816 *Illustrations of the Expedition of Cyrus*. After his death—at London on the 29th March 1830—there were published *An Investigation of the Atlantic Currents and those between the Atlantic and Indian Oceans* (1832) and *The Comparative Geography of Western Asia* (1831). See the monograph on him by Clements Markham (1895).

Rennes (the *Condate* of the Redones), the capital formerly of the province of Brittany, and now of the department of Ille-et-Vilaine, is situated at the confluence of those two rivers, 234 miles WSW. of Paris and 51 SSE. of St Malo. A seven days' fire in 1720 destroyed nearly 4000 houses, and the ancient walls have been superseded by pleasant promenades, so that the place wears a modern aspect. Four bridges connect the upper or new town and the lower or old town, and the most noteworthy of the public buildings are the cathedral, finished in 1844, and Italian in style; Notre Dame, with its dome surmounted by a huge image of the Virgin; the archbishop's palace (1672); the stately Palais de Justice (1618–54); the university buildings (1855), with a picture-gallery; the theatre (1835); the Hôtel de Ville, with a public library; and the Lycée. As the focus of main and branch lines of railway between Paris and the north-west of France, and commanding good river and canal navigation, Rennes is favourably situated for commerce; and, in addition to the transport of the abundant farm-produce of the neighbouring districts, it carries on a considerable trade in its own manufactures, which include sail-cloth, table-linen, &c. Pop. (1872) 48,658; (1886) 62,482; (1891) 65,102. There is a standard history by Ducrest and Villeneuve.

Rennet (A.S. *rinnan*, *rennan*, 'to run') consists of the inner lining of the true stomach (see Digestion) of the sucking-calf. It contains a ferment which causes milk to clot (see Milk), called the milk-curdling-ferment. The rennet is used in the manufacture of cheese, and to a less extent in the preparation of curds and whey or junket. It is prepared by removing the stomach from the calf as soon as it has been killed, and separating off the lining membrane of the stomach. It is then salted and dried, and will keep for some time in that condition. When used, a small piece of the rennet, in which the ferment is still quite active, is softened in water and added to the milk which is to be curdled. For many years past the milk-curdling-ferment has been obtained from rennet in the form of an extract. It is soluble in salt and water, and is extracted from the fresh rennet of the calf, and kept from putrefying by the addition of alcohol. Extracts of rennet thus prepared are extensively used, and may be had at the druggists' stores.

Rennet. See Apple.

Rennie, John, civil engineer, was born at the farm of Phantassie, near East Linton, East Lothian, 7th June 1761. After being for some time a workman in the employment of Andrew Meikle, inventor of a Thrashing-mill (q.v.), he attended the lectures of Robison and Black at Edinburgh University. He visited (1780) the works of Messrs Boulton and Watt at Soho, near Birmingham, and was immediately taken into employment by that eminent firm. Here his mechanical genius soon displayed itself; and so highly did Watt esteem Rennie that he gave him, in 1789, the sole direction of the construction and fitting-up of the machinery of the Albion Mills, London; and the ingenious improvements effected in the connecting wheel-work were so striking that Rennie at once rose into general notice, and abundance of mill-work now flowed in upon him. To this branch of engineering he added, about 1799, the construction of bridges, in which his pre-eminent talent and ingenuity displayed themselves. The chief of his bridges were those of Kelso (1803), Leeds, Musselburgh, Newton-Stewart, Boston, and New Galloway, with the Waterloo Bridge over the Thames, which was commenced in 1811, and finished in less than six years, at a cost of more than £1,050,000 (see Vol. II. pp. 437–8). Another of his works is Southwark Bridge; he also drew the plan for the London Bridge, which, however, was not commenced till after his death. He superintended the execution of the Grand Western Canal in Somerset, the Polbrook Canal in Cornwall, the canal between Arundel and Portsmouth, and, chief of all, the Kennet and Avon Canal between Newbury and Bath; he also drained a large tract of marsh land in the Lincoln Fens. The Bell Rock lighthouse was his, in conjunction with Stevenson. The London Docks, the East and West India Docks at Blackwall, the Hull Docks, the Prince's Dock at Liverpool, and those of Dublin, Greenock, and Leith were all designed by him, and wholly or partially executed under his superintendence. He also planned many improvements on harbours and on the dockyards of Portsmouth, Chatham, Sheerness, and Plymouth; executing at the last-mentioned port the most remarkable of all his naval works, the celebrated Breakwater (q.v.). He also made great improvements in the diving-bell. He died October 4, 1821, and was buried in St Paul's Cathedral. A striking characteristic of his works is the remarkable combination in them of beauty and durability; and though they were frequently objected to on the ground of costliness, yet in the end their lasting qualities more than compensate for this. In person Rennie was of extraordinary stature and herculean strength. See Smiles's *Lives of the Engineers* (1874).

GEORGE RENNIE, civil engineer, and eldest son of the preceding, was born in Surrey, January 3, 1791, educated at Edinburgh University, and commenced the practical study of engineering, under his father, in London in 1811. In 1818 he was appointed superintendent of the machinery of the Mint, and at the same time aided his father in the planning and designing of several of his later works. After his father's death in 1821 Rennie entered into partnership with his younger brother, John (afterwards Sir John Rennie), as engineers and machinery constructors; and during the existence of the firm it carried on an immense business, including the execution of most of the works which had been planned by the elder Rennie and the completion of those which he had left unfinished. Their operations embraced the construction of bridges, harbours, docks, shipyard and dredging machinery, steam-factories, both in Great Britain and on the Continent, and marine engines for warships. They built ships both of wood and iron, drained large tracts of land in the midland counties of England, and superintended the construction of several continental railways. George Rennie died 30th March 1866.

His brother, SIR JOHN RENNIE, associated with him in business till 1845, was born August 30, 1794, entered his father's office previous to the construction of Southwark and Waterloo bridges, and was knighted on the completion of London Bridge, which he executed from his father's designs. He acted as engineer to the Admiralty for ten years, and, in conjunction with his brother, contributed to the introduction of the screw-propeller into the navy. He had a wide reputation for all subjects connected with hydraulic engineering, harbour-works, &c., and a list of his important engineering works will be found in his *Autobiography* (1875). He died September 3, 1874. He was author of *British and Foreign Harbours* (1854) and a monograph on Plymouth breakwater (1848).

Rent, in common speech, is money paid for the use of land or houses. In political economy it usually means money paid for the use of land; and it is in this reference that the theories and discussions of economists regarding rent have arisen. Economists have generally held it to be the great merit of Ricardo that he elucidated the true theory of rent. Anderson, Malthus, and West had indeed enunciated it before, but the classical statement of it (fully developed in his *Principles of Political Economy*, 1817) came from Ricardo. According to that theory the amount of rent paid represents the excess of the price of the produce of the land over the cost of production on that land. The cost of production includes the usual wages paid to the labourer, and the usual interest on the capital applied to the land, as well as remuneration of management. In other words, after the labourer has been paid the usual wages and the farmer has received the usual return for his capital and trouble from the produce of the land, the remainder is rent.

It will be seen therefore that the amount of the rent depends on the price obtained for the produce. Rising prices for agricultural produce mean rising rents. And in this, as in other departments, prices depend on the relation of demand to the supply. A rapidly increasing demand, or in other words, a rapidly growing population, and a supply that cannot nearly keep pace with it will lead to a great rise in prices. Such was the condition of England at the end of the 18th century and the beginning of the 19th, when a rapidly growing population had to depend almost solely on the home market. At such a time there was a great rise in rents. During the last generation the population has increased with a similar rapidity, yet, owing to free trade, the enormous development of the means of transport, and the opening up of vast agricultural lands in America and the colonies for the supply of the home market, prices have fallen and also rents. The demand has increased, but the supply has increased vastly more, and in spite of the growing population rents have fallen. The general truth however remains that rent depends on prices, and not prices on rent. Or, to use the Ricardian formula, which, however, is not a satisfactory expression of the fact, rent is not an element in the price of corn.

After having been much overrated as a discovery in political economy, the Ricardian theory of rent is now in many quarters unduly depreciated. It still remains generally valid under the conditions contemplated by its expounder. Those conditions are a system of land-holding by private owners who do not cultivate their land, capitalist farmers, and free labourers; the relation of the three classes to each other being determined by competition. In other words, the economists who have worked out the theory have had in view England, and other countries in so far as they are similarly circumstanced as England. But even in England there are many things which greatly modify the operation of the principle—the influence of custom, the natural conservatism of all classes, local attachment on the part of the farmer and labourer, &c. Very important also is the fact that many of the landlords have regard to social and political considerations, as well as to reasons of fairness and equity in fixing their rents. It must, moreover, be remembered that a disturbance in agricultural prices, such as that caused by the introduction into European markets of the enormous supplies from America, may have rendered the Ricardian theory ludicrously inapplicable to the rents actually paid, particularly under long leases. Under these circumstances rent was often paid not out of the surplus of the farmer's profits, but out of his capital. The Ricardian theory of rent therefore formulates a tendency which, even under the conditions contemplated, accords with facts only in a rough and general way.

When we consider economic history and the existing economic conditions of the world we may perceive how limited in scope the Ricardian theory of rent has been. In many countries custom has decided, and still decides, the rent paid for land. In very many countries it has not been either competition or custom that has regulated rent, but the owner has wrung from the cultivator all that he could. The only limit to the exactions of the owner has been his own pleasure or caprice or the endurance of the cultivator. In countries, however, where the state is the owner of the land rent may more correctly be regarded as a tax.

The rent paid for land occupied by towns and that paid for mines are in some important respects different from the rent of agricultural land. The rent paid for land in towns is much more directly influenced by the increase of population and the growth of prosperity. Inasmuch as the owner receives great advantages from such causes while contributing little or nothing, economists of standing maintain that such land should be under municipal ownership and control. The rent paid for mines is materially affected by the fact that mines become exhausted, while the agricultural properties of the soil are permanent in the main. As regards rent generally, it should be repeated that economic formulas are of comparatively little value. The main thing is a thorough knowledge of the facts and conditions, which vary continually according to the time and country with which we are concerned. For other aspects of rent, see also Land Laws, Landlord and Tenant.

Renton, a town of Dumbartonshire, on the right bank of the Leven, 2 miles N. by W. of Dumbarton. Founded in 1782, it has a Tuscan column (1774) to the memory of the novelist Smollett, who was born close by, and it carries on calico-printing, dyeing, and bleaching. Pop. (1831) 1860; (1881) 4319; (1891) 5458.

Renwick, James, the last of the martyrs of the Covenant, was born at Moniaive, Dumfriesshire, 15th February 1662. He attended Edinburgh University with a view to the ministry, but was denied his degree, as he refused the oath of allegiance; and, after witnessing the deaths of Cargill and others of the martyrs, he resolved to embrace the cause for which they suffered. He was chosen by the 'Societies,' as the bands of men devoted to the Covenant were called, to proceed to Holland to complete his studies in 1682, was ordained at Groningen in 1683, and at once proceeded to Scotland, where his first sermon was preached at Darmead Muir in the same year. His life was now exposed to great hazards; he was obliged to move from place to place, and was often reduced to great destitution. In 1684 he published his *Apologetic Declaration*, for which he was outlawed. When James II. came to the throne in 1685 Renwick with 200 men went to Sanquhar, and published a declaration rejecting him. A reward of £100 was offered for his capture, he was hunted from place to place, and made many hairbreadth escapes, but was at last captured in Edinburgh. He was condemned and executed, 17th February 1688.

See Shield's *Life*, Renwick's *Choice Collection of Sermons, &c.* (1777), Simpson's *Life of Renwick* (1843).

Renwick, James, LL.D., author and physicist, was born at Liverpool in 1792, and graduated at Columbia College, New York, in 1807. In 1820 he was made professor of Chemistry and Physics in that college, a position he held until 1853. In 1838 he was appointed by the United States government one of the commissioners to explore the line of the boundary between Maine and New Brunswick. He wrote, besides smaller text-books and translations, *Outlines of Natural Philosophy* (1822–23, the first extended work of its kind published in the United States), a *Treatise on the Steam-engine* (1830), several books on Mechanics, and Lives of De Witt Clinton, Jay and Hamilton, and others. He died 12th January 1863.—One of his sons, James, was architect of Grace Church and St Patrick's Cathedral, New York; other notable buildings from his designs are the Smithsonian Institution, Vassar College, &c.

Repairs is the legal as well as popular term to denote the repairs done to a house or tenement by a tenant or landlord during the currency of the lease. In England the burden of repairs is at common law thrown on the tenant, so that, unless the lease expressly say that the landlord is to do the repairs, the tenant will be bound to use the premises fairly and to keep house property wind and water tight. Usually the lease states who is to do the repairs. In the lease of farms the tenant is bound only to keep the house in repair, and not the out-buildings, though he is bound to keep the fences in repair. If the landlord is bound to do the repairs, and fails to do them, the tenant is not entitled to quit the premises on that account, though he will be entitled to sue the landlord for damage caused by the want of repairs. In Scotland the landlord is bound at common law to put the premises into tenantable repair at the commencement of the lease. The tenant is then bound to keep them in ordinary repair, but not to keep them in repair where some hurricane or extraordinary cause has done injury. In the United States the laws of the states vary; in several states it is enacted that a general promise to repair shall not bind the tenant to rebuild in case of destruction by fire.

Repeal. See O'Connell.

Repeating Rifle. See Rifles.

Repentance, Stool of. See Stool of Repentance.

Replevin, in English law, is a form of action by which goods which have been seized under a distress are taken back (security being given to the amount for which the goods were distrained), and the action of replevin commenced, to try the legality of the seizure.

Reporting, an important branch of journalism, has already been incidentally discussed at Newspaper; the methods by which, as a rule, it is practicable are dealt with at Shorthand. Here some account of the history of parliamentary reporting, in many respects the most important, is given.

Accounts of single speeches, and, at times, of entire debates in the English parliament, have come down to us from a very early period. The earlier volumes of the Journals of the House of Commons contain short notes of speeches; the later volumes record nothing but the votes and proceedings. Sir Symonds d'Ewes edited the *Journals of Queen Elizabeth's Parliaments;* and the Commons' Journals contain notes of speeches in the parliaments of James I. Rushworth, assistant-clerk in the Long Parliament, 1640, took down in a species of shorthand any speech of importance; and his account of *Remarkable Proceedings in Five Parliaments* forms one of the most valuable portions of his *Historical Collections.* During the reign of William III. a member now and then sent a copy of his speech to the newspapers, for printing which, however, they were sometimes called to account. In the reign of Queen Anne a monthly pamphlet, called the *Political State,* gave an outline of the debates in parliament. In the reign of George I. the *Historical Register*, published annually, professed to give reports of parliamentary speeches. The *Gentleman's Magazine* began a monthly publication of the debates, the number for August 1735 containing a report of the debate in the House of Lords on the previous 23d January. Cave, the publisher, continued the practice in succeeding numbers, and his systematic proceedings are thus described by Sir John Hawkins: 'Taking with him a friend or two, he found means to procure for them and himself admission into the gallery of the House of Commons, or to some concealed station in the other house, and there they privately took down notes of the several speeches, and the general tendency and substance of the arguments. Thus furnished, Cave and his associates would adjourn to a neighbouring tavern, and compare and adjust their notes; by means whereof, and the help of their memories, they became enabled to fix at least the substance of what they had lately heard and remarked. The reducing this crude matter into form was the work of a future day and an abler hand—Guthrie, the historian, whom Cave retained for the purpose.' There was, however, no publication of the debates during the sitting of the Houses; parliament was always prorogued before anything said in the course of the session was given in the magazine. At first the names of the speakers were cautiously indicated by the first and last letter only, and in many cases the speaker's name was wholly omitted. Growing bolder by degrees, Cave printed the names at length. The House of Commons soon took the alarm. The publication of the debates of either House had been repeatedly declared to be a high breach of privilege—as by the Commons in 1588 and by the Lords in 1698. The Commons followed up several previous resolutions to the same effect by ordering, in 1728, 'that it is an indignity to, and a breach of, the privilege of this House for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that upon discovery of the authors, printers, or publishers of any such newspaper this House will proceed against the offenders with the utmost severity.' In 1738 Speaker Onslow called the attention of the House to the breach of its standing orders by Cave and others; and the result was another thundering resolution against the publication of debates 'either while parliament is sitting or during the recess,' and a threat to proceed against offenders with the 'utmost severity.' The reports, notwithstanding, still appeared, but under the disguise of 'Debates in the Senate of Lilliput,' in the *Gentleman's Magazine;* and 'Debates in the Political Club,' in the *London Magazine.* Dr Samuel Johnson was employed by Cave in the composition of his parliamentary debates, and the reports from 1740 to 1743 are held to have been entirely prepared by him, sometimes with the assistance of the above-mentioned Guthrie. When it was observed to Johnson that he dealt out reason and eloquence pretty equally to both parties, he remarked: 'I took care that the Whig dogs should not have the best of it.' It was not till thirty years later that the parliamentary debates descended from the magazines to the newspapers. The latter had, however, for some time resolved to report the debates, and they took advantage of the popular excitement arising out of the Luttrell-Wilkes election for Middlesex to try the right of the House to interdict the publication of its proceedings.

The ever-memorable contest between parliament and the press began at the close of the year 1770. The House of Commons followed up another solemn threat by prompt action; and the Lord Mayor of London and Alderman Oliver were sent to the Tower for refusing to arrest some printers of reports on the warrant of the Speaker, John Wilkes taking an active share in the controversy. The city of London loudly protested against the arbitrary proceedings of the House, and the whole country responded to the appeal. The power of parliament to imprison ceases at the end of the current session, and on the day of prorogation, July 23, the Lord Mayor and Alderman Oliver marched out of the Tower in triumph, and at night the city was illuminated. Next session the House of Commons tacitly acknowledged itself beaten. The printers defied the House, continued to publish their proceedings, and slept, notwithstanding, secure in their beds. In a short time the House of Lords also conceded the point, and the victory was complete; though it is still in the power of any member, who may call the Speaker's attention to the fact that 'strangers are present,' to exclude the public and the reporters from the House. This power has frequently been exercised during living memory, but on such occasions some one or more members who have dissented from this course have taken notes of the speeches, and have avowedly sent them to the newspapers.

The old machinery of newspaper reporting was susceptible of immense improvement. One of the Woodfalls (a brother of the Woodfall of Junius) had so retentive a memory that when editor of the *Morning Chronicle* he used to listen to a debate in the gallery, and write it out next day, the taking of notes being at that time forbidden. His successor established a corps of parliamentary reporters to attend the debates of both Houses every night in succession. He thus brought out the night's debate on the following morning, anticipating his rivals by ten or twelve hours. The improvement in the reports of the debates from the period of the American Revolution until the year 1815 was but gradual. At the close of the French war, however, the publication of parliamentary debates became an object of national importance, and in the course of a few years assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters, who till then had no means of entering the Strangers' Gallery except those which were common to the public generally. Amongst the professional parliamentary reporters of this period Charles Dickens was conspicuous. He was at work for the *Morning Chronicle* in 1834, and was one of the best reporters of his time.

The system of parliamentary reporting underwent a change of great importance about 1847, when the electric telegraph was brought into general use by companies formed to work it. They proposed to supply papers out of London with London news, and a report of parliamentary debates was part of the news thus supplied. In order to get this report the Telegraph Company obtained admission to the gallery for its reporters, and thus broke the monopoly which the London daily newspapers had up to that time enjoyed. Subsequently, when the electric telegraphs passed into the hands of the government, the parliamentary reports for newspapers out of London were provided by press agencies, and the accommodation in the Reporters' Gallery had to be increased for them. With the growth of provincial newspapers the demand for more reports than the agencies supplied was felt, and the more powerful newspapers endeavoured to secure special reports for themselves by the assistance of reporters who were engaged on the London press. In this way they were able to get and publish reports often much longer than those printed in London. This, however, was only done at great inconvenience, and an effort was made to obtain for leading provincial newspapers a right of admission to the Reporters' Gallery. These claims were considered by a special committee of the House of Commons, which in 1879 reported in favour of them; next year the long-coveted privilege was granted, and the representatives of some of the provincial papers take their regular 'turns' (relieving one another at short intervals) along with those of the metropolitan dailies. See Pendleton, *Newspaper-reporting in the Olden Times and To-day* (1890).

Repoussé (Fr.). This term is applied to a peculiar method of ornamenting metal which resembles Embossing (q.v.). Briefly stated, it is metal-work formed in relief by striking the sheet, usually a thin one, from behind with a hammer or punch, the rough forms so produced being afterwards chased or otherwise finished. After the parts which require to be convex are 'raised' from the back or inside of any object, such as a vase or flat dish, it is either filled with or placed on a bed of pitch and then worked upon the face with small punches, and afterwards with chasing, engraving, and other tools. Stamping produces work somewhat similar in general appearance, but of a much more mechanical nature, since the die used determines exactly the pattern, and no variety is obtained. See DIE-SINKING. Some kinds of hammered iron, again, such as open ornamental gates and grilles, are rather examples of forging than of repoussé. Among the best existing pieces of ancient Greek bronze sculpture some have been beaten up (not cast), and are therefore of the nature of repoussé work. A number of the famous artistic productions—notably those of the 16th century—referred to under the head Metalwork are executed in repoussé. This art, by which, in the hands of a master, work can be executed with a delicacy, softness, and beauty unattainable by any other process, was revived (in a true artistic sense) in France about the middle of the 19th century. Some of the finest modern works in repoussé have been executed by Antoine Vechte and Morel Ladeuil. One of the largest objects ever produced in repoussé in England is the Elcho Volunteer Challenge Shield. It is of iron, 6 feet high, and was designed by F. Watts, R.A. Elaborate work in repoussé is necessarily very costly, especially if the metal employed is hard, such as iron, copper, or silver, which is usually the case when important designs are to be executed. But the process is also applied in Birmingham to decorate comparatively cheap articles in Britannia metal, which is soft and easily worked.

Representation, in politics, is the function performed by the elected members of legislative and administrative bodies. Ancient democracies were usually constituted on the principle of government by the whole body of citizens; at Athens, for example, all important questions were decided by the vote of the Ecclesia. In England, as in many other countries, the freemen of townships and small districts elected their own officers and managed their own affairs; the shiremoot of early times was attended by the reeve and four men from each township; it was, in fact, a representative assembly, properly so called. When the smaller kingdoms were united under one head the change was not at first favourable to popular government; it was impossible in those days to bring together representatives from a wide area; and the conduct of national affairs fell into the hands of the king and his councillors and the great men of the realm. But feudal custom required that a superior should consult his vassals, or some of them, before levying any exceptional aid; under the influence of this idea courts or assemblies of a more or less representative character were formed throughout western Europe. In England the high court of Parliament (q.v.) was organised on a feudal basis, like the neighbouring parliament of Scotland; but the principle of representation was applied as early as the 13th century to the shires and boroughs of England generally.

In framing or criticising the constitution of a representative body we encounter practical questions of considerable interest. We have to determine, first, who ought to elect, whether a property qualification should be required, whether owners of property should have more than one vote, whether manhood suffrage, household suffrage, or a more limited franchise will give the best results, and whether women ought to be allowed to vote. We have then to consider how the electors are to be grouped. The scheme of single-member districts adopted in 1884-85 in the United Kingdom results in the representation of all local majorities; local minorities are excluded, and votes may be so distributed that a majority of members is returned by a minority of electors. Mr Thomas Hare was the author of an elaborate scheme of proportional representation, in which the whole country is treated as one constituency, each elector has one vote, and any candidate obtaining the necessary quota of votes is elected, while provision is made for transferring votes from a candidate who obtains more than the quota by enabling an elector to vote for several names in the order of his preference. It is contended that this plan, if adopted, would make the House of Commons a perfect mirror of public opinion; but the plan has not yet attracted any great amount of popular support. After the lapse of about a century the 'one man, one vote' shibboleth of Major John Cartwright (1740–1824) has been recently revived. In school board elections the voting for representatives is cumulative; the voter has a right to as many votes as there are members to be elected, and may give all his votes or as many as he chooses to one candidate. Passing from election law, we have to consider what are the duties of elected representatives, and what should be their relation to their constituents. Should they be paid? Should they have a long term of office, that they may learn their business, or a short term, that they may never forget their dependence on the electors? Are they delegates, bound to act on the instructions of those who appoint them, or is it their duty to act on their own judgment, and to do what is best for the general welfare? The accepted theory in England is that a member is not a delegate; his constituents have no power to withdraw their mandate, and the member is bound to act on his own judgment. But the highly organised parties of modern times leave very little freedom to the individual representative; he can only secure election by pledging himself to vote with his party on certain issues.

For a full discussion of these and other questions, see J. S. Mill, *Representative Government* (1861; new ed. 1884); T. Hare, *The Election of Parliamentary Representatives* (1859; new ed. 1865); Walpole, *The Electorate and the Legislature* (1881). Many interesting political experiments are described in Bryce's *American Commonwealth* (1888). For the representative system of the United States, see Congress, President, United States. Representation was not the original system even in republics (see Republic), but direct voting of all citizens; this old system is still practised in some of the smaller cantons of Switzerland (q.v.).

Reprieve (Fr. *reprendre*, 'to take back') is the suspension of punishment for a crime, and is used chiefly in connection with capital crimes. The power of suspending all sentences at any time is vested in the crown, or chief-magistrate of a republic, at discretion; and in Britain is exercised through the Home Secretary (see Secretary of State, Pardon). There are also several grounds on which the judge or a court reprieves a sentence. Where the judge is not satisfied with the verdict, or is doubtful of the validity of the indictment, he reprieves the sentence in order to give time for some application to the crown. When the prisoner is a pregnant woman, and pleads that fact, it is proper to put off the execution of the sentence until after her delivery. When a woman pleads her pregnancy as a reason for reprieve the traditional practice is to empannel a jury of matrons, and, if they bring in a verdict of 'quick with child,' execution is stayed. Another cause of reprieve is the insanity of the prisoner, for, if before execution it appear the prisoner is insane, whether the insanity supervened after the crime or not, the judge ought to reprieve him. A reprieve is usually followed by remission or commutation of the punishment to which the prisoner has been sentenced.

Reprisal is the retaking, from an enemy, goods which he has seized, or the capture from him of other goods, as an equivalent for the damage he has wrought. Letters of Reprisal are the same as Letters of Marque. See Letter of Marque.

Reprobation. See Predestination.

Reproduction is the term applied to the whole process whereby life is continued from generation to generation. One of the characteristics of life is its continuity; the races of animals and the orders of plants live on without marked change for centuries; by slow modifications they may be enriched or impoverished, increased or thinned, but there is no breach of continuity. All the forms of life seem to evolutionists like twigs on one many-branched tree; they are genetically related by near or distant bonds of kinship, and in a very real sense each generation is continuous with those which come before and after it. As an evergreen tree replaces by fresh growth those leaves which it loses, so, throughout the world, by various forms of reproduction the continuance of life is secured.

As reproduction is a fundamental fact of life, it cannot be discussed apart from other facts, such as growth, at the limit of which reproduction usually occurs, or development, in which the germ grows into the likeness of its parent, or the occurrence of two sexes producing complementary and mutually dependent reproductive elements. A theory of reproduction must be consistent with the facts of growth and development, and merges into theories of sex and of heredity—the latter being based on a study of the precise relations between successive generations. See EMBRYOLOGY, HEREDITY, SEX.

Modes of Reproduction.—Separated fragments of a sponge or cuttings from the rose, the buds of a hydra, or the bulbils of a lily, the eggs of birds, and the seeds of plants are alike able to grow into new organisms; and thus we see that the common fact about all kinds of reproduction is that parts of one organism are separated to form or to help to form new lives. In many cases what is separated from the parent life is simply part of its body, an overgrowth or a definite bud, which, being set free, is able to reproduce the whole of which it is a representative sample. This we call asexual reproduction. In most cases, however, the parents give origin to special reproductive elements—egg-cells and male-cells—which combine and are together able to grow into a new life. This we call sexual reproduction.

The simplest forms of reproduction are found among the single-celled plants and animals. There we may find an organism like Schizogenes, multiplying by breakage, reproducing by rupture, presumably when the cell has overgrown its normal size; in others numerous buds are liberated at once, as in Arcella and Pelomyxa; in many, familiarly in the yeast-plant, one bud is formed at a time; in most the cell divides into two or many daughter-cells. The formation of many daughter-cells or spores is little more than ordinary division taking place repeatedly in rapid succession, and within the substance of the parent-cell—in other words, in limited time and space.

We have seen that reproduction begins among single-celled organisms in a kind of rupture; but even among the more complex forms of life an equally crude mode of reproduction sometimes occurs. The cast-off arm of a starfish may re-grow the entire animal with a readiness that suggests a habit; some kinds of worms (e.g. Nemerteans) break into pieces, each of which is able to re-grow the whole; large pieces of a sea-anemone or of a sponge are sometimes separated off and form new organisms. It is easy to show experimentally that parts cut from a hydra, a sponge, or a sea-anemone, from a seaweed, a moss, or a tree, may in certain conditions grow into an entire organism.

But the usual mode of asexual reproduction is by the formation of definite buds. When these buds remain continuous, colonial organisms result, like many sponges, most hydroids, Siphonophora like the Portuguese man-of-war, many corals, almost all the Polyzoa, and many Tunicates. The runners of a strawberry and the suckers which grow around a rose-bush illustrate the same state. But in a few plants, like the liverwort and the tiger-lily, a kind of bud may be detached, and thus begin a new life. It is among animals, however, that the liberation of buds is best illustrated, for this mode of reproduction occurs in hydra and many hydroids, in some 'worms,' and in Polyzoa, and even in animals as highly organised as Tunicates. Budding is usually exhibited by comparatively simple and by sedentary animals, and seems indeed to be natural to vegetative organisms. It is easy to understand why asexual reproduction is among many-celled animals always associated with sexual reproduction, and entirely replaced by it in the higher forms. For budding is only possible when the organism is not very highly differentiated, or when part of the body retains many indifferent units; moreover, it is an expensive way of securing the continuance of generation, and is without the advantage to the species which undoubtedly results from the mingling of two life-currents in sexual reproduction.

Sexual reproduction in its fully differentiated form involves (*a*) the distinctness of two parent organisms, (*b*) the formation of two different kinds of reproductive elements—e.g. spermatozoa produced by the male and ova by the female, and (*c*) the fertilisation of the egg-cell by a male element. Moreover, the process of sexual reproduction also includes the sexual union of the two parents, or other ways in which fertilisation is secured, while in some cases the fertilised ovum develops in organic relation with the mother-organism, from which it is eventually separated as an embryo. But, while many organisms exhibit fully differentiated sexual reproduction, and while the essentials of the process are always the same, there are not a few important variations in detail—witness the occurrence of hermaphroditism, parthenogenesis, and alternation of generations, the first and last of which are discussed in separate articles.

Physiology of Reproduction.—All growth is, in a certain sense, of the nature of reproduction. It is an increase in the amount of protoplasm and its attendant train of substances. Abundance of food material and conditions favourable to rapid assimilation are necessarily accompanied by rapidity of growth; but in the most favouring circumstances there is an inevitable limit to the growth in size of a single cell. It occurs when the rate of assimilation of the constantly increasing mass of protoplasm becomes equal to the highest possible rate of absorption. Since absorption can only take place through the surfaces, and since, with any given figure of cell, the ratio of volume to surface is a perfectly definite one, and one which increases at a definite rate as the cell grows, there must be for any given figure of cell a perfectly definite limit of size. For any mass of cells arranged in any manner there must be, for similar reasons (though other factors, such as weight, &c., may be operative and varyingly important), a definite limit of size. When in the single-celled animals this limit is reached, or is nearly reached, so that starvation begins—and in any case the greater the size of the cell the less rapid, in proportion to volume, must be the absorption, unless at a certain point other factors at present unknown occur—then division of the cell takes place, by which means, the volume remaining the same, the surface is doubled, so that the ratio of volume to surface and therefore of assimilation to absorption is lowered, and growth is once more possible. This law (first clearly stated by Spencer and by Leuckart) is evidently the expression of a factor concerned in the initiation of cell division and therefore of the Metazoa or many-celled animals. In the Protozoa, then, reproduction is related to, and in a certain sense caused by, a diminution in the possible rate of assimilation, which, to the protoplasm concerned, bears the aspect of an impaired nutrition. In the Metazoa, although reproduction is not so entirely a mere process of cell division as in the Protozoa, a connection between nutrition and reproduction is observable. The common hydra, with an abundant food-supply and favouring circumstance, grows rapidly, the growth becoming a process of asexual reproduction and taking the form of the production of numerous buds, which may themselves produce a crop of secondary buds. But if the conditions become less favourable to nutrition through the lessening of the supply of food material, or, in terms of the more definite generalisation emphasised above, less favourable to assimilation through, say, a fall of temperature, then this rapid growth ceases and reproductive organs are formed and sexual reproduction takes place. Planarian worms in good nutritive conditions form asexual chains of daughter worms. A check to nutrition is followed by the separation and sexual maturity of the links.

Fruit trees are root-pruned in order that the crop of fruit may be abundant; the reason being that, as nutrition is lessened by such pruning, there follows an increase of reproductive activity which takes the form of fruit. If the vegetative activity of the plant be what one desires, then the flower buds are nipped off and sexual activity prevented. A similar result follows from the castration of animals. The position of the flower at the end of the vegetative axis is an expression of the fact that at that point the food-supplies are more scanty than at any other point along the axis. This distribution of food matter is shown again in such plants as the tiger-lily, which have a mode of asexual reproduction, one that is of continuous growth, by the development of little bulbils which occur in the axis of the leaves, such bulbils being only found on the lower part of the stem. Other factors than the supply of food-matter influence assimilation and reproduction. As in the case of all molecular movements, variations of temperature are an obvious cause of change of state. For every animal—i.e. for every peculiar form of protoplasm—there is a particular temperature which, other things being constant, is most favourable to rapidity of assimilation. This point is widely different in the various forms of life. In every case it is probable that a rise of temperature up to a certain point is followed by a feverish state of body and a tendency to hasten sexual maturity and reproduction. If our conception of the relation of assimilation to reproduction be correct, then, as already suggested, a fall of temperature below that most favourable to assimilation ought to be followed by an increasing tendency to sexual reproduction.

Reproductive maturity—the blossoming of the individual life—occurs, as we have seen, about the time when growth ceases. In the lower animals sexual maturity is attained relatively sooner than in the higher forms; but there are many strange cases of precocious and retarded reproduction. Thus we may contrast our common annuals and the 'century plant' or American aloe, or some midges, worms, and even a couple of amphibians, which are reproductive during larval life, with highly evolved animals, such as the elephants. The physiology of reproduction must take account of that profound reaction which affects the whole system as sexual maturity is attained, of the various ways in which the reproductive elements are separated from the parents, of the relation which, alike in plant and animal, may be established between the fertilised egg-cell and the mother-organism, and of the way in which an embryo thus nurtured eventually becomes independent. Moreover, there are often highly evolved psychical activities associated with reproduction—notably the love between mates and between parents and offspring.

But, while reproduction is a blossoming of the individual life, it is also in a sense the beginning of death. The flower and fruit often end the life of the plant. It may be that the processes of rupture by which some of the simplest organisms reduce their bulk and multiply their kind are but a few steps from the more diffuse dissolution of death. It is a fact that in some simple animals—e.g. some 'worms'—the parent, and especially the mother, ruptures and dies in liberating the reproductive elements. So, among higher forms, not a few insects—mayflies, locusts, butterflies—die a few hours after reproduction. The exhaustion is fatal, and the males are sometimes victims as well as their mates. In higher organisms the fatality of the reproductive sacrifice has been greatly lessened, yet death may tragically occur, even in human life, as the direct nemesis of reproduction. In short, the process by which new lives begin, by which the continued life of the species is secured, tends to be antagonistic to the life of the parent individuals. The old leaves fall off the tree, and their places are filled by others.

The Rate of Reproduction and Increase.—The rate of reproduction depends upon the constitution of the individual organism and on its immediate environment and nutrition. The rate of increase, which is much more difficult to estimate, depends upon the wide and complex conditions of life which are often included in the phrase 'the struggle for existence.' While it is true that organisms sometimes exhibit an extraordinary increase in numbers in favourable areas and seasons, and while we know of many forms and even of whole races which have dwindled away and become extinct, the fluctuations in the numbers of plants and animals seem for the most part to be imperceptibly gradual. Their rate of reproduction is adjusted to the conditions of their life; the rise or fall of the population is seldom emphatic. The essay of Malthus (1798), in which he showed that the increase of human population tended to outrun the means of subsistence, but was met by various checks, afforded suggestions to Darwin and Wallace, who extended the induction of Malthus to plants and animals, recognising in their increase the fundamental condition of the struggle for existence, and analysing the checks as various forms of natural selection. But Herbert Spencer's analysis of the laws of multiplication was even more penetrating. Including under the term individuation all those race-preservative processes by which individual life is completed and maintained, and under the term genesis all those processes aiding the formation and perfecting of new individuals, he showed both inductively and deductively that individuation and genesis vary inversely. Genesis decreases as individuation increases, but not quite so fast; in other words, progressive evolution in the direction of individuation is associated with a diminishing rate of reproduction.

The Importance of Reproduction in Evolution.—As almost every individual life begins in the intimate union of two living units—the male-cell and the egg-cell—there is in the nature of the organism's beginning an evident possibility of variation. The two cells, and more especially the nuclei of the two cells, are intermingled; and in the vital combination which results new characteristics may be evolved, old features may be strengthened, peculiarities may be averaged off. On fertilisation as a source of variation, emphasis has been laid by Treviranus, Galton, Brooks, and others, while Hatschek regards the intermingling as an important counteractive of disadvantageous individual peculiarities, and Weismann finds in it the sole source of transmissible variations in many-celled animals.

In the individual life the antithesis between the reproductive and the nutritive functions has many expressions, and in terms of this antithesis not a few lines of variations can be rationalised. Thus, the shortening of the axis of the flower seems to be the result of a check imposed upon the vegetative system by the reproduction function; thus, the development of gymnosperm into angiosperm suggests a continuous subordination of the reproductive carpellary leaf; thus, in almost every natural alliance of phanerogams may be read a contrast between more and less vegetative types, such as is seen within the limits of a single species in the transitions between the leafy kale and the cauliflower. Among animals the antithesis is expressed in different ways—as in the varied degree in which the reproductive individuals of a hydroid colony are differentiated from the nutritive members.

In considering the evolution of animals great importance is always—and rightly—attached to the self-preserving struggles and endeavours which secure the satisfaction of nutritive needs; but the species-maintaining activities of reproduction have been not less important. Thus, Darwin insisted on the importance of sexual selection as a factor in evolution, and, though the criticisms of Wallace and others have lessened the cogency of Darwin's argument, there can be little doubt that courtship has aided in the evolution of the psychical life of animals. Romanes, too, in his insistence on the importance of isolation, recognises 'the reproductive factor in evolution.' For by variations in the reproductive system a species may be divided into mutually sterile sets, which, prevented from intercrossing by this physiological barrier, are free to develop along divergent paths. In a very different connection, Robert Chambers emphasised the importance of 'prolonged gestation,' and Fiske has directed attention to the progressive influence of prolonged infancy, while Miss Buckley has well pointed out that an increase of parental care and sacrifice as seen in birds and mammals has surely been a factor in, as well as a result of, the general ascent of animals.

The increase of reproductive sacrifice which we observe in the evolution of mammals and in the progress through oviparous monotremes, prematurely-bearing marsupials, and various grades of placentals; the growth of parental care, and the frequent subordination of self-preserving to species-maintaining ends; and finally, the rise of sociality from foundations based in organic kinship, are well-known facts of animal life which suggest the importance of the reproductive factor in evolution.

See EMBRYOLOGY, HEREDITY, SEX; H. Spencer, *Principles of Biology* (Lond. 1864-66); E. Haeckel, *Generelle Morphologie* (Berlin, 1866); V. Hensen, *Physiologie der Zeugung*, in Hermann's *Handbuch der Physiologie* (Leip. 1881); article 'Reproduction,' by P. Geddes and S. H. Vines, in *Ency. Brit.*; A. Weismann, *Papers on Heredity*, &c. (Oxford, 1889); P. Geddes and J. A. Thomson, *Evolution of Sex* (Lond. 1889).

Reptile-Fund, the fund so called, described at HANOVER, Vol. V. p. 547, was abolished by Caprivi in 1890.

Reptiles, a very large class of Vertebrate animals, including Tortoises and Turtles, Lizards of many kinds, the divergent New Zealand 'lizard' Sphenodon, Snakes, and Crocodilians—five distinct orders with living representatives, but including also at least as many orders of wholly extinct types, such as Ichthyosaurs, Plesiosaurs, and Deinosaurs.

Reptiles occupy a central position in the Vertebrate series: beneath them are Amphibians and Fishes, above them are Birds and Mammals. They begin the series of 'higher Vertebrates,' which at no period of life breathe by gills, which in embryonic life are provided with two birth-robes or fœtal membranes—a protective amnion and a respiratory allantois. Their relationships seem to be threefold, with the Amphibians, with Birds, and with Mammals. But there is no doubt that they are most closely linked to Birds—a fact first clearly recognised by Huxley, who emphasised the deep structural affinities of Birds and Reptiles by linking them together as Sauropsida, in contrast to Mammalia on the one hand and Ichthyopsida (Amphibians and Fishes) on the other.

Referring to the article BIRDS for a contrast between Mammals, Birds, and Reptiles, we shall simply notice that Reptiles are cold-blooded, the temperature of the body not greatly exceeding that of the surrounding medium; that the heart is three-chambered, except in Crocodilians, where four chambers first occur; that mostly venous blood goes from the heart to the anterior viscera, and mixed blood to the posterior region, only the head and anterior regions receiving purely arterial blood; that the body is covered with scales, with which subjacent bony plates or scutes are sometimes associated; that the skull articulates by a single condyle with the backbone, and the lower jaw works against the quadrate bone; that the great majority are oviparous, while in some the eggs are hatched within the mother. The earliest remains of Reptiles are found in Permian strata, and the golden age of Reptiles was in Mesozoic, especially in Jurassic and Cretaceous, times.

Classification of Living Reptiles.—As the orders of Reptiles with living representatives are separately discussed, it will be enough here to give a general classification. Order 1, Chelonia: Tortoises and Turtles. 2, Rhynchocephalia: one form—the New Zealand lizard Sphenodon (q.v.), whose extinct ancestors date from the Permian. 3, Lacertilia: Lizards (q.v.). 4, Ophidia: Snakes (q.v.). 5, Crocodilia: Crocodiles (q.v.), Alligators (q.v.).

EXTINCT REPTILES.—The classification of the extinct Reptilian types is still very uncertain; but many authorities agree in recognising the following orders:

Anomodontia.—Reptiles with lizard-like body, limbs adapted for walking, biconcave vertebræ, and teeth fixed in sockets. The order is restricted to the Permian and Trias, and exhibits affinities with the Labyrinthodont Amphibians and with Mammals. Among the representative genera are Pariasaurus, Galesaurus, Deuterosaurus, Dicynodon, and Placodus.

Sauropterygia.—Reptiles without exoskeleton, with long neck and short tail, limbs adapted for walking or for swimming, biconcave vertebræ, teeth fixed in sockets. All of them seem to have been carnivorous. The order is represented from the Trias to the Upper Chalk, and exhibits affinities with Amphibians. Among the representative genera are Plesiosaurus, Mesosaurus, and Nothosaurus.

Ichthopterygia.—Marine Reptiles, with whale-like body, without exoskeleton, with limbs modified as paddles, with biconcave vertebræ, with teeth implanted in a continuous groove. Many were carnivorous and fed on fishes. Seeley has shown that some were viviparous, the fossilised young being found in the fossilised mothers. The order is represented from the Upper Trias to the Upper Chalk, and exhibits affinities with Labyrinthodont Amphibians and with the New Zealand 'lizard' Sphenodon. Among the genera are Ichthyosaurus and Opthalmosaurus. Some attained a length of 30 to 40 feet.

Rhyncocephalia.—As Sphenodon is the only surviving representative of the Rhyncocephalia, the order may be almost regarded as extinct. It is represented by Palæohatteria from the Permian, besides Champsosaurus, Hyperodapeton, Rhynchosaurus from later strata. Within or near this order may also be included a remarkable form Proterosaurus from the Permian, a type for which Seeley has established a distinct order, Proterosauria. The special interest of these forms is, according to Baur, that they 'are certainly the most generalised group of all reptiles, and come nearest, in many respects, to that order of reptiles from which all others took their origin.'

Dinosauria.—The largest land Reptiles of crocodilian or more bird-like form, represented from the Trias to the Upper Chalk, exhibiting affinities with crocodiles and with birds. Representative genera are Iguanodon (sometimes measuring about 30 feet), Camptosaurus, Scelidosaurus, Stegosaurus, Ceratops (with long horns on the skull), Megalosaurus, Ceratosaurus (also horned), Brontosaurus (upwards of 50 feet in length), Atlantosaurus (with a femur 6 feet long).

Ornithosauria.—Flying reptiles, often called Pterodactyles, with a fold of skin extended on the greatly elongated outermost finger. The order is represented from the Lias to the Upper Chalk by such genera as Pteranodon, Pterodactylus, Dimorphodon, and Rhamphorhynchus. Some had an expanse of wing of about 25 feet, but many were small. Their affinities are uncertain.

See Huxley, *Anatomy of Vertebrated Animals* (1879); Nicholson and Lydekker, *Manual of Palæontology*, vol. ii. by Lydekker (Edin. 1890); Hoffmann in Bronn's *Klassen und Ordnungen des Thierreichs* (Leip., in progress); Duméril and Bibron, *Erpétologie Générale* (9 vols. Paris, 1834–54); British Museum Catalogues by Boulenger &c.; Holbrook, *North American Herpetology* (Phila. 5 vols. 1836–42).

Repton, a village of Derbyshire, 6¼ miles SSW. of Derby and 4¼ NE. of Burton-upon-Trent. Here was founded the first Christian church in Mercia, of which Repton for a while was the royal and episcopal capital. It was the seat from before 660 till its destruction by the Danes in 874 of a celebrated nunnery, as afterwards of an Austin priory from 1172 till the Dissolution. Remains of this priory are incorporated in the buildings of the free grammar-school, which, founded in 1556 by Sir John Porte, has risen to be one of the great English public schools, with an endowment of £2000, eight scholarships and several entrance exhibitions, some 20 masters, and 275 boarders. Among former pupils have been Justice Denman, Bishop Piers Claughton, Professor Sanday, and J. E. Sandys, the public orator at Cambridge. The parish church has a graceful spire and a very interesting Saxon crypt, 17 feet square. Pop. of parish, 2060. See Bigsby's *History of Repton* (1854).

Republic (Lat. *res publica*, 'the public good'), a political community in which the sovereign power is lodged, not in a hereditary chief, but either in certain privileged members of the community or in the whole community. According to the constitution of the governing body, a republic may therefore vary from the most exclusive oligarchy to a pure democracy. The several republics of Greece and that of Rome were, at the outset at least, aristocratic communities. The mediæval republics of Venice, Genoa, and the other Italian towns were also more or less aristocratic. The sovereign power was held to be vested in the franchised citizens, and every function—legislativĕ, executive, or judicial—not exercised directly by that body could only be exercised by parties deriving their authority from it. But the extent of the franchise, and the mode of exercising it, varied much in these civic communities; and the most prosperous and long-lived was Venice, which was also the most aristocratic of them all. In the 16th century the Seven Provinces of the Netherlands, on their revolt from Spain, adopted a republican form of government, as did Switzerland on becoming independent of the German empire. Great Britain was nominally a republic for eleven years (from 1649 to 1660). France was a republic from 1793 to 1805, and from 1848 to 1853; and the republic was again proclaimed 4th September 1870. Such government as Spain had between February 1873 and December 31, 1874, was of a republican form. Switzerland is also a republic; since 1848 more democratic than formerly. The other republics of Europe are the diminutive states of San Marino and Andorra, and, in certain respects, the free cities of Hamburg, Bremen, and Lübeck. The most important of modern republics is that of the United States of America, where pure democracy has been tried on a scale unknown elsewhere. Except during the short-lived empire of 1863–67, Mexico has been a republic since 1824. Since the revolution in Brazil in 1890 all the South American states (omitting the three Guiana dependencies) are republics. In the republics of the ancient world the franchised classes exercised their power directly without any system of delegation or representation. The same was at first the case in the Swiss cantons, where, however, representative government has been gradually but generally introduced. Modern republics have been founded on the representative, not the direct, system, which can hardly exist except in a community that is very small and concentrated as to space. Switzerland and the United States of America are *federal* republics, consisting of a number of separate states bound together by a treaty, so as to present to the external world the appearance of one state with a central government, which has the power of enacting laws and issuing orders that are directly binding on the individual citizens. The constitutions of the various republican countries are discussed under their several heads: see especially ATHENS, ROME, VENICE, SWITZERLAND, FRANCE, and UNITED STATES.

Republican, a party name in American politics, which has had at different times different significations. In the first years of the Republic it was the alternative title of the Anti-federalists, who advocated the sovereignty of the states and the rights of the people, and finally secured those amendments and additions to the Constitution which were intended to guarantee state rights, and which declared that all powers not expressly granted to congress by the Constitution are retained by the states or the people. Before the war of 1812, however, the term Democrats (q.v.) had been substituted as the title of the party; and the name of Republicans went out of use until 1856, when it was taken up by the new party which was organised to oppose the Democrats, its original holders. This party was formed to combat the extension of slavery; it appealed to all who were opposed to the repeal of the Missouri Compromise (see MISSOURI) and the efforts to make Kansas a slave state (see KANSAS). It grew out of the Free-soil party (see FREE-SOILERS), and at once took the place, as opponents of the Democrats, that the Whig party, which had died of over compromise, had for some time feebly held. In 1856 it nominated Frémont for the presidency, and made a good fight. The decision in the Dred Scott Case (q.v.) and the progress of events in Kansas greatly strengthened the party, and after the divisions among the Democrats over the same question in 1860 the success of the Republicans was assured. Electing Lincoln in that year, they held office continuously from 1861 to 1885, the Republican presidents being Lincoln, Johnson, Grant (twice), Hayes, Garfield, and Arthur; and in 1888 they were again successful, electing Benjamin Harrison. The conduct of the civil war was in the hands of the Republican party, although, of course, northern Democrats formed a large proportion of the Union armies. For its history, see UNITED STATES; and see also SLAVERY. Republicans claim great credit for their management of the finances of the nation, which brought about the resumption of specie payment. The slavery question has passed into history, and, although the more complete enfranchisement of the southern negroes has received the attention of the party, the principal opposition between Republicans and Democrats now is on the question of tariff, the former being strong protectionists, the latter advocating a revision of the tariff and the placing of a number of articles on the free list. On this question the elections of 1888 and 1892 were fought, Cleveland (Democrat) being defeated in the former but successful in the latter.

Republican Bird. See WEAVER BIRD.

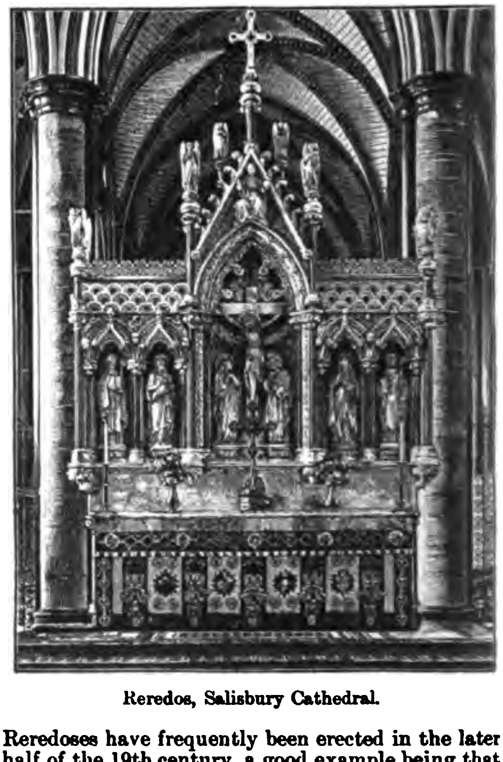
Repudiation, an unprincipled method for the extinguishment of a debt, by simply refusing to acknowledge the obligation, which has been adopted notoriously by several states of the American Union; Hayti has been the next worst offender. The eleventh amendment of the Constitution of the United States prohibits citizens of another or a foreign state from bringing suits against a state in the federal courts; while the individual states, not being independent sovereigns, could only be called to account by a foreign power through the national government. Reprisals or war are thus as impossible as a suit at law, and there is really no means by which the states can be compelled to recognise and meet their obligations. Twice in the history of the country have several states taken advantage of this condition of affairs—once after the commercial crisis of 1839, in which the United States Bank stopped payment, and again in the years following the civil war. In the latter period Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas were among the defaulters. Virginia, indeed, refused payment chiefly on the ground that no part of its existing debt had been allocated to West Virginia when the latter was separated as a state in 1863; and later acts of repudiation have found a local justification in the same grievance. But in the other states repudiation is to be traced to the effects of the war and to the unsettled government which ensued. The rebellion had left commerce in these states prostrate and paralysed, and especially was it necessary that railways should be rebuilt and new roads constructed; and to this end the public credit was pledged, often recklessly and at ruinous rates. In most cases the debts created in aid of railways were repudiated on the ground that the money had been obtained collusively and with no proper return of benefit to the states: North Carolina thus wiped off an obligation of more than $12,000,000. The other states mostly based their action on decisions of their own courts or on the action of their own legislatures; but such decisions are to be regarded as *ultra vires*, and in their action the states were not justified by law at all, but were simply taking advantage of the fact that they could not be compelled to pay.

Requeña, a town of Spain, 37 miles W. of Valencia, cultivates silkworms, saffron, and fruits. Pop. 13,527.

Requests, COURT OF, an ancient court of equity in England, inferior to the Court of Chancery, and abolished 1641. Also, a local tribunal (known likewise by the name of Court of Conscience) instituted in London by Henry VIII. for the recovery of small debts. Similar local tribunals elsewhere have all been superseded by the county courts.

Requiem (Lat. *requies*, 'rest'), a dirge or solemn service for the dead in the Roman Catholic Church. It consists in the celebration of the mass *Pro Fidelibus Defunctis* ('For the Faithful Departed'), the first words of the Introit of which are *Requiem æternam.*

Reredos (Fr.), the wall or screen at the back of an altar. It is usually in the form of a screen detached from the east wall, and is adorned with niches, statues, &c., or with paintings or tapestry. In some cases it is attached to the east wall and is of great size, covering the whole of the wall, as at All Souls College, Oxford. That splendid 15th-century reredos had been plastered over at the Reformation, but was discovered and restored in 1872–76. In Durham Cathedral is a very fine example of a reredos in the form of a detached screen; it was brought by sea to Newcastle from London by Lord Neville in 1380, being perhaps of French workmanship, and was restored in 1846. The lofty reredos (*c.* 1480) at St Albans, dividing the presbytery from the retro-choir, is of the same type and age as that at Winchester.



Reredos, Salisbury Cathedral.

Reredoses have frequently been erected in the later half of the 19th century, a good example being that of Salisbury, designed by Sir G. G. Scott, and erected in 1875 at the cost (£1800) of Earl Beauchamp to take the place of one demolished about 1790 by Wyatt. Owing to the imagery they contain, they have been the subject of controversy in the Church of England—e.g. in the case of the Exeter reredos (1873–75), and of that of St Paul's (1889–91), both of which were allowed, after frequent appeal, to remain.

Rescripts (Lat. *rescripta*), answers of the popes and emperors to questions in jurisprudence officially propounded to them. *Rescripta principis* were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, more especially women and soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *Pragmaticæ sanctiones*, a name which has found its way into the public law of Europe (see PRAGMATIC SANCTION). Rescripts might gradually come to have the force of law, in so far as their determinations in particular cases were of general application.

Rescue, in English law, is the illegal delivery and discharge of a prisoner or of goods out of the custody of the law. If, for example, a tenant whose goods are distrained for rent take them by force from the bailiff, the distrainer has a right of action against the person who rescues the goods. A person who rescues a prisoner accused or convicted of treason, felony, or misdemeanour is himself deemed to be guilty of treason, felony, &c.; the punishment varies with the gravity of the charge. A person who rescues or attempts to rescue a murderer going to execution is liable to penal servitude for life.

Resedaceæ, a natural order of plants, mostly herbaceous, having alternate leaves and terminal spikes of hermaphrodite irregular flowers. There are some forty known species, mostly natives of Europe and the west of Asia, and mostly mere weeds. Weld (q.v.) and Mignonette (q.v.) are the species most worthy of notice.

Reservation, MENTAL (Lat. *reservatio* or *restrictio mentalis*), the act of reserving or holding back some word or clause which is necessary to convey fully the meaning really intended by the speaker. It differs from equivocation (Lat. *equivocatio* or *amphibolia*) in this, that in the latter the words employed, although doubtful, and perhaps not fitted naturally to convey the real meaning of the speaker, are yet, absolutely speaking, and without the addition of any further word or clause, susceptible of that meaning. Few questions in casuistry have excited more controversy, or have been the subject of fiercer recrimination, than that of the lawfulness of equivocation and mental reservation. In the celebrated *Letters* of Pascal (q.v.) against the Jesuits it was one of the most prominent and, used as he employed it, the most effective topics; and Pascal's charges against the Jesuit casuistry of that day have been repeated in almost every popular controversy on the subject which has since arisen. There are several varieties of mental reservation, differing from each other, and all differing from equivocation. But as regards the morality of the subject all the forms of language calculated to deceive may be classed together. Mental reservation is of two kinds, *purely mental* and *not purely mental*. By the former designation is meant a mental reservation which cannot be detected, whether in the words themselves, or in the circumstances in which they are spoken. Of this kind would be the mental reservation implied if a person, on being asked if he had seen A. B. (whom he really had just seen *walking* by), were to reply: 'I have not seen him,' meaning '*riding on horseback*.' A 'not purely mental' reservation is that which, although not naturally implied or contained in the words, may nevertheless be inferred or suspected, either from them or the circumstances in which they are used. Of this kind would be the mental reservation of a servant, in giving the ordinary answer to a visitor's inquiry for his master: 'Not at home,' although his master were really in the house; or that of a confessor, who, in a country where the privileges of the secret of the confessional are known and admitted, on being asked whether a certain person had committed a crime, which the confessor knew from his confession that he had committed, should answer: 'I do not know,' meaning 'outside of the confessional.' And, in general, all such doubtful forms, whether of mental reservation or of equivocation, may be divided into *discoverable* and *undiscoverable*. Much of the odium which has been excited against the casuists for their teaching on this head has arisen from the confusion of their views as to these two classes of mental reservation.

According to the most approved Catholic authorities, 'purely mental' reservations and 'absolutely undiscoverable' equivocations are held to be in all cases unlawful, such forms of speech being in truth lies, inasmuch as they have but one real sense, which is not the sense intended by the person who uses them, and hence can only serve to deceive. This doctrine is held by all sound Catholic casuists, and the contradictory doctrine is expressly condemned by Pope Innocent XI. (Propp. 26, 27). On the contrary, mental reservations 'not purely mental' and 'discoverable' equivocations are held to be not inconsistent with truth, and in certain circumstances, when there is necessity or weighty reason for resorting to them, allowable. An historical example of such equivocation or reservation is in the well-known answer of St Athanasius to the question of the party who were in pursuit of him, and who, overtaking him, but not knowing his person, asked what way Athanasius had gone. '*He is not far off*,' replied Athanasius, and the party passed on in pursuit. And an ordinary example of discoverable mental reservation is that of a person who, on being asked by one to whom he could not with safety give a refusal, whether he has any money, should reply: 'No,' meaning, 'none to lend to you.' In order, however, to justify the use of these devices of speech, casuists require that there shall be some grave and urgent reason on the speaker's part; as, for example, the necessity of keeping a state secret, or a secret of the confessional, or of a professional character, or even the confidence entrusted by a friend, or the ordinary and fitting privacy which is required for the comfort and security of domestic life and of the peaceful intercourse of society; and that the concealed sense of the form of speech employed, although it may be *actually undiscovered*, and even unlikely to be discovered, may yet be, in all the circumstances, *really discoverable*. Some Protestant moralists admit that in some cases even equivocation is permissible; if any such reservations are allowed it is obvious there must be great difficulty in drawing a line between reservations that are permissible and those that are not. See CASUISTRY; Liguori's works; and Cardinal Newman's *Apologia*.

Reservation of the Sacrament. See LORD'S SUPPER, Vol. VI. p. 717.

Reserved List, in the Royal Navy, a device which formerly existed for expediting the promotion of officers who were still of an age for active service. Under certain Orders in Council of 1851 and 1853, old officers of good service were selected for promotion to the next grade on the Reserved List. This formed a bar to any further promotion; and removed the officer from active employment, except in the remote contingency of the Active List being exhausted, when these 'reserved' officers were liable to be called upon to serve. For all practical purposes, however, the Reserved List was a retired list. The officers placed on it obtained the half-pay of the rank to which they were promoted, and their removal gave vacancies for the promotion of younger and more efficient men. This list has practically died out; in December 1890 there were only six admirals and six commanders remaining on it, and under the Retirement Scheme of 1870 absolute retirement according to age was substituted.

Reserves. In the organisation of the military resources of most European countries the *reserve forces* are, first, those soldiers who, having served some time in the regular army, are still liable to be called upon to rejoin it when raised from a peace to a war establishment on mobilisation; and secondly, those who are liable to be called upon to follow in second and third lines if the occasion requires. Thus, in Germany and Austria the regular army and its reserves have behind them the Landwehr and Landsturm. In France the Territorial Army and its reserves form the second line, and in Russia the militia takes a similar position. Liability to serve in one or other of these reserves lasts generally from about the age of twenty to forty-two.

In Great Britain there are two reserves—viz. the Army Reserve and the Militia Reserve. The first consists of two classes, but the second class, some 900 pensioners of Chelsea and Greenwich hospitals, is gradually disappearing, and is not liable for service out of the United Kingdom. The first-class *Army Reserve* (some 60,000) consists of men who have served from three to eight years in the regular army, and are liable during the remainder of their twelve years' term of enlistment to be called back into the ranks in case of national danger or great emergency. They can be called out for twelve days' training in each year and in aid of the civil power, are paid £9 a year quarterly in arrear, and may re-engage for a further term of four years' reserve service at 4d. a day. They are called to the ranks by proclamation of Her Majesty in council, the occasion being first communicated to parliament if sitting. The *Militia Reserve* consists of militiamen who, for an extra £1 annual bounty, take the liability to be called upon to serve in the regular army abroad or at home whenever the army reserve is called out on permanent service. Otherwise they do not serve in the regular army. The rest of the Militia (q.v.), the yeomanry, and the volunteers form a second line of defence for the United Kingdom in case of invasion.

The native army of India has two reserves, active and garrison. The first is formed of men who have served not less than five or more than twelve years with the colours; the second of those who have completed twenty-one years' colour service.

A reserve, on the battlefield, is a body of troops held back by the commanding officer so as to be ready to meet a counter-attack, to support a success, or cover a retirement.

The *Naval Reserve* is the subject of a separate article.

Reservoir. See WATER-SUPPLY.

Reshd, a town of Persia, capital of the province of Ghilan, stands near the south-west shore of the Caspian Sea, 150 miles NW. of Teheran. Silk is grown and manufactured; and rice and tobacco are cultivated. The port of the place is Enzeli, on the other side of the bay on which Reshd stands, and 16 miles distant. Pop. upwards of 25,000.

Residence. See DOMICILE.

Residuary Legatee. See LEGACY.

Re'sina, a town of Italy, 4 miles SE. of Naples, at the foot of Vesuvius, and facing the sea. Pop. 13,626. Resina is built on the site of ancient Herculaneum, and was in part destroyed by the lava outburst of 1631.

Resins, a class of natural vegetable products composed of carbon, hydrogen, and oxygen. They are closely allied to the essential oils, all of which, when exposed to the air, absorb oxygen, and finally become converted into substances having the characters of resin; and in most cases they are obtained from the plants which yield them mixed with and dissolved in a corresponding essential oil. Like the natural oils, the natural resins are usually mixtures of two or more distinct resins, which admit of separation by their unequal solubility in different fluids.

The following are the general characters of this class of compounds. At ordinary temperatures they are solid, translucent, and for the most part coloured, although some are colourless and transparent. Some are devoid of odour, while others give off an aromatic fragrance from the admixture of an essential oil. In their crude state they never crystallise, but are amorphous and brittle, breaking with a conchoidal fracture; when pure several of them may, however, be obtained in the crystalline form. They are readily melted by the action of heat, and are inflammable, burning with a white smoky flame. They are usually described as non-volatile, but it has been shown that common resin may be distilled in a current of superheated steam. They are insoluble in water, but dissolve in alcohol, ether, and the essential and fixed oils. They are insulators or non-conductors of electricity, and become negatively electric by friction. Many of them possess acid properties, in which case their alcoholic solutions redden litmus. These resins combine with the alkalies, and form frothy soap-like solutions in alkaline lyes. The resinous soaps thus formed differ from ordinary soap in not being precipitated by chloride of sodium.

The resins are divisible into the *hard resins*, the *soft resins*, and the *gum-resins*. The hard resins are at ordinary temperatures solid and brittle; they are easily pulverised, and contain little or no essential oil. Under this head are included copal, the varieties of lac, mastic, and sandarach, and the resins of benzoin (commonly called gum-benzoin), jalap, guaiacum, &c. The soft resins admit of being moulded by the hand, and some of them are viscous and semi-fluid, in which case they are termed *balsams*. They consist essentially of solutions of hard resins in essential oils, or admixtures of the two. They become oxidised and hardened by exposure to the air into the first class of resins. Under this head are placed turpentine, storax, balsam of copaiba, and the balsams of Canada, Peru, and Tolu. The gum-resins are the milky juices of certain plants solidified by exposure to air. For these, see GUM.

The resins are very widely diffused throughout the vegetable kingdom. They are generally obtained by making incisions into the wood of the trees which produce them; sometimes, however, they exude spontaneously, and in other cases they require to be extracted from the wood by boiling alcohol. The crude resins are separated from the essential oils with which they are usually mixed by distillation with water, the resin remaining while the oil and water pass off; and from the gummy and mucilaginous matters by alcohol, which dissolves out the pure resins, which can be precipitated from their alcoholic solution by the addition of water. The resins are extensively employed in medicine and the arts.

Various fossil resins are known, of which the most important is Amber (q.v.). Some chemists place bitumen and asphalt amongst this class; and amongst the fossil resins described by mineralogists may be mentioned Fichtelite, Hartite, Idrialite, Ozokerite, Scheererite, Xyloretin, &c.

The common resin, or rosin, of commerce exudes in a semi-fluid state from several species of pine, especially *Pinus tæda*, *P. mitis*, *P. palustris*, and *P. rigida* of North America, *P. pinaster*, *P. pinea*, and *P. Laricio* of southern Europe, and *P. sylvestris* of northern Europe. The crude article, consisting of turpentine and resin proper, is subjected to distillation, when the resin alone remains behind. The resin thus procured is used very extensively in the manufacture of common yellow soap, also for sizing paper and various other purposes, including the preparation of ointments and plasters in pharmacy.

The other resins most generally known and used in Europe, and here all treated in separate articles, are Anime, Copal, Dammar, Mastic, Sandarach, Frankincense, Lac, and Kauri Gum.

Res Judicata, in Law, means that the subject-matter of an action has been already decided by a court of competent jurisdiction. A matter so decided cannot again be made a ground of action, as between the same parties.

Resolution, in Music, the relieving of a discord by a following concord; see HARMONY. For the Resolution of Forces, see COMPOSITION.

Resorcin. See DYEING, Vol. IV. p. 141.

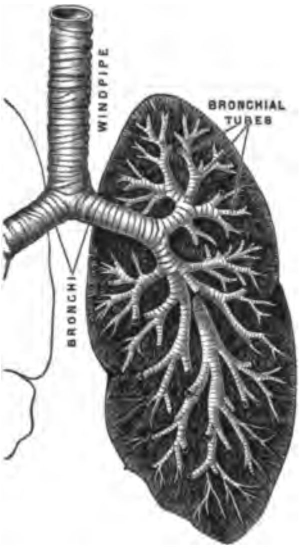
Respiration, or BREATHING, is a part of the life of all organisms, animal and vegetable. It is a series of chemical changes, the first of which is the absorption of oxygen into the body, and the last of which is the excretion of carbonic acid. The association of this intake of oxygen and excretion of carbonic acid with the same organs, the lungs, is due to the fact that both the food-stuff and the waste-stuff are gases, and not to any immediate connection between them. Necessarily any organ adapted to the diffusion of a gas from the air into the blood must also be adapted for the diffusion of a gas from the blood into the air; that is, supposing that the living membrane, of which the lung essentially consists, which separates the air from the blood, acts, so far as the diffusion of gases is concerned, as a dead membrane; even if it has any effect arising from the fact of its being a living membrane it is probable that it will behave in a similar way to both the ingoing and outgoing gases. We shall first describe the process as it occurs in man and other Mammalia, and then give a sketch of comparative respiration, the various methods adopted in other types of animals for effecting the same purpose. The respiration of plants is dealt with in the article on VEGETABLE PHYSIOLOGY. For the general relation of the function of respiration to the other bodily functions, see PHYSIOLOGY.

In all animals in which the parts of the body are nourished by the circulation of a stream of food material, the blood, there must always be two distinct sets of processes to consider: (1) the maintenance of the blood in a normal state, by the supply of fresh food-matter from time to time, and by the elimination of waste-matter; (2) the nutrition of the individual tissues and cells of the body by the blood-stream (see CIRCULATION). Applying this to the function of respiration, we shall have to consider (1) the manner in which oxygen is supplied to the blood and carbonic acid gas removed from it; (2) the manner in which the cells are able to take oxygen out of the blood and cast into it their useless carbonic acid; also the changes that take place within the cells between the intake of the oxygen and the output of the carbonic acid. These two sets of processes are usually described as the outer and the inner, or tissue, respiration. Some writers include in the term outer respiration the absorption of oxygen by the cells from the blood, and the excretion of carbonic acid into the blood, and restrict the term inner respiration to the actual changes that take place within the cells. It is evident that outer respiration corresponds to the processes of digestion and absorption to which food materials other than gaseous are subjected. It must be evident, too, that the mass of our present information refers to outer respiration; the changes that take place within the cells, of which inner respiration is a part, are the whole mystery of the objective side of life.

OUTER RESPIRATION.—In all animals which possess a blood-stream the outer respiration is carried on by the simple diffusion of oxygen into and of carbonic acid out of the blood through a thin membrane from and into the air or water in which the creature lives. As already noted, it is possible that the fact of this membrane being a living one may in some ways modify the otherwise simple processes of diffusion. The essential structure, therefore, of all breathing organs, lungs, gills, or tracheæ, must be the same: a thin membrane exposed on the one side to the oxygen—containing medium, air or water, in which the animal lives, on the other side to the blood flowing in a network of thin-walled vessels, so that the gases that have to pass in and out of the blood are only separated from the air or water from which and into which they have to pass by thin partitions—by the membranous wall of the breathing organ, and by the thin wall of the blood-vessels. Animals such as the frog, which have thin skins, can breathe with—i.e. the gases can diffuse through—the whole surface of their bodies if the under skin is well supplied with blood-vessels. A frog for this reason can live for days without its lungs, but if its skin be rendered impervious to gases will die very quickly, even with the lungs intact. But, as all the Mammalia have thick skins, this method of breathing must be reduced to a minimum, if indeed it exists at all.

In outer respiration we have two things to consider: (1) The manner in which fresh supplies of oxygen are pumped into the lungs, while the poisonous carbonic acid gas is pumped out. This may be called the mechanics of respiration. (2) The manner in which oxygen passes from the air in the lungs into the blood, and is held in the blood, and the manner in which the carbonic acid in the blood passes out of the blood into the air-chambers of the lungs. This may be called the chemistry of respiration.

Structure of Respiratory Mechanism.—This mechanism consists of the lungs, a series of minute air-chambers with a network of capillaries in the walls, the air-passages from the air-chambers of the lungs to the outer air, and the chest-walls with their muscles, which act like bellows and change the air in the lungs. The essentials of structure that a *lung* must possess have already been emphasised. The simplest lung that we can imagine would be an elastic membranous bag, well supplied with blood-vessels, and with a pipe connecting it with the air; the most complicated that exist are essentially of that construction, the complications that occur having for their object merely the enlarging of the surface exposed to the air. Let us begin with the air-passages. There are first the nose and mouth; these join the upper part of the gullet, known as the pharynx (see illustration at DIGESTION). From the pharynx arises the windpipe (trachea); this passes through the voice-box (larynx) into the chest-cavity; there it divides into two passages (the bronchi); the bronchi go on dividing again and again, generally into two; the ultimate divisions (the bronchioles) open into clusters of air-chambers. The air-chambers are about $\frac{1}{100}$th inch in diameter. It has been estimated that there are some 725 millions of them, and that their total surface is about 2000 square feet. The walls of the air-chambers are formed of a thin membrane in which the blood and lymph capillaries ramify. Minute openings lead from the air-chambers into the lymph spaces of the membrane. The membranous walls are partly formed of elastic tissue. It is this that gives to the lungs their elasticity. The larger air-passages (trachea and bronchi) are kept open by horseshoe-shaped plates of cartilage; muscles stretch between the poles of the horseshoe, complete the ring, and permit the size of the passages to vary, at the same time resisting over-distension when the internal pressure rises. These larger air-passages are lined by a mucous membrane, containing mucous glands; the innermost layer is a ciliated epithelium; the cilia lash upwards, and thus keep the passages free from mucus and remove foreign particles. As the passages become smaller they lose their cartilages, and the muscles form a continuous circular layer. The lungs are invested by a membrane (the visceral pleura). At the root of the lungs this membrane is continuous with a membrane which lines the chest-cavity (the parietal pleura). The space between the two is the pleural cavity; it is in reality a large lymph space, and communicates with the lymphatics of the pleura. Owing to the air-pressure within the lungs the two pleuræ are closely pressed together, the lungs entirely filling the chest-cavity. If the chest-wall be punctured the lungs partially collapse owing to their elasticity, and the respiratory movements are unable to move the air in the lungs.



The Trachea (windpipe), Bronchi, and one of the Lungs in section.

The *chest* is an air-tight chamber enclosing the lungs and the heart. The walls of the chest are formed of bones (the ribs, sternum, and backbone) and muscles; the bones and muscles are so arranged that the size of the chest-cavity can be altered. In this way the chest acts as a bellows and moves air in and out of the lungs. The ribs are sloped slightly downwards, especially after an expiration; when an inspiration is taken certain muscles fix the upper ribs, and those muscles connecting the ribs to each other contract and the ribs are raised, and thus the size of the chest-cavity is increased. At the same time a flat muscle called the Diaphragm (q.v.), which separates the chest-cavity from the rest of the body-cavity, and which after an expiration is arched upwards (by the pressure of the abdominal viscera upon it, the viscera in turn being pressed upon by the abdominal walls), forcibly contracts, becomes flatter, and therefore enlarges the size of the chest-cavity, forcing the abdominal viscera downwards and causing the abdomen to protrude. (The relation of the lungs to the other main organs will be seen in the illustration at ABDOMEN; see also that at DIAPHRAGM.) In these two ways, then, the size of the chest-cavity may be increased. The result of this enlargement is that the pressure of the air within the cavities of the lungs is lowered; air therefore from without rushes through the nostrils (one ought not to breathe through one's mouth) down the windpipe into the lungs, and thus a fresh supply of oxygen is introduced. The movements which produce this result are known as the inspiratory movements. In making an expiration the reverse effects are produced; the chest-cavity is made smaller, the pressure of the air in the lungs increases, and some rushes out through the nostrils into the air until the pressures inside and outside are equalised. An ordinary expiration is effected by the elasticity of the lungs, by the fall of the ribs, unsupported by the contraction of the muscles that caused an inspiratory movement, by the elasticity of the cartilages of the ribs which were twisted during inspiration, and by the elasticity of the abdominal wall which was forced outwards by those viscera pushed downwards by the diaphragm. An ordinary inspiration is therefore the result of a number of active muscular contractions, while an ordinary expiration is the result of mere passive elasticity of the parts concerned. There are certain other respiratory movements to be considered. During inspiration and expiration the glottis (the opening between the vocal chords of the larynx; see the illustration at LARYNX) undergoes a rhythmical widening and narrowing; this movement is greater in forced than in quiet breathing. And during inspiration the nostrils dilate; in most cases perhaps the inspiration has to be rather a forced one before they do so. Forced respiration occurs when the supply of oxygen is insufficient, or when carbonic acid accumulates in the blood. Any muscle that can aid in enlarging and decreasing the size of the chest-cavity is called into play. The average amount of air, in the case of an individual 5 feet 8 inches in height, that goes in and out of the lungs at each inspiration and expiration is about 20 cubic inches; this is called the tidal air. By means of forced inspiratory movements the ingoing tide may be increased by 120 cubic inches; by means of a forced expiration the outgoing tidal air may be increased by 90 cubic inches. After the most forced expiration possible there always remain within the lungs about 90 cubic inches of air. So that if we take as deep a breath as possible, and then make as forced an expiration as we can, we shall drive out 120 + 20 + 90 = 230 cubic inches of air. This is termed the respiratory capacity. Since the tidal air is only 20 cubic inches, and 180 cubic inches remain in the chest after an ordinary expiration, it follows the air directly changed during respiration is not that really within the lungs themselves, but is that within the nose, windpipe, and larger bronchi, the pipes that result from the branching of the windpipe. Therefore the changes of the air within the essential parts of the lungs are the result of diffusion between it and the purer air of the bronchi, aided by the rush with which the tidal air flows in.

The ordinary respiratory movements differ in the two sexes and at different periods of life. In young children the chest is altered in size chiefly by the movements of the diaphragm, and the protrusion of the abdominal wall during inspiration is therefore very marked. In men also it is the diaphragm which is chiefly operative, but the ribs are also moved. In women it is the movement of the ribs, especially the upper ones, which is the most extensive. The respiratory rhythm is the relation of the acts of inspiration and expiration to each other as regards time. It may be expressed as follows: In. = 3, Ex. = 4, pause = 3. The number of respirations in a healthy person is about fourteen or eighteen per minute; it is greater (nearly double) in childhood. It varies according to circumstances, exercise, rest, health, disease, &c.; in disease it may fall as low as seven or rise to a hundred.

The proportion of respiratory movements to heart-beats is about one to four, or one to five; in health they vary together. Since the heart and the lungs are contained in the same air-tight cavity, it follows that the variations in size of the heart as it beats must rhythmically affect the pressure of the air in the lungs, causing a succession of minute puffs of air to leave and enter the nostrils. Similarly the alterations in pressure within the chest-cavity affect the heart. Increase of pressure or expiration must (owing to the arrangement of the valves) help the blood to flow out of the heart. Decrease of pressure or inspiration must, for the same reason, help the flow of blood into the heart. The pressure which the expiratory muscles, aided by the elasticity of the parts concerned, can exert is on the average equal to that of 4 inches of mercury. The inspiratory muscles can lower the pressure within the chest-cavity by a pressure equal to that of about 3 inches of mercury below that of the atmosphere; the greater part of the energy of the inspiratory movements is used in overcoming the elasticity of the lungs, chest-walls, and abdominal walls. The respiratory sounds are two in number: (1) the tubular sound, heard over the windpipe and the larger bronchi, probably due to friction of air in these passages; (2) the vesicular sound, heard over the whole chest during inspiration, probably caused by the sudden dilation of the small air-chambers of the lungs, and to friction in the smaller passages. During a quiet expiration there may be no sound; when present it is very soft and indistinct, probably due to the air passing out of the air-chambers.

The Nervous Mechanism of the Respiratory Movements.—Although all the muscles concerned in the movements of breathing are voluntary muscles—i.e. can be made to contract by an act of will—yet respiration is normally an entirely involuntary act. This is obvious from the fact that during sleep, or during absence of consciousness caused in any way, respiration goes on as well as during wakefulness. Further, although we may at will breathe or cease to breathe, yet we cannot by any effort of the will suspend the respiratory movements for longer than at most a few minutes at a time. We have seen how many are the muscular movements involved in breathing, and it is obvious that the adjustment as to time and intensity of contraction of all these muscles must be a very nice one—in technical phrase, they must be co-ordinated. Such co-ordination must always be the result of a nervous mechanism, and this co-ordination, together with the fact of the rhythmical nature of the respiratory movements, suggests that the whole must be under the dominance of a nervous centre. The position of this centre has been ascertained by experiment; the whole of the upper part of the brain may be removed, and yet breathing will be unimpaired; but if a certain part of the medulla (see BRAIN, and illustration, Vol. II. p. 388) be injured or removed then all respiratory movements cease at once; the centre must therefore be in that part of the medulla. The centre is bilateral, for destruction of one-half of the medulla is followed by paralysis of the respiratory muscles of that side only. Further, we must conclude that, since inspiration is in its muscular movements antagonistic to expiration, there is an inspiratory centre and an expiratory centre in each of the two halves of the respiratory centre; but, as already noted, the expiratory centre is active only in forced respiration. The similar centres on each side are so co-ordinated that they act as one centre. This compound centre then is to be regarded as regulating the respiratory movements. We have said that if the medulla be injured the respiratory movements cease at once, and that from this it is concluded that the respiratory centre is in the medulla; but in young animals it seems that the movements may continue after destruction of the medulla, or may be produced by the reflex stimulation of some centre by irritating the skin. This subsidiary centre must be in the spinal cord; but it almost certainly *is* a subsidiary centre, though the matter is not quite settled yet.

Now is the centre 'automatic' in its discharges of nervous impulses, or is it reflexly stimulated into action by the arrival of stimuli from some other part of the body? We know by ordinary experience that the centre may be influenced from without, by impulses arising from higher parts of the brain, as when by will we alter the respiratory rhythm, or when it is affected by emotions, and also by impulses arising from the stimulation of sensory surfaces, as when cold water is dashed against the skin. It is found by experiment that the centre may be influenced in two distinct ways: (1) by nervous impulses; (2) by changes in the blood.

Nervous impulses may affect either the inspiratory or the expiratory part of the centre. It seems that all afferent nerves—i.e. nerves in which the impulses travel towards and not away from the central nervous system—may influence the respiratory centre (see NERVOUS SYSTEM). But the vagi (nerves that are distributed to all the viscera) seem to be in specially close relation, beginning as they do close to the respiratory centre in the medulla, and ending in the lungs. If one vagus be cut there is not much effect upon the breathing; but if both are cut then the breathing becomes slower and deeper. If the end nearest the centre of one of them be stimulated the respiratory rhythm is *generally quickened*; by a certain strength of stimulus it may be made normal; if the strength of the stimulus be further increased the inspiratory movements may be made before expiration is finished; this effect increased to a certain extent must obviously result in a standstill of all respiratory movements; the chest-walls remain in the inspiratory place. But *occasionally* it happens that stimulation of the central end of a vagus, after both have been cut, produces a further *slowing* of the movements—they may indeed be entirely stopped; in this case the chest-walls remain in the expiratory phase. From these results it is concluded that the vagus contains two kinds of fibres that affect the respiratory centre, one kind that increases the respiratory movements, another that inhibits them; and, further, that when one kind is active in causing increased inspiratory movements the other kind is active in causing depressed expiratory movements. Further, if air be drawn out of the lungs, thus imitating expiration, an inspiratory effort is made; if air be forced into the lungs, thus imitating an inspiratory movement, an expiratory effort is made. Therefore we may conclude that expiration stimulates the inspiratory centre, and that inspiration stimulates the expiratory centre. That the effects from which these conclusions are drawn are due to the stimulation of the vagus endings in the lungs is shown by the fact that they do not occur when the vagi have been divided; and that they are not due to alteration in the state of the essential gases of the blood is shown by the fact that they may be produced by forcing an indifferent gas, such as nitrogen, in and out of the lungs. The respiratory pump is therefore a self-regulating mechanism.

If we cut the vagi the respiratory rhythm usually becomes slower, and the movements are deeper;

therefore normally stimuli are constantly passing up the vagi to the centre, and accelerating the discharge of impulses by the centre. Still, an accelerating effect is not the same thing as an initiating stimulus. Further, since respiration goes on when the higher parts of the brain are removed, impulses proceeding from above are not essential; and since when the spinal cord is cut below the medulla the movements of the nostrils and vocal chords continue (although of course all others cease), the centre works independently of sensory impulses arriving from any nerve, except the cranial nerves; and since these cranial nerves may be divided, if the medulla and spinal cord be left intact, without any effect upon the respiratory movements, we may conclude that the centre is automatic in its action, but may be influenced from without.

The more venous the blood the greater is the activity of the centre; when the blood reaches a certain state of impurity convulsions arise. We may conclude that the state of the blood affects the centre directly, and not reflexly, by stimulating the endings of afferent nerves in various parts of the body; because if the supply of blood be cut off from the medulla alone the same effects are produced. Venous blood differs from arterial blood in containing less oxygen and more carbonic acid. The deficiency of oxygen is the cause of the greater activity of the centre, because if an animal breathe an atmosphere of nitrogen the carbonic acid does not accumulate in the blood, and yet convulsions occur; whereas if the animal breathe an atmosphere containing sufficient oxygen but excess of carbonic acid, then the convulsions do not occur, but the animal may become unconscious through some of the higher centres being poisoned. When in action the centre discharges motor impulses down various nerves to all the muscles concerned in the respiratory movements. If any of the nerves be cut the movements of the muscles supplied of course cease, since they are no longer stimulated by impulses proceeding from the centre.

The Chemistry of Respiration.—We have now to explain the passage of oxygen from the air-chambers of the lungs into the blood that circulates in the vessels of the chamber-walls, and the passage of carbonic acid from the blood into the air within the lungs.

In order to understand what follows we shall have to study the laws of diffusion (see also DIFFUSION). A gas consists of a great number of separate molecules moving with great speed. The number of these molecules in a cubic inch of a gas (at ordinary temperature and pressure) is estimated about 10^{21} or 1,000,000,000,000,000,000,000. Each molecule is so small that the space between adjacent molecules is large compared with the size of the molecules; therefore, each molecule during its movement has a large path free from collision with other molecules. The average speed of a molecule varies with the temperature, increasing as the temperature rises. The molecules lying near the surface of any mass of gas will constantly impinge upon the boundaries; these impacts are so numerous and so close that they produce an apparently continuous *pressure* all over the boundary. This pressure obviously depends only upon the density (number of molecules in unit-space) and the temperature (average speed of the molecules) of the gas. Further, the molecules of a gas are so far apart that when two or more gases are mixed their molecules interfere so little with each other that each gas exerts the same pressure upon the walls of the containing vessel as it would do were it alone present. In such a case the total pressure is the sum of the two or more *partial pressures* of the several gases. If the space in which a gas is enclosed be diminished the molecules are brought nearer to each other, until a point is reached at which many of the molecules apparently act upon each other in such a way as to *become more complex molecules, thus forming a liquid* in the lower part of the vessel with its gas in the upper part. The complex molecules are still in motion, and interchange, or *diffusion*, constantly takes place between the two regions. The number of molecules leaving the gaseous region depends only upon the state (temperature and density) of the gas. The number leaving the liquid depends only upon the state (temperature and density) of the liquid. When the diffusion takes place in a closed space a state of equilibrium of interchange is soon reached. In the lungs the liquid molecules of the oxygen of the blood are being constantly moved past the common surface between the air and the blood; the inflow therefore of oxygen from the air into the blood is greater than the outflow from the blood to the air. On the other hand, the gaseous carbonic acid in the air is constantly removed from the common surface between it and the blood; and therefore the outflow of carbonic acid from the blood into the air is greater than the inflow from the air into the blood. This picture of the state of matters that regulate the interchange of gases in respiration is simpler than the reality. The further complexity will be described immediately.

We must know what are the laws governing the diffusion when the gas *above* the liquid is not the gas of the liquid, as is the case when air rests upon a surface of water. Some of the molecules of the air will become entangled in the liquid, will form the liquid of the particular gases *within* the other liquid, and then the state of affairs will be as before, so far as the gases, and their liquids, of the air are concerned, and a state of equilibrium between each of these gases and its own liquid will be formed. But now suppose that the liquid and the gas have a special chemical affinity for one another, as is the case with the oxygen of the air and a substance in the blood, and as is the case with the carbonic acid of the blood and a substance or substances in the blood. As soon as the gas has diffused into the liquid the chemical compound will be formed; but now the reverse effect will begin, dissociation of the compound will occur, but slowly, because a greater violence of collision is necessary. Therefore, other things being equal, less pressure will be needed to maintain equilibrium, because fewer liquid molecules of the compound will become gaseous, and therefore fewer gaseous molecules need become liquid to preserve equilibrium. Indeed, it is found that at a certain temperature and a certain pressure the dissociation scarcely takes place at all; but if temperature be raised, or if the pressure be lowered to a certain point, then the dissociation will be very rapid.

These laws of diffusion apply to the gases of the blood. In the investigation of these gases a sample of blood is placed under the receiver of an air-pump (thus imitating, though exaggerating, the normal pumping action of the chest-walls), the gases extracted are passed through various solutions which retain the several gases, and thus they may be estimated and examined. The quantity of oxygen obtained from arterial blood is greater than that obtained from venous blood. The arterial blood of a dog yields for every 100 vols. at ordinary pressure and 0° C. 58·3 vols. of mixed gases when the external pressure is reduced to zero. This mixture is composed of 23·2 vols. of oxygen, 34·3 vols. of carbonic acid, and 1·8 vols. of nitrogen.

If blood took up as much of these gases by mere diffusion as water does, it would contain 0·86 vols. of oxygen, 1·2 vols. of carbonic acid, and 1·6 vols. of nitrogen. Therefore it is evident that, while the nitrogen is merely diffused into the blood, the oxygen and the carbonic acid must be combined with some substance or substances in the blood. If we gradually lower the external pressure of the atmosphere upon the blood we notice that at any given temperature (at which the combination can exist) the pressure may be lowered to a certain point without much gas coming off, and that at that point the gases begin to come off rapidly. This is another proof that the gases are combined and not merely absorbed in the blood; for in case of simple absorption the gases come off in equal amounts for equal lowerings of pressure. The amount of the gases that can be taken from blood-plasma (free from blood-cells) is 0·26 vols. of oxygen, 35·26 vols. of carbonic acid, and 2·24 vols. of nitrogen. The great mass of the oxygen is, therefore, not in the plasma, but in the corpuscles; while the great mass of the carbonic acid is in the plasma. The oxygen is found to be united to the red colouring matter, of which the red blood-cells are chiefly composed. This substance is called hæmoglobin. It is not so easy to determine in what combination the carbonic acid exists in the plasma. A certain amount is found in the red corpuscles (though the above figures do not show it); indeed, some writers consider that the hæmoglobin of these cells is the chief carrier of carbonic acid. The effect of lowered pressure upon blood-plasma, so far as regards carbonic acid, is much the same as it is upon solutions of sodium hydrogen carbonate. Some writers believe that the carbonic acid exists in the plasma in the form of sodium bicarbonate. Others believe that it may be in the form of bisodium hydrogen phosphate. The presence of red blood-corpuscles has a very marked effect upon the disengagement of carbonic acid under lowered pressure; it hastens it considerably. This effect appears to be due to the presence of oxyhæmoglobin.

The total pressure of the atmosphere is 760 mm. of mercury. The partial pressure of *oxygen* in the *air* is 159·6; of *carbonic acid*, practically zero; of *nitrogen*, 600·4. Oxygen does not leave arterial blood until the partial pressure falls to 29·64, nor venous blood until the pressure falls to 22·04; these therefore are the partial pressures of oxygen in arterial and venous blood. Carbonic acid does not leave arterial blood until the partial pressure falls to 21·18, and venous blood until it falls to 41·04. Therefore blood exposed to air would readily gain oxygen and lose carbonic acid. But the air in the part of the lungs where the respiratory interchange takes place is not the same as the air surrounding the body; the partial pressures of expired air will be nearer the true numbers; they are—of oxygen, 121·6; of carbonic acid, 33·4; of nitrogen, 600. But even expired air is not the same as air within the alveoli; for the air taken in and out of the lungs (tidal air) only enters and leaves the larger respiratory passages near the opening into the outer air; from these it diffuses into the air of the alveoli. The partial pressures of this air have been estimated by introducing a collector into the alveoli and taking out samples. Specimens of air collected in this way have been found to have the following partial pressures: Oxygen, 27·44; carbonic acid, 27·06; nitrogen, 705·5. It is difficult to believe that this is a correct estimate, for the difference between the partial pressure in the alveoli and that in the expired air is so enormous. However, assuming it to be correct, the following diagram will show the direction in which diffusion must take place.

	Venous Blood.	Alveolar Air.
Oxygen	22·04	27·44
Carbonic Acid	41·04	21·04

The vertical line represents the alveolar and capillary wall; the arrows show the direction in which the gas molecules must diffuse. But if we compare the partial pressures in venous blood, in arterial blood, and in alveolar air, a very remarkable fact appears.

	Alveolar Air.	Venous Blood.	Arterial Blood.
Oxygen	27·44	22·04	29·64
Carbonic Acid	27·06	41·04	21·04

The venous blood flows through the lungs, and issues as arterial blood, and yet the partial pressure of oxygen in arterial blood is *higher than it is in alveolar air, the place from which it must have come;* while the pressure of carbonic acid in arterial blood is *lower than it is in alveolar air, the place to which it has passed.* We must therefore conclude that the living alveolar wall has exercised some influence upon the gases in virtue of its secreting and excreting activity; it has done work against the molecular energies that produce diffusion. But the numbers given by various authors for the partial pressures of the gases in the various places differ, so that perhaps no thoroughly reliable conclusion can be drawn from them. Still in any case the slight differences of partial pressure, especially of oxygen, render the validity of any explanation of the rapidity of gaseous interchange within the lungs in terms of ordinary diffusion extremely doubtful. A possible aid to the interchange has recently been suggested in the sudden stroke of the heart, which would have an accelerating effect upon the liberation of gases from a fluid under low partial pressure; just as a tap upon the sides of a glass containing soda-water will cause bubbles of carbonic acid to be given off. Further, as already stated, some carbonic acid is combined with hæmoglobin. This combination is, like oxyhæmoglobin, dependent upon the partial pressure of the carbonic acid, and is easily given off when that pressure is lowered. Possibly the hæmoglobin may be an important carbonic acid carrier in the blood.

Effects on Respiration of the Quality and Quantity of the Gases of the Atmosphere.—The respiratory mechanism, as well as the whole body, is adapted to work with air of a certain composition, and at a certain pressure. The mechanism can adapt itself, within certain limits, to variations of composition and pressure. We have to state what these limits are, and what happens when they are overstepped. We shall study first of all, because of its practical importance, the results of breathing in a confined space, or in one insufficiently ventilated. The effect upon the air of course is that the proportion of oxygen is lowered, and that of carbonic acid increased. The first effect upon a person experiencing such a state of affairs is that a sense of mental and muscular fatigue occurs when the proportion of carbonic acid rises to 0·1 per cent., the normal proportion being 0·04 per cent.; and this is not due to the carbonic acid, but to the presence of organic matter, derived probably from the clothes, of the amount of which the carbonic acid happens to be a measure; for if pure carbonic acid be introduced into the air of a room, until the proportion rises to 1 per cent., no disagreeable sensations are experienced in breathing it. If the proportion of oxygen be still further diminished, or if by shutting the trachea of an animal all supply of oxygen to its blood be cut off, the oxygen of the blood begins to be used up, and carbonic acid begins to accumulate, and asphyxia sets in. There are three stages of asphyxia. (1) The breathing becomes deeper and more rapid, the blood-pressure rising at the same time. (2) The respiratory movements continue to increase in force and rapidity, extra muscles are called into play, the expiratory movements are especially marked; then all the muscles that can possibly aid in expiration are used, the excitement spreads to nearly all the muscles of the body, and convulsions set in; these violent efforts exhaust the body. (3) A stage of quiet, due to exhaustion, occurs; a few long-drawn inspiratory gasps are made, these die out; the whole body is convulsively stretched out, and death intervenes. When the trachea of a dog is artificially closed these events run their course in from four to five minutes; the convulsions appear at the end of the first minute, and cease suddenly within the second minute. In drowning death is often hastened by the entrance of water into the lungs. The time at which death from drowning occurs varies with the state of the animal at the time of the occurrence. Young animals—e.g. a puppy—in which the respiratory changes are less active than in adults, may survive an immersion of fifty minutes; but a full-grown dog rarely recovers after having been 1½ minute under water. For man, see below, p. 667. By training, as in the case of divers, the respiratory centre may be accustomed to bear the scarcity of oxygen for much longer than it can normally.

We next consider the effects of changes in the partial pressures of the gases of the atmosphere, the total pressure remaining more or less unchanged. *Lessened* partial pressure of *oxygen*, as already noted, results in asphyxia. *Increased* partial pressure of *oxygen* results in the phenomenon known as *apnœa*. After several very deep inspirations the state known as *apnœa* occurs, and it is easy to hold the breath for a longer time than usual. The usual explanation of this has been that the oxygenation of the blood is so complete that there is enough to last some time, and the centre is not stimulated by its absence or by the presence of the reducing stuff in the blood. Later authorities regard the cessation of respiratory movements which occur when oxygen is rapidly forced into the lungs by rapidly succeeding respiratory movements as due to fatigue of the respiratory apparatus. *Increased* partial pressure of *carbonic acid* tends to the accumulation of carbonic acid in the blood, ultimately producing a state of narcosis without convulsions. *Decreased* partial pressure of *carbonic acid* results merely in the carbonic acid of the blood being able to leave the blood with greater readiness. Alterations in the partial pressure of nitrogen have no effect. *Ozone*, instead of making the blood more arterial, as one might expect, makes it more venous, and causes irritation of the respiratory passages. *Carbonic oxide* combines with the hæmoglobin with more avidity than oxygen; consequently it interferes with due respiration. *Sulphuretted hydrogen*, acting as a reducing agent, has ultimately the same effect. *Nitrous oxide* (laughing gas) produces narcosis, and is used as an anæsthetic. Some gases—*hydrogen*, *marsh-gas*, and other neutral gases—have no effect. Some—*chlorine*, *ammonia*, &c.—cause spasm of the glottis, and so cannot be breathed.

Another point to attend to is the effect of variations in external pressure, the proportional composition of the atmosphere remaining unchanged. Sudden and great diminution of pressure will cause fatal convulsions, due to the sudden liberation of bubbles of the gases of the blood within the vessels; these plug up the smaller vessels, and affect the working of the valves of the heart, and cause asphyxia. If the pressure be gradually *diminished*, as in ascending a mountain, no effect even at considerable heights is experienced beyond a feeling of 'distress' often accompanied by bleeding at the nose. This is due to a derangement of the vascular system, the walls being constructed to meet a certain external pressure. If only the respiratory interchange of gases were concerned, the total external pressure might be reduced from 760 mm. to 300 mm., corresponding to a partial pressure of oxygen of 76 mm., and to an altitude of 17,000 feet, before the combination of oxygen with hæmoglobin, at the temperature of the blood, would be seriously affected. In various parts of the world there are people living at an altitude of 11,000 feet. If the pressure be still further reduced asphyxia occurs, but it is not quite the same asphyxia as that which results from absence of oxygen; the characteristic convulsions are often absent, while a rapid onset of feebleness amounting almost to paralysis occurs. Increase of pressure up to a pressure of several atmospheres is followed only by symptoms of drowsiness, due probably to increased pressure upon the whole organism rather than to a direct derangement of respiration. At a pressure of fifteen atmospheres, which corresponds to a partial pressure of oxygen of three atmospheres, the animal dies of asphyxia with convulsions as though from a deficiency of oxygen. The production of carbonic acid is diminished with increase of pressure—i.e. the oxidations of the whole body are lessened. At a certain point these oxidations cease, and the animal dies. All living things are killed by a too great pressure of oxygen. The oxidations of some other substances—e.g. phosphorus—are analogous; at a certain pressure they will not burn.

The effect of variations in temperature must not be overlooked. By variations in temperature we mean of course variations in the temperature of the body and of the blood, and not merely variations in the temperature of the surrounding medium, for these have normally, in warm-blooded animals (the temperature of cold-blooded animals varies with that of the surrounding medium), no effect upon the temperature of the body, owing to the regulating mechanism afforded by the vessels of the skin and vaso-motor system (see CIRCULATION). The temperature of an Eskimo is nearly the same as that of an African; and in a Turkish bath the temperature only rises a very little. In cold-blooded animals the oxidative and chemical processes of the body decrease with a lowered temperature, and increase with increase of temperature; but the reverse is the case with warm-blooded animals, for the temperature of the body in an atmosphere of low temperature is partly kept up by increased oxidation; but in fever—i.e. when the temperature of the blood is actually raised—the chemical activity of the body of a warm-blooded animal rises. Such an animal dies when the temperature of its blood rises to 45° C. or 50° C., a mammal at 45° C., and a bird at 50° C. Death is due to the fact that when the temperature rises to this point the partial pressure of the oxygen of the air is no longer sufficient to maintain the combination of oxygen with hæmoglobin. Theoretically a higher temperature might be survived if the external partial pressure of oxygen were proportionally increased.

INNER OR TISSUE RESPIRATION.—We now come to the last and most interesting part of our subject—the manner in which the oxygen of the blood enters the tissues, the use made of this oxygen by the cells of the tissues finally resulting in the formation of carbonic acid, and the manner in which this carbonic acid leaves the tissues and enters the blood. The term 'inner respiration' is by some writers restricted to the interchange of the gases between the tissues and the blood; but it is usual and more convenient to include in that term what is known of the uses made of the gases by the cells. We have spoken with confidence of this respiratory action of all the cells of the body, but we must not forget that it has not always been believed in, and even now is doubted by some. The original theory was that the oxygen was used, and the carbonic acid formed, in the lungs only. This was disproved when it was shown that there is more oxygen and less carbonic acid in the blood coming from the lungs than in that going to them. Next it was, and still is by some, thought that the oxidations take place within the blood; the cells of the tissues were imagined as pouring oxidisable matters into the blood. Usually very little matter capable of taking oxygen away from a loose combination can be found in the blood, but in that of asphyxiated animals more of such matter was found; this was explained by supposing that in asphyxia the oxidisable excreta from the cells accumulated in the blood through insufficiency of oxygen; but it has recently been shown that this reducing stuff only exists in the red blood-cells—i.e. in the reduced hæmoglobin—while lymph, which we might expect to find rich in such matters, it being into the lymph that most of the excreta of the cells are poured, is totally devoid of it. Lastly, the supposition that the cells of the tissues use the oxygen directly is so much in harmony with all our present ideas of animal physiology and with the facts of comparative respiration (one-celled animals breathe, and plants breathe, and in these there is no circulating blood) and of embryology (the embryo mammal breathes though its blood-vessels are not connected directly with those of its mother) that one is disposed to believe it without further proof.

The mode of interchange of gases between the blood and the tissues must be the same as that with which we are already familiar—viz. the diffusion from a place of high partial pressure to one of lower partial pressure. The fact that a low partial pressure of oxygen is constantly maintained within the tissues is one of the phenomena that constitute the mystery of life. We have already seen that even in outer respiration the living cells of the essential membrane of the lungs may apparently do work against partial pressure, absorbing more oxygen and excreting more carbonic acid than the differences of pressure will account for; it is therefore extremely probable that a similar state of activity is characteristic of the cells of the other tissues. Taking the more obvious facts first, we know that with any weight of body—i.e. with a given amount of tissue to be supplied with oxygen—the amount of oxygen taken in and of carbonic acid excreted varies with the activity of the organism and with the amount of work that it is doing; it is greater in youth than in old age, in wakefulness than in sleep, during the activity of secreting glands than when these are at rest, during the performance of muscular work than in repose; in this case it is the excretion of carbonic acid rather than the intake of oxygen which is especially marked. This last peculiarity brings us face to face with a remarkable state of affairs. The partial pressure of oxygen within muscular tissue is always practically zero—i.e. however low the external pressure of oxygen may be, none will leave the muscle. The effect of this of course will be, so far as ordinary diffusion is concerned, that oxygen will always be leaving the blood and entering the tissues. This oxygen is in some way stored up within the muscle-cells, so that a muscle will work for a considerable time without any fresh supplies of oxygen, even in an atmosphere of nitrogen. This explains the fact noted above, that during muscular work the excretion of carbonic acid is in excess of the absorption of oxygen. A supply of oxygen, however, is necessary for the maintenance of the *irritability* of the muscle, which soon falls off without it, probably before the supply of stored oxygen used for the performance of its *work* has been exhausted. This is about all that is known of the chemical changes connected with respiration within a cell. The oxygen enters it by diffusion, possibly aided by some vital activity; the rapid storing away of the oxygen and consequent readiness to absorb more is in reality an example of such activity; the oxygen is made use of within the cell for maintaining its life, for producing heat, for producing rapid decompositions which supply the energy of muscular contraction; finally the carbonic acid leaves the cell and enters the blood, possibly aided in this process by some process other than a simple diffusion. The respiratory changes of other tissues are probably similar to those of muscle; within them, within the lymph that bathes them, and within their secretions there is practically no free oxygen, while the pressure of carbonic acid, owing to its constant production within the cells, is greater within the cells, their secretions, and the lymph that bathes them than it is in venous blood.

There is another fact about respiration which is still a puzzling matter, and, since it results from the changes within the cells, is likely to remain so for some time. All the food of a meal, or its equivalent, is in about six hours oxidised into carbonic acid, water, and urea. This is obvious without any elaborate calculations from the fact that we may eat every six hours and yet not gain in weight, while, apart from the indigestible parts of the food, which do not affect the problem, the chief matters that leave the body are those mentioned above. Yet food-stuffs outside the body are not affected by oxygen at the temperature of the body. Various suggestions as to the possible reason for this have been made; but, since the phenomenon is obviously dependent upon the vital processes of cells, suggestions in terms of the principles of ordinary chemistry cannot carry us far.

Further information regarding respiration will be found in the last editions of the text-books of physiology recommended at the end of the article upon that subject. The diseases of the respiratory organs are dealt with in separate articles, BRONCHITIS, CONSUMPTION, PLEURISY, PNEUMONIA, TUBERCLE, &c.

Historical.—Aristotle (384 B.C.) thought that the object of respiration was to cool the body. He observed that the warmer the animal the more rapid the breathing, and transposed cause and effect. Galen (131–203 A.D.) experimented upon the mechanics of respiration, and knew something of the nervous mechanism. He believed that 'soot' and water were excreted from the body by the lungs. Malpighi (1661) described the structure of the lungs. Van Helmont (1664) discovered carbonic acid; Black (1757) observed that carbonic acid is breathed out of the body. Priestley (1774) discovered oxygen. Lavoisier (1775) discovered nitrogen, found the composition of the air, and taught that the formation of carbonic acid and water resulted from the combustion that took place in the lungs. Vogel proved the existence of carbonic acid in the venous blood; Hoffmann found oxygen in arterial blood. Magnus extracted and analysed the gases of the blood in both states.

Comparative.—Most of the Protozoa, all the sponges and stinging animals, and many simple worm-types live in water, which washes their surface and saturates their substance, the oxygen dissolved in the water serving the same purpose as that mixed with the air. While many worms breathe simply through their skin, many of the aquatic forms have structures specialised for respiration—modifications of the legs or tentacles or vascular outgrowths of the body-wall. In Echinoderms respiration is effected by the tube-feet, and sometimes by hollow 'skin-gills' as well. The crustaceans usually breathe by gills or through the skin; in Peripatus, Myriopods, and insects air-tubes or tracheæ ramify throughout the body. Scorpions have plaited sacs or 'lung-books,' which many regard as modifications of tracheæ; and these are developed in spiders also, with or, rarely, without the addition of ordinary air-tubes. The king-crab has a unique arrangement, consisting of plaited sacs or 'gill-books,' adapted for breathing in water. Some molluscs breathe simply by the skin, others have external gills, most have gills sheltered by the mantle, and air-breathing forms like snails have a mantle-cavity which serves as a lung. In Balanoglossus there are numerous respiratory clefts opening from the pharynx to the exterior; Appendicularia and young Tunicates have a pair of these; in adult Tunicates the primitive clefts are replaced by numerous secondary slits on the wall of the pharynx, through which water drawn in by the mouth passes into an atrial or peribranchial chamber and thence to the exterior; the same is true of Amphioxus. Clefts from the wall of the pharynx to the exterior are, indeed, characteristic of vertebrates, but beyond amphibians they are transitory embryonic structures, never used for breathing. This loss of functional gill-clefts is associated partly with the development of an embryonic birth-robe known as the allantois, which secures the aeration of the embryo's blood, and partly with the transition from aquatic to terrestrial life. In the hagfish the nasal sac opens into the mouth; in fishes this is only true of the double-breathing Dipnoi; in all other vertebrates air passes through the nostrils in and out of the mouth and lungs. In the hag and lamprey there are purse-like gill-pockets, and the respiratory arrangements are otherwise peculiar. In fishes gill-filaments are borne on the skeletal arches separating the gill-clefts, and the blood-vessels spread out on the filaments are washed by currents of water. Young Elasmobranchs have at first external gills and afterwards the internal gills characteristic of all fishes. The Dipnoi have gills, but they also come to the surface and gulp air, using their air-bladder as a lung, and thus pointing the way to amphibians. For, while almost all amphibians have gills in their youth, all the adults are lung-breathers, though some retain their gills as well. Among higher vertebrates there are many peculiarities, such as the single lung of most serpents, the balloon-like air-sacs around the lungs of birds, and the adaptations of cetaceans as aquatic lung-breathers, but the essential characteristics of pulmonary respiration are the same in all. The hæmoglobin, so important in respiration, occurs first in Nemerteans, and is present in some other worms, some Echinoderms, a few Arthropods, some molluscs, and in all vertebrates except the Tunicates, Amphioxus, and a few exceptional fishes. But though hæmoglobin is not present in most invertebrates, analogous pigments are common, especially one called hæmocyanin, which turns bluish when oxidised.

Artificial Respiration.—When death is imminent owing to a cessation of the natural respiration movements, it may sometimes be averted by an imitation of them carried on regularly for some time. Such a condition may occur in disease (e.g. asthma, epilepsy), though very rarely; it is most common in suffocation, either by drowning, choking, or strangulation, and is sometimes met with also in poisoning by noxious vapours (e.g. carbonic acid, carbonic oxide, coal-gas, chloroform, &c.). In order that any method may have a chance of being successful it is of course necessary that the entrance of air into the lungs be not impeded, either by a piece of food or by water in the windpipe, or by the tongue falling back and closing the upper opening. A piece of food may sometimes be removed through the mouth by the finger; if this fails the windpipe should be opened (see Tracheotomy). In those apparently drowned the body should first be laid on the face, with the head low, and the thorax and abdomen pressed upon in order to expel fluids which may have been drawn into the trachea and bronchial tubes. The tongue may need to be held forward; this may be done by an assistant, or an elastic band passed round the tongue and the chin will effect the object.

Numerous different methods have been devised for effecting the objects aimed at, and no general consensus of opinion has yet been arrived at as to which is the best. The methods fall into three divisions: (1) insufflation, or blowing of air into the lungs, either by the mouth or by means of bellows; (2) manual methods, in which external manipulations of the chest-walls are made to effect the entrance and exit of air; (3) electrical stimulation of the respiratory muscles. In all cases where artificial respiration is required every moment is of importance. It is doubtful whether life can ever be restored when the heart has ceased to beat for more than a few seconds; and when breathing has stopped failure of the heart's action is always imminent. That method is therefore best which can be applied with the least possible loss of time, so that under ordinary circumstances the methods which require bellows or electric batteries are out of the question. Direct insufflation, or blowing of air into the patient's lungs by the mouth applied to his mouth, is now hardly ever used except in the case of very young children. Of the manual methods those most in use are Marshall Hall's (1856), Silvester's (1857), and Howard's (1877). The second is certainly the most easy to learn, but is more fatiguing to carry out for a length of time than either of the others. In Marshall Hall's method the body is laid upon its face and rolled 'in what may be termed cradle fashion' from this position on to one side and a little beyond it (inspiration), and then back on to the face (expiration). In Silvester's method the

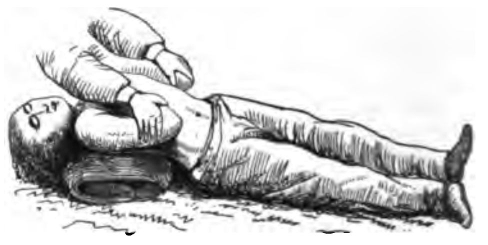


Fig. 1.

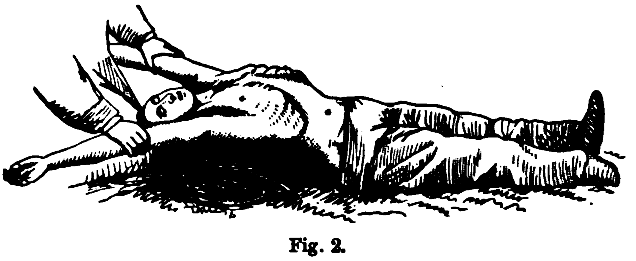


Fig. 2.

patient is laid on his back on a plane, inclined a little from the feet upwards, and the shoulders are gently raised by a firm cushion placed under them, which also throws the head back. The operator then grasps the patient's arms just above the elbows, and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated. In Howard's method the patient is laid on his back with a cushion below the middle. The operator kneels astride his hips, places his hands with fingers spread outwards over the lower part of the chest-wall, and alternately bends forward, throwing his weight on the chest to imitate expiration, and springs back to allow the elastic recoil of the chest-wall to imitate inspiration.

Whatever method be adopted, the movements must be gently, regularly, and perseveringly carried on, at the rate of from ten to fifteen times in the minute; and when the faintest natural effort at respiration is observed they must at once be timed so as to reinforce and not to oppose it. In some cases life has been restored under artificial respiration when no respiratory movements have occurred for an hour or even several hours. In all cases, but especially in that of persons apparently drowned, artificial respiration should be conducted in a warm atmosphere, 90° F., or even more if possible, and should be supplemented by warmth applied to the body and by vigorous friction. In those apparently drowned recovery is very rare after complete immersion for five minutes or more. If stunning or fainting has occurred at the moment of immersion, so that the respiratory movements have been annulled or much diminished for the time, less water will have entered the lungs, and the chance of recovery may be greater. In other modes of death by suffocation, such as choking or strangulation, the action of the heart may continue longer, and restoration to life be therefore possible after a longer deprivation of air.

See the publications of the Royal Humane Society and Royal National Lifeboat Institution; various handbooks on ambulance work. A résumé and discussion of the various methods is given by Dr B. W. Richardson in the *Asclepiad* for 1890, p. 201.

Respirators are worn over the mouth (oral) or mouth and nose (ori-nasal) for changing the properties of the air inspired. The name was first given by Mr Jeffreys to an apparatus he contrived about 1835 for the purpose of warming the air, formed of numerous layers of fine perforated metal with wire soldered to them. Their value in diminishing the risk of catching cold, which in many cases is undoubted, probably depends at least in part on their affording protection to a sensitive portion of the skin; they act, in fact, as an additional article of clothing. But they are of most value to those who are not able to breathe through the nose in the natural way. Respirators have been largely used of late years in diseases of the nose, throat, lungs, &c. for impregnating the inspired air with medicated vapours; for this purpose they are constructed with a chamber containing a sponge or cotton-wool which is kept charged with the substance whose action is desired (carbolic acid, creasote, eucalyptus, or pine-oil, &c.). Respirators have been also devised for freeing the inspired air of impurities—e.g. in the case of firemen, who have to go into an atmosphere strongly charged with smoke; of needle-grinders and others whose work gives rise to much irritating dust; of those who are exposed to foul gases, &c. See FILTER.

Respite, a temporary delay of the execution of a criminal. See REPRIEVE.

Respondentia is a loan raised by the master of a ship, when he has no other means of doing so, upon security of the cargo or goods on board the ship. The contract has reference to a particular voyage, and the conditions are that if the subject on which the money is advanced be lost by sea, risk, or superior force of the enemy the lender shall lose his money; and that if the goods arrive in safety the loan shall be repaid with a greater than ordinary rate of interest, called marine interest. When the ship herself is hypothecated the contract is called Bottomry (q.v.). As a matter of fact the term respondentia is now seldom used, and generally the expression bottomry is employed whether the vessel or her cargo or both be the security.

Responsibility. See INSANITY, INFANT, HUSBAND AND WIFE, EVIDENCE, CAPACITY (LEGAL), LIABILITY.

Responsions. See OXFORD, Vol. VII. p. 682.

Rest-harrow (*Ononis*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, having a 5-cleft bell-shaped calyx, the standard of the corolla large and striated, the keel beaked, the pod turgid and few-seeded. There are many species, chiefly natives of Europe, and generally herbaceous or half-shrubby. The Common Rest-harrow (*O. arvensis*) is abundant in pastures and by waysides in Britain. Its lower leaves have three leaflets, the upper are simple; the flowers are axillary and rose-coloured, or occasionally white. The plant is half-shrubby, with somewhat spiny stems; viscid; and its smell strong and unpleasant. The roots are tough and woody, whence its English name. It is sometimes a troublesome weed, but only in neglected pastures, and disappears before careful cultivation.

Restiaceæ, a natural order of plants, nearly allied to Cyperaceæ, mostly natives of the southern hemisphere, and abounding at the Cape of Good Hope and in Australia. They are herbaceous plants, or sometimes half-shrubby, have simple stems and narrow leaves, and are hard, wiry, and rush-like. They have generally a creeping root-stock.

Restigouche, a river of Canada, rises in eastern Quebec, flows south-east into New Brunswick, then east and north-east into the Bay of Chaleurs, forming part of the boundary between the two provinces. Its length is about 200 miles.

Restoration, the resumption of monarchical government on the return of Charles II. to his kingdom, May 29, 1660. A form of prayer for that day was annexed to the Common Prayer-book from then until 1859; and, in commemoration of Boscobel (q.v.), 'Oak-apple Day' was long also celebrated by the displaying and wearing of branches and sprigs of oak, with gilded oak-apples.

Restoration, in its true sense, means bringing back or replacing what has gone; but of late years the word has come to have a new meaning. Restoration now means making new imitative work to take the place of decayed or fractured work, and in this sense it applies to pictures, sculpture, furniture, and architecture; but as applied to architecture it is allowed a still wider meaning—viz. the building up anew and with new materials portions of buildings which have ceased to exist, such new work being designed afresh in imitation of what was supposed once to have existed. The new meaning of the word restoration only applies to works of art, including all the decorative arts. The 'restoration' of pictures and sculptures has long ago been condemned as diminishing the value of such works of art. For instance, at the British Museum and other public galleries it used to be the custom to employ a sculptor to 'restore' antique statues by making new arms, legs, or noses, or even heads, to replace such features as were missing; and, although sculptors of note were employed to do this, it was eventually decided that the results were not satisfactory. The truth is that up to that time it had not been understood that a work of art is the creation of an individual—his rendering of an idea—and that another artist, even if living at the same time and in the same mental atmosphere, would hardly grasp that idea so completely as to be able to supply a portion of the work if missing, and much less could one living hundreds of years afterwards be successful in so supplying the missing portion.

It is, however, with reference to building that restoration in this new meaning is chiefly concerned. Roughly speaking, by the end of the 17th century all appreciation of the artistic qualities of our mediæval buildings had ceased, the art had died out, and given place to the Renaissance (q.v.) style of architecture. But about the middle of the 18th century the artistic qualities of mediæval architecture began slowly again to obtain a hold upon the people. It seemed to be looked upon as quaint and romantic, and strange rude imitations of it were made, such as Strawberry Hill, which was built by Horace Walpole. Such work is now generally described as 'Carpenter's Gothic,' perhaps because the restorers often put in wood-framed windows with pointed arches in feeble imitation of mediæval work.

The first attempts to reproduce Gothic work followed upon the decay of the Renaissance style of architecture, and constituted the germ of the modern restoration movement, or Gothic Revival, as it is generally called. This movement began to work actively about the beginning of the 19th century, and was largely accelerated by a revival of activity in the Established Church of England. An impulse was given to the restoration movement by a society called the Camden Society, and afterwards the Ecclesiological Society, which was composed of churchmen and clergy, and started at Cambridge in the year 1840. The members of this society studied the history and usages of the church before the Reformation, and by that means found out why our mediæval churches were constructed in the form in which they have come down to us, and what was the use to which their furniture, such as rood-screens and rood-lofts, sedilia, piscina, credence tables, aumbries, and the like, was put. Before the formation of this society men had already studied mediæval architecture, and had recognised that there are five distinct styles following one upon the other—viz. Saxon work, Norman work, Early English, Decorated, and Perpendicular work (see ARCHITECTURE, GOTHIC ARCHITECTURE). This classification was first made by Thomas Rickman, and these terms which he gave have been adhered to. Our mediæval churches are generally composed of two or three and sometimes of all the styles; but the modern Gothic revivalists desired, and in many cases still desire, to see the buildings complete in one style, and consequently, if an ancient building is composed chiefly of one style, they would destroy all the subsequent work and replace it by work designed in the same style. The subsequent work thus destroyed is generally spoken of as 'debased' work.

Under the influence of the Camden Society the Perpendicular clerestory and flat roof were taken off the Round Church at Cambridge, and the present high-pitched roof, which was thought to be more correct, was put on. Each one of the styles was in fashion in its turn, strangely enough, each becoming fashionable in the order in which they were naturally developed. As might be expected, the movement produced specialists, of whom Sir Gilbert Scott was the most noted. Into his hands was placed nearly every cathedral church in England, as well as a countless number of parish churches; however, he did but follow in the steps of the elder Pugin. Long before his death a cry of discontent arose. Even those who had felt that it might be possible to imitate the mediæval work accurately, so as to replace missing features, saw that this was a hopeless task, for not a single successful example of 'restoration' could be pointed to. Ruskin wrote strongly against 'restoration,' urging the folly of attempting to reproduce a lost work of art or any portion of it, and giving it as his opinion that the only right method of treating our ancient buildings—such indeed as had not been destroyed by 'restoration'—was to repair them structurally by propping leaning walls and mending leaky roofs. His words did but sound the note which was in the minds of many, and in 1877 a society was formed in London calling itself the Society for the Protection of Ancient Buildings, and having among its members men of all professions, including the clergy. This society has done its best to point out to those who still believe in the possibility of 'restoration' the destructive character of such work—destructive both of works of art and historical evidences—and it has urged the importance of keeping our ancient buildings in thorough and constant repair so as to avoid the necessity of wholesale renewal or rebuilding. The society also urges that no purely ornamental feature should ever be renewed any more than the antique statue should have its missing features replaced, and that where new features have of necessity to be introduced every effort should be made to keep them harmonious with, but dissimilar from, the ancient work. As examples of 'restoration' works we may give the north transept of Westminster Abbey and the west side of Westminster Hall, nearly the whole of St Alban's Abbey, the west front of Salisbury Cathedral (where an attempt has even been made to produce mediæval sculpture), Chester Cathedral, Worcester Cathedral; and, in fact, not a cathedral remains in England that does not bear marks of the movement. As has been shown, the 'restoration' movement had its origin in England, it has met a check, and shows signs of dying out; although it has spread to Scotland, the Continent, and even to India. Fortunately government has put a check upon it there, and we may hope that restoration as understood by the school of Sir Gilbert Scott is now ancient history.

Restoration of Pictures. The restoration and the cleaning of pictures may be considered together: though cleaning, of course, more strictly applies to the removal from their surface of the accretions of dust or discoloured varnish which obscure their beauties, while restoration refers to the reparation of actual flaws in their surfaces of paint, or in the canvas or wood upon which the paint is laid. When a mastic varnish has been used by the painter, and has become discoloured and opaque, it may be removed by careful and gentle friction with the points of the fingers, previously covered with a resinous powder, which frays off particles of the hardened coating in the form of a fine white dust. When copal varnish has been applied, its removal is more difficult and dangerous, and is usually effected by an application of weak alcohol, spirits of turpentine, and oil. A pad of cotton wool is saturated in this mixture, and passed over the surface of the varnish, which it dissolves and removes; a similar pad steeped in pure oil being applied at intervals to stop the action of the spirit when it threatens to disturb the colour beneath the varnish. When portions of the paint or of the ground of priming on which it has been laid have been removed, these are sometimes filled up to the level of the remaining portions with glue, size, and chalk, and then carefully repainted with dry colour to match the surrounding portions of the surface.

The injuries of time to the various materials upon which colours are laid are very various, and require careful and skilful treatment. In panel pictures worm-holes must be carefully filled up with the last-named composition, and matched with the adjacent portion as just described. If the wood has split, its edges must be carefully brought together, and fastened securely with 'buttons' of hard wood; or the entire back may be protected with a kind of grating of mahogany spars, so adjusted as to admit of a slight contraction and expansion of the panel in varying temperatures. If the panel be too far gone to admit of this treatment, the wood is carefully removed by tenon-saws, planes, and files, till only the surface of priming and colour remains, which can then be remounted on canvas or a fresh panel. If the picture is on canvas which has become decayed, it may be 'relined' by having its back securely fastened, by paste or glue, to a new canvas, and afterwards ironed, a process which has the effect of restoring evenness to a cracked surface of paint; though if the artist has worked with a thick impasto the raised points of colour are apt to become flattened, and the character of the handling to be slightly altered. When a fresco has to be removed from a wall this is usually effected by pasting its surface on paper, and then with a chisel slowly detaching the mortar which bears the colour from the stones upon which it has been laid, each portion, as it is gradually withdrawn, being coiled on a large cylinder. All the operations to which we have referred require extreme caution and great practice for their successful accomplishment. When they are entrusted to careless and untrained hands damage is certain, and it is impossible to estimate the immense amount of injury to works of art that has been effected by ignorant picture-restorers. Proper care of a picture, however, and preservation from damp and dust, will obviate the necessity for its being subjected to restoration; and such protection may be most simply effected by carefully closing in its back, and by covering its surface with glass, which answers all, and more than all, the preservative purpose of varnish, with the additional advantage that it does not chill and discolour with time. Glass is being largely adopted in the great public galleries, for covering even oil-pictures, and it has only one disadvantage—its tendency to reflect the objects placed opposite it, and so to interfere with the ready and complete examination, as a connected whole, of the entire surface of a large, and especially of a dark, painting.

Restorationists, a general name for those who hold the belief in a general *apocatastasis*, or 'restoration' of all things, in which, after a purgation proportioned to the various moral conditions of their souls at the time of death, all men would be restored to the favour of God. The title itself is especially associated with a body of Universalists which flourished at Boston, U.S., in the first half of the 19th century; but for the doctrine, see the article HELL, Vol. V. p. 631, and the articles APOCATASTASIS, and UNIVERSALISTS.

Resurrection. This expression denotes the revival of the human body in a future state after it has been consigned to the grave. We find traces of this doctrine in other religions, in Zoroastrianism, and especially in later Judaism, but the doctrine is peculiarly Christian. In the earlier Hebrew Scriptures there is no mention of it. It is not to be found in the Pentateuch, in the Psalms, nor even in the earlier prophecies. It is supposed to be alluded to in Isaiah (xxvi. 19), and in Ezekiel (xxxvii.) in the well-known chapter as to the revival of dry bones in the valley of vision; and in the last chapter of Daniel (xii. 2) there is the distinct affirmation that 'many that sleep in the dust of the earth shall awake, some to everlasting life, and some to shame and everlasting contempt.' There is also a well-known passage in Job (xix. 25–27) which was long thought to refer to the doctrine of the resurrection of the body; but all recent criticism denies the validity of this reference. It is therefore not till the later Judaism that the doctrine appears, and it is sometimes said, doubtfully, to have been derived from Persia or elsewhere. In the time of our Lord it had become a formal doctrine of the Pharisees. The general body of the Jewish people seem also to have believed in it; the Sadducees alone disputed it. It appears, in fact, to have become bound up in the Jewish mind with the idea of a future life, so that an argument which proved the one proved the other. It should be added that Mohammedanism (q.v.) cherishes gross beliefs on this head.

It remained for Christ and His apostles to reveal clearly the doctrine of the resurrection of the body, and to connect it with the fact of Christ's own resurrection as its special evidence and pledge. The following may be stated as the main points involved in the doctrine as revealed in the New Testament: (1) The resurrection of the dead is ascribed to Christ Himself; it will complete His work of redemption for the human race (John v. 21; 1 Cor. xv. 22 *sq.*; 1 Thess. iv. 14; Rev. i. 18). (2) All the dead will be raised indiscriminately to receive judgment according to their works, 'they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of damnation' (John v. 21–29; 1 Cor. xv. 22; Rev. xx. 11). (3) The resurrection will take place at 'the last day,' by which seems to be meant the close of the present world (John vi. 39, 40, xi. 24; 1 Thess. iv. 15). (4) The great event is represented as being ushered in by the sound of a trumpet, a representation probably borrowed from the Jewish practice of convening assemblies by sound of trumpet (1 Cor. xv. 52; 1 Thess. iv. 16). (5) As to the character of the change through which our bodies are raised after the lapse of ages, and yet retain their identity preserved, there is nothing distinctly made known. The possibility of such a change was evidently a subject of argument in the primitive Christian age, and the apostle argues strongly in its favour (1 Cor. xv. 32 *sq.*) from occurrences which are scarcely less mysterious in the natural world.

The Gnostics denied the resurrection of the body, and made the change a purely spiritual one. The Catholic belief was greatly developed by Tertullian, Jerome, and Augustine, who, however, insisted that the resurrection body, though identical with the original one, is a glorified body. A third view, represented in ancient times by Origen, and recently by Rothe, affirms that the spirit must always have a bodily organism, and that the perfected personality necessarily assumes a spiritualised embodiment; in this view resurrection is limited to perfected spirits.

See the articles IMMORTALITY, CONDITIONAL IMMORTALITY; also those on HEAVEN and HELL. There is a full bibliography in Alger's *History of the Doctrine of the Future Life* (Phila. 1864); and see the Excursus in Godet's Commentary on St John; Westcott's *Gospel of the Resurrection* (1866; 5th ed. 1884); and Macan's essay on the *Resurrection of Jesus Christ* (1877).

Resurrectionists, or BODY-SNATCHERS, the names popularly given to those who made it their business to dig corpses out of their graves and sell them as 'subjects' to lecturers on anatomy. Gradual progress in the science of anatomy led to its more thorough study by greatly increased numbers of medical students; and from about the middle of the 18th century professors of anatomy found that the supply of subjects, heretofore mainly obtained from the bodies of executed criminals, was altogether inadequate to meet the wants of the surgical and medical schools. The resurrectionists invented a new profession to supply the lack, and in the first quarter of the 19th century drove a most flourishing trade—the graveyards in the outlying parts of London being especially the happy hunting-grounds of the confraternity. As the business became organised, grave-diggers and sextons were bribed to leave graveyards unlocked and keep out of the way when a body was being raised. A very short time, usually at dead of night, sufficed; an expert pair of resurrectionists being able in about forty-five minutes to prise up the coffin out of a newly-made grave by means of a peculiar crowbar for the purpose, to burst in the lid, and remove the corpse. Corpses resurrected after this fashion seem to have been worth £8 or £10—offering large profits and quick returns to this precarious and risky trade. The body-snatchers carefully replaced the clothing in the coffin; the stealing of the naked corpse being by the law of England a misdemeanour only, whereas the removal of the clothes was of course a felony, punishable by transportation. So notorious did the practice of resurrectionism become that in many parts of the country painful precautions against it were regularly taken. Heavy gratings were securely fixed over new-made graves, spring-guns were set, and often the relatives of deceased persons sat armed by their graves night after night until it was assumed that the corpses would be no longer serviceable to 'the doctors'—a custom that survived in some places till far on in the century. Guard-houses or towers were sometimes built for the accommodation of the watchers. To the popular horror of this degraded calling, recruited from the worst classes, was added a strong suspicion that resurrectionists would on occasion manufacture corpses—a suspicion confirmed in the notorious case of Burke and Hare (see BURKE, WILLIAM). The passing of the Anatomy Acts of 1832 and 1871 rendered the lucrative trade of the resurrectionist superfluous; but in out-of-the-way places there are still traces of the old terror of body-snatchers supposed to drive out silently at nights in gigs with india-rubber tires, the horses being also shod with india-rubber, and the occupants of the gig provided with pitch-plasters to clap on the mouths of any likely victims. Single instances of a special kind of resurrectionism have occurred more recently; it is practised expressly with the hope of obtaining a reward from the relatives of the person whose body is stolen. Thus, the American millionaire, A. T. Stewart, died in April 1876, and was embalmed and duly buried in a triple coffin in the family vault in a New York graveyard; two and a half years afterwards the body was removed, and a reward of $25,000 was offered by advertisement for its restoration. The body-snatchers, represented by a regular practising lawyer, demanded $200,000, then $100,000, and after three years restored the body on payment of $20,000, a promise being exacted that no attempt should be made to discover the thieves (see *Chambers's Journal*, 1888, p. 717). The body of the Earl of Crawford and Balcarres, who died at Florence in December 1878, was removed from the mausoleum at Dunecht, near Aberdeen, a year afterwards; but in this case no reward was offered, and the body was found in a wood close by in July 1882, seven months after its removal.

Retainer is, in English law, the act of engaging an attorney or counsel to attend to a certain suit or case. The retainer of an attorney may be either verbal or in writing; but the retainer of counsel is usually by written memorandum handed to his clerk, together with a small retaining fee. A general retainer is given by a party who wishes to secure the services of counsel in all actions brought by or against him. The term retainer is also used to denote the right of an executor to retain a debt due to himself from his testator's estate.

Retford, EAST, a market-town of Nottinghamshire, on the right bank of the Idle, an affluent of the Trent, 24 miles E. by S. of Sheffield and 138 NNW. of London by the Great Northern Railway. It has a handsome town-hall (1867), a grammar-school (1552; rebuilt 1858), paper-mills, iron-foundries, &c. It was first formally incorporated by James I., the municipal boundary being extended in 1878. The parliamentary borough was extended in 1829 to take in the whole wapentake of Bassetlaw—since 1885 one of the four county divisions. Pop. of municipal borough (1851) 2943; (1881) 9748; (1891) 10,603. See Piercy's *History of Retford* (1828).

Rethel, a town of France (dept. Ardennes), prettily situated on the right bank of the Aisne, 24 miles NE. of Rheims, has woollen and other manufactures. Pop. 7377.

Retimo (*Rhithymnos*), a seaport of Crete, on its north coast, 40 miles W. of Candia; pop. 8000.

Retina. See EYE.

Retinité. See PITCHSTONE.

Retinos'pora. See CYPRESS.

Retirement of officers from the British army is governed by royal warrants issued from time to time. The rules of 1889 permit officers to retire voluntarily with gratuities or pensions, and oblige them to retire at certain ages, or after a period of non-employment, on half-pay. Voluntary retirement on a gratuity of £1200 is allowed to officers other than those of the Coast Brigade Royal Artillery, Coast Battalion Royal Engineers, Royal Malta Fencible Artillery, Riding-masters and Quartermasters (q.v.), after twelve years' service, and to others on a pension according to rank and service. With certain modifications, the maximum rates are captains, £150 a year; majors, £250; lieutenant-colonels, £450. The age for compulsory retirement is forty-five for captains and officers of lower rank, with the exceptions named above, forty-eight for majors, fifty-five for lieutenant-colonels and colonels, sixty-two for major-generals, and sixty-seven for lieutenant-generals and generals. Non-employment for five years in any rank also entails retirement. Officers of the Indian Staff Corps and captains of the Royal Engineers do not come under these rules. The pensions granted in cases of retirement for age are, generally speaking, £50 more than those cited above, but for the three ranks of general officers they are £600 to £700, £750 to £850, and £900 to £1000 according to age.

Certain additions, generally in the form of gratuities, are allowed to purchase officers and officers of the late East India Company's Artillery and Engineers, in consideration of their altered prospects. The pensions of officers of the Indian Staff Corps are subject to regulations laid down from time to time by the Secretary of State for India. They are considerably larger in amount than those granted to the other branches of the service, and are affected by numerous rules as to furlough, length of service in India, &c., but no pension can be earned by less than twenty years' service.

Officers of the Coast Brigade Royal Artillery and

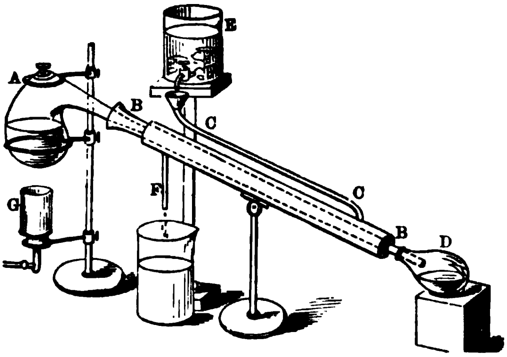
Coast Battalion Royal Engineers, inspectors of army schools, riding-masters, and quartermasters can earn a maximum pension of £200 a year, or the two first-mentioned classes if retired for age (fifty-five years) may receive the full pay of their rank. For the Royal Malta Fencible Artillery the maximum rates of retired pay are captains, £200 a year; majors, £300; lieutenant-colonels or colonels, £365.

Departmental officers receive retired pay at rates corresponding to those granted to other officers and on similar conditions as to age. Some of the highest rates are chaplain-general, £600; commissary-general, £800; director-general, Medical Staff, £1125.

The army estimates for 1891-92 provide for a total of £1,853,632 on account of retired pay and gratuities (£1,543,950), half-pay (£75.550), allowances to widows, &c. (£164,563), rewards for distinguished services (£12,400), pensions for wounds (£15,200), and retired pay of officers of auxiliary forces (£41,903). Similar votes for warrant-officers, non-commissioned officers, and men amount to £1,856,207.

In the navy officers are placed on the retired list at sixty-five years of age if admirals or vice-admirals, sixty for rear-admirals, fifty-five for captains, fifty for commanders, and forty-five for lieutenants, with the option in each case of retiring five years earlier. Lieutenants and commanders are also retired compulsorily if they have not served for five years afloat, captains after seven years without service, and flag-officers after ten years. In 1891 there were 2048 naval and 239 marine officers on the retired list, costing £616,518. See PENSIONS, DISCHARGE, SUPERANNUATION.

Retort, a vessel employed by chemists for the purpose of distilling or effecting decomposition by the aid of heat. It may be made of glass, earthenware, or metal, according to the purposes for which it is to be employed. Glass retorts are the most common, and their ordinary form is seen in the figure. They may be employed for the production of such products as do not require any extraordinary degree of cold for the condensation of their vapour—as, for instance, for the production of hydrocyanic or nitric acid. The globular vessel in which the neck of the retort is inserted is from its function termed the *receiver*. Cold may be applied to the neck of the retort—for the purpose of condensing the vapour—in various ways, as by the application of a cold wet cloth, by a current of water, or by a special apparatus known as *Liebig's Condenser*, shown in the figure at BB.



Retort fitted with Liebig's Condenser:
A, bulb of the retort, into which the liquid to be distilled is put; D, the receiver, into which the end of the retort is placed; BB, the condenser, receiving a supply of cold water from E by means of the pipe C, the heated water escaping at F; G, the heating apparatus, a Bunsen burner in this case.

In ordinary cases requiring a higher temperature than glass could bear earthen retorts are used; for the preparation of hydrofluoric acid retorts of lead are employed; while for the preparation of strong sulphuric acid platinum is the best material for the retort. Iron retorts are employed in the laboratory for the preparation of oxygen from black oxide of manganese and some other processes, and in gas-works for the destructive distillation of coal. See DISTILLATION.

Retours. See RECORDS (*Scotland*).

Retreat, a period of retirement to a religious house, for self-examination, meditation, and prayer. Retreats commonly last either three or seven days, and are conducted by a cleric, who delivers addresses daily. They are in use both in the Roman and, among the High Church party, in the Anglican Church.

Retriever. As the name implies, the retriever is a breed of dog trained to find out and bring back any killed or wounded game. The work of the retriever was long done by various breeds of dogs, such as the pointer, setter, or spaniel, but, in addition to it spoiling these dogs for their regular work, they were found to be too hard-mouthed, the worst fault possible in a retriever, as he wastes more in game injured than would have been lost without him. Crosses with the Newfoundland were tried, and gradually two kinds of retriever were introduced. One variety, known as wavy-coated, was probably the result of a cross with the setter; and the other, known as curly-coated, is from the water-spaniel or poodle. Not much attention was paid to the retriever until the introduction of dog shows, about 1850, but since that time the breed has been kept free from any fresh cross, with a great improvement in the appearance. The two varieties of retriever differ only in coat; the curly coat should curl closely and firmly all over the body, the wavy coat should fall straight and thick. An intelligent large head, with a full clear eye, should always be seen in the retriever. Legs and feet need to be large and strong. The retriever should not be too small, as it needs a powerful dog to retrieve a hare successfully. The retriever makes a very good watch-dog, and numberless bad specimens of the breed are to be found fulfilling this vocation only. The pure retriever is gentle in temper and easy to command.

Retrograde, in Astronomy, a term applied to the motion (real or apparent) of a celestial body when that is opposite in direction to the yearly course of the sun from west to east. The superior Planets (q.v.) retrograde when in opposition (see CONJUNCTION). As their motion is then nearly parallel to the earth's, they, moving more slowly than it, appear to *fall behind* for a time. This period of retrogradation is of course longer for the planets whose motion is slower, and less for those whose speed more nearly approaches that of the earth. The inferior planets, which move faster than the earth, retrograde when in inferior conjunction. Their course being then nearly parallel to the earth's, they gain upon it, and appear to pass the sun from east to west. Thus Venus, when nearing the end of her appearance as an evening star, descends each night nearer to the western horizon, until so near the sun as to be lost in his rays. Passing then to his west side, the planet reappears as a morning star.

Retz, JEAN FRANÇOIS PAUL DE GONDI, CARDINAL DE, was born at Montmirail in 1614, of a family originally Italian, that had acquired great estates in Brittany and formed connections with the noblest families of France. His uncle was Archbishop of Paris, and he was early destined for the church in spite of amours, duels, and every form of unclerical behaviour. A friend reproaching him with his debts, 'Cæsar,' said the splendid young prodigal, 'at my age owed six times as much as I do.' Retz was entangled in political intrigues from his childhood up, even under the watchful eye of Richelieu, and, having at length in 1643 obtained the coadjutorship with reversion of the archbishopric of Paris, he skilfully used the position to make the Paris populace devoted to himself. He plotted actively against Mazarin, and was one of the main instigators of the outbreak of the Fronde in October 1648. During the next four years he rose and fell with the fortunes of his party, receiving, however, a cardinal's hat from Rome, until 1652, when he was flung into prison, first at Vincennes, then at Nantes. After two years he made his escape, wandered in Spain and England, appeared at Rome—where, it is said, he secured the election of Pope Alexander VII.—and at length in 1662 made his peace with Louis XIV. by resigning finally his claim to the archbishopric in exchange for the abbacy of St Denis and restoration to his other benefices, with arrears. He spent the rest of his life mainly in quiet at Paris, at Commercy, and St Mihiel in Lorraine. His enormous debts, reaching to four millions of francs, he provided for in 1675 by determining to 'live for his creditors,' making over to them his whole income save 20,000 livres. He died at Paris, 24th August 1679.

Retz was connected by marriage with Madame de Sévigné, and figures in a perhaps too pleasing light in her delightful letters. His *Mémoires*, coming down but till 1655, throws much light on the dark and troubled intrigues of the Fronde, and displays quite remarkable skill in narrative and elaborate character-drawing. His own character has been sketched with faithful, if unkindly, truth by his great antagonist, La Rochefoucauld, and the sum of the whole is contained in the words: 'He has raised up the greatest disorders in the state without having formed any plan how to profit by them.'

The earliest edition of his masterpiece in a kind peculiar to French literature appeared at Nancy in 1717, but the first adequate edition was given in the 24th vol. of Michaud and Poujoulat's collection (Paris, 1836). Later and better editions are by Géruzez (1844) and Champollion-Figeac (1859); but the best is that in the series of 'Les Grands Écrivains de la France,' edited successively by A. Feillet, J. Gourdault, and R. Chantelauze (10 vols., i.–ix., 1872–88). See works by Curnier (2 vols. 1863), Topin (3d ed. 1872), Chantelauze (3 vols. 1878–79), and Gazier (1876).

Retz, Rais, or Raiz, Gilles de, a 15th-century monster of iniquity, was a Breton of high rank and family connections, who distinguished himself under Charles VII. in the struggle with the English, fighting by the side of the Maid at Orleans, and bearing the alms-dish at the coronation of the king. He was made marshal of France in 1420, and soon after retired to his estates, where for over ten years he is alleged to have indulged in the most infamous orgies, having kipnapped or enticed to his castle as many as 150 children, who were sacrificed as victims to his unnatural lusts or his sorceries. He was at length hanged and burned at Nantes in 1440, after a trial closed by his own confession. It should be noted that the whole story is by no means free from suspicion, and, moreover, that both the Bishop of Nantes and the Duke of Brittany were active personal enemies of Retz. Attempts have been made to find in him an historical original for 'Bluebeard' by persons ignorant of the world-wide diffusion of stories of forbidden chambers and punishments for curiosity. See Baring-Gould's *Book of Were-Wolves* (1865).

Retzsch, Friedrich August Moritz, painter and engraver, was born in Dresden, 9th December 1779, and studied at the academy of his native city, where he became a professor in 1824. He died 11th June 1857. He has acquired great celebrity by his etchings in outline of Schiller and Goethe—those of Goethe's *Faust* being particularly well known—Fouqué's tales, and Shakespeare. His masterpiece is 'The Chess-players' (Man against Satan). Retzsch likewise painted admirably in oils.

Reuchlin, Johann, also known by his Græcised name of *Capnio*, humanist and one of the first promoters of Hebrew studies in Germany, was born at Pforzheim in the Black Forest, 28th December 1455. He received his earliest education at Schlettstadt, and in 1473 was appointed travelling companion to Prince Friedrich of Baden. In this capacity he visited Paris, where he studied Greek under Hermonymus of Sparta, besides assiduously practising the composition of Latin. Two years later Reuchlin went to Basel, where he continued his study of Greek, and wrote his Latin dictionary, *Vocabularius Breviloquus* (1476). In the same year he paid a second visit to France, studied law at Orleans (1478) and at Poitiers, then, returning to Germany (1481), set up as lecturer at Tübingen. In 1482 and again in 1490 he was in Italy on the business of Duke Eberhard; in 1492 we find him studying Hebrew under a learned Jew, Jacob Jehiel Loans, the imperial physician. In 1496 Reuchlin went to Heidelberg, where he became the main promoter of Greek studies in Germany, though not a public lecturer. In 1498 he was sent to Rome by Philip the Elector-palatine, and applied himself more vigorously than ever to the study of Hebrew and Greek. Reuchlin returned to Stuttgart in 1499, and in 1500 obtained a judicial appointment. In 1506 appeared his *Rudimenta Linguæ Hebraicæ*. His Hebraic studies, which embraced the post-biblical Jewish literature, were drawing him into bitter strife with learned Jews, Jewish proselytes, and the Dominicans, and directly and powerfully helping on the Reformation. It was in 1510 that Johann Pfefferkorn, a Jewish proselyte, in the true spirit of a renegade, called upon princes and subjects to persecute the religion of his fathers, and especially urged the emperor to burn or confiscate all Jewish books except the Bible. Reuchlin remonstrated, maintaining that no Jewish books should be destroyed except those directly written against Christianity. This tolerant attitude drew upon Reuchlin the enmity of the Dominicans, and particularly the inquisitor, Jakob von Hoogstraten. These enemies of Reuchlin held possession of the universities of Paris, Louvain, Erfurt, and Mainz; but all the distinguished and independent thinkers in Germany were on the side of the brave and humane scholar. Among the Reuchlinists we may especially mention the names of Ulrich von Hutten (q.v.) and Franz von Sickingen (q.v.); and to this controversy we owe the *Epistolæ Obscurorum Virorum* (q.v.). A quarrel broke out between Ulrich Duke of Würtemberg and the Swabian League, in the course of which Reuchlin became a prisoner of Duke Wilhelm of Bavaria, who, however, in 1520 appointed him professor at the university of Ingolstadt. In 1522 the plague broke out at Ingolstadt, and Reuchlin taught once more for a term at Tübingen, but soon after fell sick and died at Liebenzell, near Hirschau, on the 30th of June.

Reuchlin edited various Greek texts, published a Greek grammar, a whole series of polemical pamphlets, and a satirical drama (against the Obscurantists), and in *De Verbo Mirifico* and *De Arte Cabbalistica* shows a theosophico-cabbalistic tendency. See Lives by Barham (Lond. 1843), Geiger (1871), Horawitz (1877), and a work on him by Holstein (1888).

Reumont, Alfred von, a German historian, was born at Aix-la-Chapelle on 15th August 1808, and died there on 27th April 1887, having from

1829 to 1860 followed a diplomatic career, chiefly in Italy. His numberless works deal mainly with Italian history, and one of the best known, his *Lorenzo de' Medici*, appeared in English in 1876.

Réunion, formerly called ÎLE DE BOURBON, an island belonging to France, and lying in the Indian Ocean, 115 miles SW. from Mauritius and 350 E. from Madagascar. An ellipse in shape, it has an area of 970 sq. m., being 38 miles in length and 28 in breadth. Pop. in 1892, 171,731, mostly Creoles, but including 15,000 negroes and nearly 30,000 natives of India. The backbone of the island is a volcanic range, culminating in two highest peaks, the Piton de Neiges (10,069 feet) in the centre of the island, and in the south-east Piton de Fournaise (8612 feet), one of the most active volcanoes in the world. The central parts of the island between these volcanic peaks consist of plateaus and terraces, separated by deep cauldron-shaped valleys and narrow, but profound, gorges and ravines. Piton de Fournaise is surrounded by a vast dreary desert called the *Pays Brûlé* ('Burnt Land'). Except in the mountainous parts the soil is in general very fruitful. The scenery is often beautiful. Streams, although not large, are very numerous, and fall in cascades to the sea. The climate is hot, but on the whole not unhealthy. Rainfall averages 45½ inches in the year. Cyclones sometimes occur during the hotter and rainy part of the year (November to April), and high spring-tides occasionally do serious damage during the remaining drier months. One-third of the island is cultivated, one-third under timber, and one-sixth is grass-land. Tropical fruits, sugar (the staple crop), coffee, vanilla, cinchona, maize, vegetables (potatoes, &c.), spices, tobacco, and similar products are grown. The total trade is estimated at 1½ million sterling—exports, £650,000; imports, £700,000 to £900,000. By far the most important article of export is sugar (£450,000); coffee, vanilla, rum, potatoes, and tapioca are the other chief exports. The imports consist principally of rice, claret, and in a secondary degree lard, live cattle, fish, grain, coal, oils, flour, and cloth. The capital of the island is St Denis, on the north coast, with 33,000 inhabitants, a college, a botanic garden, &c.; it is a bishop's seat. The remaining towns are St Paul, on the north-west, with 29,000 inhabitants, and with marine workshops; St Pierre, on the south-west coast, pop. 25,009; Pointe des Galets, the new port, between St Denis and St Paul; and Salazie, with warm mineral springs, a health-resort of 6000 inhabitants. The coast towns are connected by a railway 78 miles long. The colony costs France some £170,000 every year, and is administered by a governor and a council of thirty members. Réunion and Mauritius were discovered by the Portuguese navigator, Mascarenhas, and named after him the Mascarene Isles. The French took possession of this island in 1649, and called it Bourbon, which was changed to Réunion at the Revolution, and to Isle Bonaparte in 1809. Réunion has been the official name since 1848. The island was in the possession of Britain from 1810 to 1815.

See Bory de St Vincent, *Voyages* (1804); Maillard, *Note sur la Réunion* (1862); Roussin, *L'Île de la Réunion* (4 vols. 1882 *et seq.*); and Keller, *Natur- und Volksleben der Insel Réunion* (1888).

Re'us, a town of Spain, 58 miles by rail SW. of Barcelona and 4 N. of its seaport, Salou. The prosperity of the place dates from about 1750, when a number of English merchants settled there. It is a busy centre of the cotton, silk, and silk ribbon industries, prepares wine, and manufactures soap, brandy, and leather. Pop. 27,505.

Reuss, a tributary of the Aar in Switzerland, rises on the northern face of the St Gothard, flows northwards past Andermatt and Amsteg, between which places its bed lies at the bottom of a wild and narrow gorge, spanned by the Devil's Bridge and other wonders of Swiss roadmaking, and enters the southern end of the Lake of Lucerne. This it leaves again at its northern end, at the town of Lucerne, and, still going nearly due north, reaches the Aar near Windisch (Aargau). Its length is 90 miles; its basin, 1317 sq. m.

Reuss, the name of two sovereign principalities of Germany, lying between the kingdom of Saxony on the E., the Prussian duchy of that name on the N., and Bavaria on the S. Since 1666 the possessions of the House of Reuss have been divided between the Elder and the Younger lines. The principality of Reuss-Greiz (the Elder Line) is 122 sq. m. in extent, and had (in 1890) 62,759 inhabitants. The chief town is Greiz (q.v.). The principality of the Younger Line is Reuss-Schleiz-Gera. Area, 319 sq. m.; pop. (1890) 119,555. Capital, Schleiz (q.v.). Of both principalities the surface is hilly, being traversed by the Frankenwald (Thüringer Wald), whose summits reach upwards of 2000 feet in height. The chief rivers are the Saale and the White Elster, the valleys of which are well cultivated. More than a third of each state is covered with forests; cattle are fattened on the extensive meadows; and woollen, cotton, and silk goods are woven. The reigning prince of each state is a hereditary sovereign, and in each state always bears the name of Heinrich (Henry). He is the executive. Reuss-Greiz has a legislative assembly of twelve members, of whom nine are chosen by the people for six years; Reuss-Schleiz-Gera has an assembly of fifteen members, of whom twelve are chosen for three years by the people.

Reuss, EDUARD, a learned Protestant theologian, was born at Strasburg, July 18, 1804. He first studied philology at Strasburg, then theology there, at Göttingen, and at Halle, and oriental languages at Paris under Silvestre de Sacy; next qualified as *privat-docent* in the theological faculty at Strasburg, and filled a chair as ordinary professor from 1836 to 1838, and again after the re-establishment of the university from 1872 to 1888. He died April 15, 1891.

His chief works are *Geschichte der heiligen Schriften Neuen Testaments* (1842; 6th ed. 1887; Eng. trans. Boston, 1884); *Geschichte der heiligen Schriften Alten Testaments* (1881); and *Histoire de la Théologie Chrétienne au Siècle Apostolique* (1852; 3d ed. 1864; Eng. trans. 1872); *Histoire du Canon des Saintes Ecritures dans l'Église Chrétienne* (1862; Eng. trans. Edin. 1884); and *La Bible, Traduction nouvelle avec Commentaire* (19 vols. 1877-79). With Baum and Cunitz he commenced in 1863 the publication of a monumental edition of Calvin's works (44 vols. up to his death).

Reuter, FRITZ, German humorist, was born at Stavenhagen ('Stemhagen') in Mecklenburg-Schwerin, on 7th November 1810. His father, the burgomaster, sent him to Rostock and Jena to study law. But in 1833 he was arrested and condemned to death—in common with other members of the Jena *Burschenschaft* (q.v.) *Germania* he had indulged in wild students' talk about the fatherland and national unity; that was his only offence. The capital sentence was, however, commuted to one of thirty years' imprisonment. Young Reuter was dragged from one fortress prison to another in Silesia, Prussia, and Mecklenburg, and often subjected to great hardships and even wanton cruelty, and did not regain his freedom until Frederick-William IV. ascended the throne of Prussia in 1840. Although a general amnesty gave him back his liberty after seven years of imprisonment, his career was spoiled and his health incurably ruined; an affection of the stomach created in him an abnormal craving for strong drink, which he never conquered. It was eleven years more before he settled down to his life's work. His father, a stern and severe man, having in the meantime turned his back upon him as a good-for-nothing, he tried to resume his legal studies, learned farming, taught pupils, but lived chiefly on the kindness of a friend and on a small annuity left him by his father, who died in 1845. Reuter began to write first in High German; but having thrown into rough verse form, in Low German, the jokes and merry tales of the countryside, he published them—*Läuschen un Rimels* (1853; 18th ed. 1889), and the book became at once a great favourite with all who spoke and read Low German. Two years later he wrote an equally successful Low German poem, *Reis' nah Belligen* (12th ed. 1884), describing in broad humorous fashion the journey of certain peasants to Belgium in search of culture. The next seven years (1856–63), passed at Neubrandenburg, were the period in which he wrote his greatest books. The first of these were a second volume of *Läuschen un Rimels* (1858; 15th ed. 1889), and the deeply tragic poem *Kein Hüsung* (1858; 11th ed. 1891), picturing the wretchedness of the semi-serfs on the great Mecklenburg domains. The rest, except *Hanne Nüte* (1860; 13th ed. 1884), a poetic narrative in which birds figure prominently as speaking characters, were all written in prose in Low German (*Platt-Deutsch*), and were published under the general title of *Olle Kamellen*, which may be given in English as *Old-time Stories*. These books, more especially *Ut de Franzosentid* (1860; 17th ed. 1891; Eng. trans. as *The Year '13*, 1873), *Ut mine Festungstid* (1862; 15th ed. 1891), and his masterpiece, *Ut mine Stromtid* (1862–64; 17th ed. 1891), spread Reuter's fame abroad through all Germany, and lifted him to the proud position of Germany's greatest humorist next after Jean Paul; as a literary artist he ranks in many respects above Jean Paul. These tales have the indubitable flavour of real life: they deal with the characters and doings of rural Mecklenburg, are told with the verve of the born story-teller, and are bathed in the purest and sunniest humour. Like every true humorist, Reuter is master of a tender pathos. Uncle Bräsig in *Stromtid* is one of the greatest creations of German literature. The best witness to Reuter's own character is the history he wrote (*Ut mine Festungstid*) of the miserable seven years he spent in prison: the book has not one word of bitterness or a single trace of revengeful feeling throughout; good-nature and humour are its dominant notes. Besides the works quoted, Reuter also wrote *Schurr Murr* (1861; 11th ed. 1886), sketches of country life, partly autobiographical; *Dörchläuchting* (1866; 11th ed. 1886), a kind of humorous historical novel; the satirical *Urgeschicht von Meckelnborg* (1874), and others. Reuter lived at Eisenach in Thuringia, at the foot of the Wartburg, from 1863 till his death on 12th July 1874.

His *Sämmtliche Werke* were published in 13 vols. at Wismar in 1863–68; to these Adolf Wilbrandt added two more in 1875, together with a biography. The 7 volumes of a popular edition (1877–78) have each gone through several editions. Other biographies of him have been written by Glagau (2d ed. 1875) and Ebert (1874). See also Gaedertz, *Fritz-Reuter-Reliquien* (1885) and *Reuter Studien* (1890), and consult M'Callum's *Studies in Low German Literature* (1884).

Reuter, Baron Paul Julius, well known from the familiar newspaper heading 'Reuter's Telegram,' was born at Cassel, 21st July 1821. In Aix-la-Chapelle he formed in 1849 an organisation for collecting (partly by pigeon post) and transmitting by telegraph commercial and financial news; and in 1851 he transferred his headquarters to London. As telegraphs extended throughout the world he multiplied the ramifications of his system till it embraced the remotest regions. He even maintained couriers where the telegraphs did not reach—e.g. between Pekin and Kiachta. In 1865 Reuter converted his business into a limited liability company, and in 1871 he was made a baron of Germany. In 1872 the Shah of Persia gave him the sole right of making railways, working mines, forests, &c.—a monopoly never made effective, and annulled in 1889, when the concession of the Imperial Bank of Persia was conferred on him.

Reutlingen, a pleasant town of Würtemberg, situated on a feeder of the Neckar, 8 miles E. by S. of Tübingen and 20 S. of Stuttgart. Many of its houses are old and picturesque. The church of St Mary (1247–1343), with a tower 243 feet high, is a noble Gothic edifice. Woollen and cotton yarns are spun, and cloth, leather, cutlery, hosiery, paper, &c. are manufactured. Reutlingen was formerly a free imperial town and a member of the Swabian League; it came to Würtemberg in 1802. Pop. (1885) 17,319; (1890) 18,542.

Reval, or Revel, a Russian seaport, capital of Esthonia, stands on a small bay on the south side of the Gulf of Finland, opposite Helsingfors (52 miles distant), and 232 miles by rail WSW. of St Petersburg. It is divided into the (old) upper and (new) lower towns. The former contains the cathedral, the castle, governor's residence, and the houses of the (German) nobility. The new town extends outside the city walls. There are several mediæval guild-houses, in some of which are preserved valuable archives, and an important museum of antiquities. Reval exports cereals (chiefly oats), spirits, flax, and other commodities to the value of more than 2½ millions sterling; and imports cotton, coal, and other goods to the value of 6½ millions. There is little industry, brandy, vinegar, and wool being manufactured to a small extent. Pop. (1885) 51,277, of whom more than one-half were Esthonians, and nearly one-fourth of German descent. Reval was founded by Waldemar II. of Denmark in 1219, and became a flourishing Hanse town. It was long held (from 1346) by the Livonian Knights, was made over to Sweden in 1561, and was besieged by Peter the Great and annexed to the Russian empire in 1710. In 1713 a naval harbour was founded. See works by Bunge (1874), Amelung (1884), and Hansen (3d ed. 1885).

Revalenta Arabica. See Lentil.

Reveillé (the true French form being *réveil*), the morning call for troops. See Bugle.

Revelation is a familiar theological expression, commonly applied to the knowledge of Himself which God has given to man in Holy Scripture. In itself, however, the word is properly used not merely of the divine knowledge communicated to us in Scripture, but of all divine knowledge communicated through whatever source. Conscience and reason are in themselves modes of revelation, in so far as they witness to us of the divine laws which bind our moral life, and in harmony with which the health and happiness of that life can alone be found. History is also a species of revelation, unfolding, as it does, the same divine laws collectively in the race. Then nature reveals the divine power, wisdom, and goodness; and science, the interpreter of nature, in so far as it makes known the great laws governing the material universe, truly makes known the divine will to us. But it is with the Scriptures of the Old and New Testament that the idea of revelation has come to be especially associated. The Holy Scriptures are by all Christians regarded as in a special sense the medium of divine revelation to the human race; God having therein made known more fully and clearly than elsewhere His will and character. But at the same time we must not confound revelation, in its fact and essence, with the books of Scripture. These books are only the highest or most distinguished form or *medium* of revelation, which, in itself, and essentially, must always imply communication from one mind to another, and, in a religious sense, from the divine to the human mind. Scripture is, in its several books, regarded as the pre-eminent medium of this contact or interchange of the divine and human, as the record of special communications which God made in time past to holy men, 'who spake as they were moved by the Holy Spirit.' It *contains*, in short, a revelation for us; but the revelation is not the record, but the knowledge which the record conveys to our minds. See Bible, Inspiration.

Revelation, Book of, the last book of the New Testament canon. *Tradition.*—In the oldest extant MSS. the title is simply 'Apocalypse [i.e. Revelation] of John' (*Apokalypsis Ioannou*), and thus does not go beyond what the book itself declares. The further designation of the author in the *textus receptus* (followed by the Authorised Version) as John 'the divine' has no good MS. authority, but is an echo of the undoubtedly early tradition which identifies him with the author of the fourth gospel (who was called *theologos*, translated 'the divine,' first by Eusebius, because he begins his gospel not with the earthly genealogy of Jesus but with the doctrine of the divinity of the Logos), and of the tradition which identifies the author of both works with John, the son of Zebedee, one of the twelve apostles. Other comparatively ancient forms of the title, still more explicit in this sense, are 'The Revelation of John the Divine and Evangelist,' and 'The Revelation of the Apostle and Evangelist John.'

The 'Apocalypse of John' is included in the Muratorian canon; it was also reckoned by Origen among the 'homologoumena' or 'acknowledged' books of New Testament Scripture. It was held in high esteem by Irenæus, Hippolytus, Clement of Alexandria, and Tertullian. Justin Martyr (*circa* 147) makes reference to it as the work of the apostle John, and it was used by Theophilus of Antioch (*circa* 180) and Apollonius, and commented on by Melito of Sardis (*circa* 170). Outside the Catholic Church it was accepted by the Montanists. On the other hand, it was rejected by those whom Epiphanius calls Alogi and by the Marcionites, while within the Roman church its claims were disputed by an ecclesiastic named Gaius or Caius; his arguments in turn were controverted in an apologetic writing by his contemporary, Hippolytus. It is mentioned as one of the 'antilegomena' or 'disputed' works by Eusebius; it is absent from the Syriac, and from the Memphitic and Thebaic (Egyptian) versions of the Scripture, and from the lists of Cyril of Jerusalem, Gregory Nazianzen, and Chrysostom, as well as from the canon of the Council of Laodicea, and from the so-called 'apostolic canons.' There is no trustworthy evidence that Papias knew it.

As regards authorship, the book itself claims to be written by 'John, the servant of Jesus Christ,' 'who bare witness of all things that he saw;' and it is to be observed that many of the incidental references to it in early writers are evidently mere repetitions of this statement. But the reception of the Apocalypse into the canon was no doubt partly determined by the belief that this John was the son of Zebedee. This belief is implied in the Muratorian canon, and that he was the apostle is categorically stated by Justin Martyr and Irenæus. Dionysius of Alexandria (*circa* 250), however, while not disputing the canonicity of the book, found himself unable to overcome the arguments of certain who had preceded him against its apostolic authorship, and he accordingly assigned it to 'some other' John—perhaps (he thought) John the Presbyter. Eusebius with some definiteness assigned it to the last named.

As to the time of its composition tradition is far from consistent. The author of the Muratorian fragment, for example, incidentally places it earlier than the Pauline epistles; but Irenæus expressly states that it 'was seen towards the close of the reign of Domitian.' This statement of Irenæus is sometimes interpreted as implying that the book was also written then; but more probably he intended his readers to understand that it was written after Domitian's death—under Nerva, or perhaps even in the reign of Trajan, to which period, according to Irenæus, the apostle survived. But Tertullian seems to suggest the time of Nero as the date. Jerome dates the supposed banishment of John certainly, and the writing probably, in the 14th year of Domitian; but in this, perhaps, he is only repeating Irenæus. There is some reason to think that this date is partly derived from an interpretation of Rev. i. 9 which is not now usually accepted. Epiphanius mentions the time of Claudius. The place where the revelation was received is professedly Patmos, and ancient writers usually assumed that it was also committed to writing there.

The discussions of the Apocalypse by Melito and others have not been preserved; but from the earliest extant commentary—that of Victorinus (*circa* 300)—it may be inferred that no systematic attempt at a consistent interpretation of the work as a whole was undertaken by any ancient writer. Attention was for the most part confined to two or three isolated points. It need hardly be said that, as regarded the millennium, the ancient church was entirely of the 'futurist' school, and that in those quarters where the Apocalypse was most prized as an authentic vision of the future the interpretation always tended to be literalist and 'chiliastic.' As for another conspicuous feature—the beast and the number of the beast (see Apocalyptic Number)—it is surprising how early the key to this enigma seems to have been lost. Irenæus confesses ignorance, and can only resort to timid and tentative conjecture. Victorinus, however, explained Rev. xiii. 3 as having reference to Nero; and so also did Sulpicius Severus. To Origen and the Alexandrians, with their allegorising methods of interpretation, the problems of the Apocalypse were of comparatively little interest. Later, after the time of Constantine, the 'beast' was identified with pagan Rome, or the seven heads of the beast with seven world-empires, and Augustine was one of the first to give currency to a form of 'preterism,' holding that the millennium began with the Christian era—a belief which again became active in the 11th century. With the lapse of time came almost inevitable modifications, both of the preterist and of the futurist view, alike among those who held that the threefold series of visions (seals, trumpets, vials) in the book related to chronologically successive events, and to those who, with Augustine, viewed them as parallel (theory of 'recapitulation'). Mediæval sects recognised the papacy in the woman on the scarlet beast, an interpretation which afterwards in one form or another became widely current throughout the Protestant domain, and still holds its ground in many quarters.

Modern Criticism.—The modern criticism of the Apocalypse may in a sense be said to have begun with Luther, who in the preface to the first edition of his New Testament (1522) declared that for many reasons he was unable to accept this book as either apostolic or prophetic—'My spirit cannot adapt itself to the book.' The chief reasons he alleged were the little prominence it gave to Christ, and the peculiar manner of its teaching, so unlike the rest of the apostolic teaching or that of Christ himself. In 1530 he somewhat modified the language he had used, but he never withdrew his unfavourable opinion. The prevailing view of the Lutheran divines of the 16th and 17th centuries (Carlstadt, Flacius, and others) was that the Apocalypse can claim at best only the third and lowest degree of canonical authority. Zwingli in 1528 refused to regard it as Scripture or to admit the validity of doctrinal proofs derived from it. Calvin abstained from commenting on it. Its 'deutero-canonical' character, however, was never made prominent in Britain, and was gradually lost sight of even in Germany. Mention may perhaps be made of the English work of Abauzit on the Revelation (1730), which called forth some controversy at the time of its appearance; but, strictly speaking, the discussion of the critical problems of the book did not enter upon its modern phase until the time of Semler, 'the father of modern biblical criticism,' who in 1769 and following years, from a comparison of the fourth gospel with the Apocalypse, argued that an apostolic authorship could not possibly be claimed for both, and, starting from this canon, denied it to the latter. The same view was taken up by Schleiermacher and his immediate disciples, the most brilliant of whom—De Wette—ultimately gave out this 'disjunctive canon' as one of the most firmly established conclusions of modern criticism (1826); so also Ewald (1828). To obviate the force of some at least of Semler's arguments, those who wished to maintain the apostolic origin of both works found it important to make out an earlier date for the Apocalypse than the currently accepted tradition, following Irenæus, had assigned to it. In their efforts to do so they were powerfully supported from 1845 onwards by the Tübingen school, which had also accepted the 'disjunctive canon,' though choosing the opposite alternative to that adopted by Schleiermacher, and maintained the apostolic character of the Apocalypse, ranking it indeed as one of the five undoubtedly genuine remains of the apostolic age (Baur, followed by Schwegler, Zeller, S. Davidson, &c.). Various opponents of the Tübingen school followed Semler and De Wette in arguing for the non-apostolic authorship of the Apocalypse at least. Thus, Lücke and Neander attributed it to some unknown John; Ewald, Bleek, Düsterdieck to the presbyter John; Hitzig to John Mark. Meanwhile all sections of the historical school of exegesis were at one in the effort to see and if possible understand the book in the light of the actual circumstances of its writer. Among the details that came into greater clearness were the historical references in the beginning of chapter vi., the indication of date supplied by xi. 1, 2, and a very probable explanation of the number of the beast ('Nero Cæsar') which was first given by Fritzsche in 1831 and afterwards rediscovered, independently it is said, by Benary, Hitzig, and Reuss in 1837. Much of the evidence pointing to an early date for the book was, as already indicated, specially welcome to those who still maintained the apostolic authorship alike of the Gospel and of the Revelation, for it was becoming increasingly plain that the differences of language and conception between the two works were peculiarly inexplicable if both were assumed to belong practically to the same period in the life of their common author.

On the other hand it was felt to be difficult wholly to set aside the traditions which pointed to a later date, especially as these best explained some of the doctrinal peculiarities of the book, and many of the phenomena presented by the condition of the 'seven churches' to whom the book is primarily addressed. The two-sided character of the evidence, both external and internal, as to date is indeed obvious when one looks at it with any care; and as early as the middle of the 17th century it had occurred to Grotius (1644) that the problem raised by it might perhaps be solved by the assumption that the book was written by its one author at different times, partly in Patmos and partly at Ephesus. Vogel in the beginning of the 19th century (1811-16) offered a different solution—that it was written partly by the apostle John and partly by the presbyter John, a theory which seems to have had some attraction for Schleiermacher, and, temporarily at least, for Bleek. The theory of a composite origin of the work has in a variety of forms come into very great prominence quite recently. Thus, according to the acute analysis of Völter in his singularly able and instructive work *On the Origin of the Apocalypse* (1882; new ed. 1885; compare the appendix to Simcox's *Commentary*), the original Apocalypse as written by the apostle in 65–66 A.D. consists of i. 4–6; iv. 1–v. 10; vi. 1–vii. 8; viii.; ix.; xi. 14–19; xiv. 1–7; xviii. 1–xix. 14; xiv. 14–20; xix. 5–10. To this the apostle himself three years later (68–69 A.D.) added x. 1–xi. 13; xiv. 8; xvii. It received subsequent additions by other hands in the time of Trajan (xi. 15, 18; xii.; xix. 11, 12; xx.; xxi. 1–8), of Hadrian (v. 11–14; vii. 9–17; xiii.; xiv. 4, 5, 9–12; xv. 1–xvii. 1), and of Antoninus Pius (prologue, the epistles to the churches, &c.). A new line of investigation in the same direction was opened by Vischer, who (*The Revelation of John a Jewish Apocalypse*, 1886) sought to show that the groundwork of the composite book was primarily not Christian but Jewish, written in Hebrew, but translated and freely adapted by a Christian redactor. This view was accepted by Harnack (1886), and substantially, though with large modifications, by Pfleiderer (1887) and Weyland (1888). Schön also (1887) and Sabatier (1888) maintained the composite character of the work, holding it, however, to be essentially of Christian origin (end of 1st century), but with incorporation of Jewish fragments. The most powerful and suggestive of recent works based on the theory of composite origin is that of Spitta (*The Revelation of John*, 1889), who distinguishes a Christian Apocalypse, dating from about 60 A.D., which he attributes to John Mark (i. 4–6, 9–19; ii. 1–6, 8–10, 12–16, 18–25; iii. 1–4, 7–11, 14–20; iv. 1–4, 5*a*, 6*a*, 7–14; v.; vi.; viii. 1; vii. 9–17; xix. 9*b*, 10*a*; xxii. 8, 10–13, 16–18*a*, 20*a*, 21) and two Jewish Apocalypses dating respectively from Pompey's capture of Jerusalem in 63 B.C. (x. 1*b*, 2*a*, 8–11; xi. 1–13; xiv. 14–20; xv. 2–4, 6, 8; xvi. 1–12, 17, 21; xvii. 1–6; xviii. 1–xix. 8; xxi. 9–27; xx. 1, 2, 3*a*, 15) and from Caligula's time, about 40 A.D. (vii. 1–8; viii. 2–13; ix.; x. 1*a*, 2*b*–7; xi. 15, 19; xii. 1–14; xiii.; xvi. 13–16, 17*b*–20; xix. 12–21; xx. 1–15; xxi. 1, 5, 6). These three sections of the work correspond roughly, it will be seen, to the visions of the seals, the trumpets, and the vials. The work of redaction, Spitta holds, was done towards the end of the 1st century. He finds the original number of the beast (616) in the name of Caligula (Gaius Cæsar), and considers that it was only afterwards adapted to that of Nero (666). The treatises on the Revelation by Erbes (1891) and Schmidt (1891) are in tendency similar to that of Spitta. The subject they deal with is still under active discussion; but it is already felt by all competent judges that the investigation thus inaugurated is likely to lead to valuable results, and ultimately perhaps may be found to afford an approximate solution of most of the still unsolved problems connected with the Apocalypse, and so make it, instead of being the obscurest, one of the clearest documents relating to the development of thought and feeling in primitive Christian times.

Literature.—For the text of the Apocalypse, which is more unsettled than that of any other New Testament book (the five uncial MSS. present the unusually large proportion of 1650 various readings in somewhat over 400 verses), B. Weiss's edition, with critical notes (Leip. 1891), ought to be consulted. On the modern critical questions, besides the recent works of Völter, Spitta, and others already named, the best introductions are those of Reuss (6th ed. 1887), Weiss (2d ed. 1889; Eng. trans.), and Holtzmann (*Einl.* 2d ed. 1886; also special introduction to his *Hand-Commentar* on Revelation, 1891). Of older works see also Bleek's *Lectures on the Apocalypse* (1862; Eng. trans. 1875). Much useful information is given in Gloag's *Introduction to the Johannine Writings* (1891); also in Farrar's *Early Days of Christianity* (1882), Renan's *L'Antechrist* (1873; Eng. trans.), and Chauffard's *L'Apocalypse et son Interprétation historique* (1888). Of commentaries the most important or useful are those of Ewald (Latin, 1828), Lücke (1832), De Wette (1848), Ewald (German, 1862; Eng. trans.), Reuss (1878), Holtzmann (1891), and Spitta (1889; this work being specially useful for the account it takes of the mass of current apocalyptic material which presumably was at the disposal of authors and editor). The number of authors on the fulfilled and unfulfilled prophecies of the Apocalypse has been very great; most of them until very recently wrote on the assumption that every one of these either has received or is destined to receive a fulfilment recognisable as exact, and they can be classified according to their views of the manner of this realisation. Those, for example, who, following the indication of Augustine, think that the millennium has already come or even is already past, may fairly be called preterists. Of those we may mention Grotius, who identified Gog and Magog with the Turks in Europe, and Hengstenberg, who judged the millennium to have ended in 1848. All those, on the other hand, who think that the millennium, in any definite sense that can have been intended by the author, is yet to come, may equally justly be called 'futurists,' but they are of very various degrees, some holding that none of the special preliminary events which are described as leading up to the millennium have as yet taken place; while others, sometimes referred to as the 'continuous historical' school (of which Bengel is perhaps the most brilliant example), read into the book (with very wide divergences as to detail) what they consider to have been the leading incidents in the political or ecclesiastical history of Europe for the last eighteen centuries. Of the first description are most of the so-called 'millennarian' writers; to the second belong the followers of Mede (1627). Apart from these definite schools ought to be classed those interpreters of the spiritualising or idealising order who were represented in ancient times by the Alexandrians, and whose method has often been found in modern times a convenient refuge for exegetical timidity or helplessness. Recent commentators with any character for sobriety to lose have, as a rule, been exceedingly cautious in dealing with the predictive element in the Apocalypse, some maintaining that its prophecies admit of a variety of fulfilments, but without attempting concrete interpretations of the past, and still less definite forecasts of the future, by their light; while others go so far as to deny that the book is predictive in the strict sense at all, and hold that it was from the very first intended to be read as a more or less imaginary picture of the kind of vicissitudes through which the church militant has passed and may be expected to pass before it reaches its final triumph. See Düsterdieck (in Meyer's *Commentary*, 1859; new ed. 1887), Lee (in *Speaker's Commentary*, 1881), Boyd Carpenter (in *New Testament Commentary for English Readers*, 1883), Milligan (in Schaff's *Commentary*, 1883, and in *Expositors' Bible*, 1889), and Simcox (in *Cambridge Bible for Schools and Colleges*, 1890).

Revels, MASTER OF THE, the name of an officer, also called 'Lord of Misrule,' formerly attached to royal and other distinguished houses. It was his function to preside over the amusements of the court, or of the nobleman to whose house he was attached, during the Christmas holidays. The universities of Oxford and Cambridge and the Inns of Court had also their Lord of Misrule. This officer became a permanent appendage to the English court in the reign of Henry VIII., and his duties included the keeping of the tents and pavilions which accompanied the sovereign on a royal progress, as also the keeping of the dresses and masks used in entertainments given at court, and the providing of new ones when required. In Queen Elizabeth's time the Mastership of the Revels was divided into several distinct offices. The office practically fell into desuetude about the end of the 17th century. See FOOLS (FEAST OF); and Chambers's *Book of Days.*

Revenue. The public revenue of the civilised states of the world is in every case treated of in the articles on the several countries in the section dealing with finance; thus, the various elements of the British revenue at different periods, as compared with the expenditure, is somewhat fully given at GREAT BRITAIN, Vol. V. p. 376. The inland revenue is distinguished from the Customs Duties (q.v.), and includes (1) the Excise (q.v.), comprising alcohol duty, liquor and luxury licenses; (2) Stamps, with the 'death duties'—probate, account, legacy, and succession duty; (3) Taxes—property and income tax, land-tax, inhabited house duty (see TAXES). The right of the Commons to regulate taxation and the outlay of the national income is treated at PARLIAMENT, Vol. VII. p. 774. Below is a comparative table of the gross revenue of the principal civilised states for the years 1889 or 1890:

France	£123,424,000	United States	£80,616,000
Russia	94,787,000	Italy	65,406,000
Great Britain	89,304,300	German Empire	62,692,000
Austria-Hungary	87,581,000	Spain	31,886,000

The revenue of Canada is £7,970,000; of Cape Colony, £4,340,000; of New South Wales, £9,063,397; of Victoria, £8,676,081; of British India, £56,166,000; of the whole of the British colonies and dependencies, without India, £48,309,000. Britain and her dependencies have thus a total revenue of near £195,000,000.—For Revenue Officers, see COASTGUARD.

Reverberatory Furnace, a furnace so constructed that ores and other materials may be heated in it without coming in direct contact with the fuel. It consists essentially of three parts—viz. a fireplace at one end; in the middle a flat bed or sole, on which the material to be heated is placed; and at the other end a chimney to create a draught and to carry off the smoke or fume. Between the fireplace and the bed a fire-bridge is placed, and the whole built over with a flat arch, dipping towards the chimney. The flame plays over the fire-bridge, and the heat is reflected, or *reverberated,* on the material beneath; hence the name. See COPPER, LEAD, and IRON (puddling furnace).

Revere, PAUL, famous for his midnight ride, was born in Boston, Massachusetts, 1st January 1735, the son of a goldsmith from Guernsey, whose trade he followed after serving as a lieutenant of artillery in the expedition against Crown Point (1756). He also engaged in copperplate printing, and before the Revolution constructed a gunpowder-mill. A keen patriot, he was one of the party that destroyed the tea in Boston harbour, and he was at the head of a volunteer committee, consisting of thirty young mechanics, who formed a secret society to watch the British. When it was known that the latter intended to move, Revere crossed over to Charlestown, and on April 18, 1775, the night before Lexington and Concord, at a signal rode on to Lexington and to Lincoln, rousing the minute-men as he went; at Lincoln he was stopped, but a companion succeeded in reaching Concord. During the war he rose to lieutenant-colonel of artillery; afterwards he returned to his goldsmith's work, and in 1801 founded the Revere Copper Company at Canton, Massachusetts. He died 10th May 1818. His ride is the subject of a well-known poem by Longfellow.

Reverend (Lat. *reverendus*, to be respected), a title of respect given to the clergy. In the Anglican Church deans are 'Very Reverend;' bishops, 'Right Reverend;' and archbishops, 'Most Reverend.' In Scotland the clergy in general are 'Reverend,' while it is the practice to apply 'Very Reverend' to the moderator of the General Assembly for the time being, and to the principal of a university, being a clergyman. The style Reverend is generally adopted by and given to the clergy of the different dissenting bodies; and in 1876 the Privy-council decided on appeal that there is no law restricting it to ministers of the Church of England. There have, however, been instances in which some dissenting ministers have repudiated it. See ADDRESS (FORMS OF).

Reversion is the right to the enjoyment of money, or of any kind of property, postponed until or contingent on the happening of a given event. Reversions are usually divided into three classes: Absolute Reversion, in which the emergence of the rights is certain, Contingent Reversion, and Reversionary Life Interests. In the first case, when the date of the emergence is also fixed, the value of the reversion is dependent merely upon the operations of interest (see INTEREST). When the date of the emergence of the reversionary right is uncertain, the purchase in an individual case must always be a speculation; but if there are a sufficient number of such rights, postponed to events of which there are sufficient observations from which to deduce laws of average, then the marketable value is easily calculated. For example, it is required to know what is the immediate value of £100 payable certainly on the death of a man aged sixty. Here the value of the reversion is £100, under deduction of the prior life interest, which in this case is the present value of annuity equal to the interest of £100 on the life of a male aged sixty. When an assurance company buys a reversion, it is simply buying that which it sells when it grants a policy of life assurance. In the former case, however, an office, to secure its expenses and profits, will assume a high rate of interest and a long life; in the latter case, for the same reason, it will assume a low rate and a short life. By the Sale of Reversions Act, 1867, no purchase of a reversion is challengeable on the ground of undervalue merely. Where the reversion is contingent, problems arise whose solution requires the utmost skill on the part of the actuary. For instance, B, aged thirty, wishes to borrow £100 on the security of a sum payable to him *in the event* of his surviving A, aged fifty-eight. Here the security being doubtful, it could only be rendered marketable by assuring a sum to be paid in the event of B dying before A; and there would remain the important question of what this sum should be, so as to cover the loan and the premiums of assurance with yearly accumulations on both. The value of a reversionary life interest is found by deducting the value of a joint life annuity from the value of the annuity on the life of the survivor (see the Institute of Actuaries' text-book, part ii.).

In law a reversion is that right to property which remains after some particular estate has ceased which had been granted by the owner. Thus, if A has a life estate in B's property, and after he dies the property returns to B, B is said to have the reversion or to be the reversioner. The landlord of property let to a tenant is called the reversioner, because the moment the lease determines, the whole of the property and possessions vest in him. In Scots law reversion means the right of redemption retained by a borrower over an estate disponed in security.

Reversion, a term used to describe the tendency of animals and plants to show characteristics of some ancestral form. Thus, horses have occasionally transverse bars on the legs and shoulders, and a blue pigeon like the wild rock-dove (*Columba livia*) sometimes appears even in a perfectly pure breed. See ATAVISM, and DEGENERATION.

Revêtment. See FORTIFICATION, p. 744.

Review. See PERIODICALS.

Réville, ALBERT, a French Protestant theologian, was born at Dieppe, November 4, 1826, studied at Geneva and Strasburg, and acted as pastor of the Walloon Church at Rotterdam from 1851 to 1872. Thereafter he lived near Dieppe, devoting himself to study, until his call in 1880 to the chair of the History of Religions in the College of France. In 1886 he was appointed to be president of the Section des Études Religieuses at the Sorbonne.

His numerous books include *Manuel d'Histoire comparée de la Philosophie et de la Religion*, based on Scholten (1859; Eng. trans. 1864); *De la Rédemption* (1860); *Essais de Critique Religieuse* (1860); *Manuel d'Instruction Religieuse* (1863); *Histoire du Dogme de la Divinité de Jesus Christ* (1869; Eng. trans. 1870); *Prolégomènes de l'Histoire des Religions* (1881; Eng. trans. 1884); *The Native Religions of Mexico and Peru* (the Hibbert Lectures for 1884); *Les Religions des Peuples Non-civilisés* (1883); and *La Religion Chinoise* (1889).

Revising Barrister. See BARRISTER.

Revival, or REVIVAL OF RELIGION, a term employed to denote an increase of faith and piety in individual Christians, particularly after a period of religious declension, and also an increase of religion in a community or neighbourhood, both through the revival of those who are already religious, and through the conversion of the previously irreligious. Such religious movements frequently extend, more or less generally, over a neighbourhood, or sometimes over a country. Instances of a similar kind are recorded in the Scriptures as occurring both in the history of the Jews and in the early history of the Christian church, particularly in the effusion of the Holy Spirit on the day of Pentecost, and afterwards in connection with the ministry of the apostles, when many were converted through a single discourse, or, in other cases, evidently within a short time. In the middle ages revivals took place in connection with the Crusades and under the auspices of the monastic orders (see CHURCH HISTORY); and sometimes with repulsive adjuncts, as in the case of the Flagellants (q.v.) and the Dancing Mania (q.v.). The Reformation of the 16th century, and the more partial movements of the same kind which preceded it, are also regarded as essentially revivals of religion—the Reformation itself the greatest which has taken place since the apostolic age. In Scotland there were notable 'works' in 1625 at Irvine and Stewarton, in 1630 at Kirk-of-Shotts, and in 1638. After the Reformation the next wide-spread movement of the kind was that in the first half of the 18th century from which the Methodist churches originated. It was accompanied with many circumstances similar to those which have attended later revivals of religion. The term revival did not begin to be commonly employed till after this period; and the revival which took place in New England and other parts of North America about the same time under Edwards, Bellamy, and the

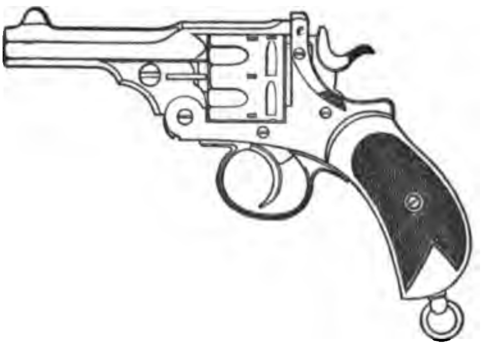
Tennents was generally designated the Great Awakening. The beginning of this revival seems to have had no connection with the Methodist movement in England, although subsequently they became connected through Whitefield's visits to North America. There were revivals at Cambuslang in 1742, and at Moulin in Perthshire in 1798–1800. A very extensive revival in Wales resulted in the formation of the Welsh Calvinistic Methodist Church, but was not confined in its effects to those who became connected with that church. Local revivals also in some instances attended the ministry of evangelical ministers of the Church of England; and in America there were revivals in 1796, in 1812–15, and again in 1827–32. In 1839 the attention of all Scotland was drawn to a religious movement at Kilsyth, originating in the preaching of Mr William C. Burns (q.v.), and this was followed by similar occurrences in a number of other places, more or less evidently connected with it. The great American revival of 1859–61 began in New England, particularly in Connecticut and Massachusetts, and rapidly extended to New York and over the middle and western states. It was not generally attended with scenes of great excitement; strong but calm religious feeling was its general characteristic. It spread all over the United States, and it was believed that in a single year half a million converts were received into the churches. A similar movement took place in Ireland, and rapidly extended over the whole north, and subsequently to Scotland, Wales, and some parts of England. As a rule it was free from excitement, and characterised by little else than the intensity of religious feeling displayed. Another remarkable revival, which extended over the greater part of Great Britain in 1874–75, originated in the efforts of two American evangelists, Messrs Moody and Sankey, and was characterised by the almost entire absence of sensationalism. The Salvation Army carries on its work largely by methods known as revivalistic. Revivals of religion have occurred also in other parts of the world. Though evangelical Christians generally recognise revivals as in the main divine works of grace, they agree in deploring the extravagances and irregularities that have not unfrequently accompanied them and done grievous harm to the cause of religion.

See Fleming's *Fulfilling of the Scripture* (1681); Edwards, *The Work of God in Northampton, Massachusetts* (1736); Robe's *Narrative* (1742); Pringle, *Surprising Accounts of the Revival of Religion in the United States* (1802); lectures on the subject by Sprague (1833) and Finney (1835); Mrs Lundie Duncan, *History of Revivals of Religion in the British Isles* (1840); Fish, *Handbook of Revivals* (1874); Porter, *Revivals of Religion* (1877); Overton's *Evangelical Revival of the 18th Century* (1886); and the journals and biographies of the Wesleys, Whitefield, the Haldanes, and other eminent evangelists.

Revival of Learning. See RENAISSANCE.

Revolution, any extensive change in the constitution of a country suddenly brought about. The most important events in modern history specifically known under this name are the English revolution of 1689 (Guizot by 'Revolution' means the 'Great Rebellion'); the American revolution of 1776; the French revolution of 1789; the revolution of 1830 ('the July revolution'), which deposed Charles X. and raised Louis-Philippe to power; the revolution of 1848 ('the revolution of February'), which established the second republic; and the revolutions by which the existing South American republics (including that of Brazil in 1890, and of Chili in 1891) were established or are from time to time modified. The revolutionary period *par excellence* is the years 1848 and 1849. The French change of constitution in 1871 is not usually spoken of as a revolution, though in effect it was one. For the Revolutionary Tribunal, see DANTON.

Revolvers, in Firearms, are weapons having barrels or chambers which revolve upon a common centre, and are fired in turn by one lock mechanism. Revolving firearms date from the commencement of the 17th century, when hand-guns having two or more barrels were mounted to turn upon an axis, and so arranged that the powder-pans came successively under the action of the lock; the barrels were not rotated by pulling the trigger, but were turned by the hand. The celebrated Marquis of Worcester invented several such. In 1815 Le Norman, a Parisian gunsmith, produced a pistol with five barrels, Devisme one with seven, but neither proved successful. The 'Mariette,' made with from four to twenty-four barrels, was the first to become popular, although from its weight, cumbrous mechanism, and short range, it could have been of little use except at close quarters. This pistol was the precursor of the 'pepper-box' pistol, to which it was closely allied; the barrels of both were bored in a solid mass of metal, and made to revolve as the hammer was raised to full cock. Not so old as the principle of revolving barrels, but still an invention of past generations, is that of a revolving chamber or breech-piece, pierced with cylindrical apertures to contain the charges, and so arranged that each chamber came successively into line with the barrel and lock common to all. E. H. Collier in 1818 patented an improved carbine with three revolving chambers, which appears to have been an efficient weapon. Colonel Samuel Colt produced his world-renowned revolver in 1835. This consists of a rifle barrel, a revolving cylinder with six or seven chambers, each furnished with its own nipple and cap, and a lever trigger, which operates the mechanism required to turn the chambers and fire the weapon. The double-action revolver is one in which by simply pulling the trigger the hammer is raised and released, and the chambers turned; whilst in the single-action revolver the hammer is raised by the thumb of the firer and released by the trigger. Breech-loading revolvers are of two kinds—the solid frame revolver, which requires the empty cases to be forced out by a diminutive ramrod (generally attached to the pistol by a swivel), and the self-extracting revolver, of which there are many kinds. The regulation pistol of the British army is that illustrated here. By pressing the lever, *e*, the bolt securing the top of the hinged frame is released, and the barrel turning upon the hinge raises the chambers, whilst the extractor-rod coming into contact with a spur-lever, flips out the fired cases and returns into position; the chambers are thus exposed for loading, and upon the barrel being raised the breech-bolts snap home,



Webley's Revolver Pistol (Mark I.).

and the pistol is ready for firing by pulling the trigger. This principle is the most popular of any employed for self-extracting revolvers, and it has proved efficient. There are many types of revolvers, self-extracting and other, but, with the exception of cheap weapons and some single-action solid-frame revolvers popular in America, the principle adopted by the British and other governments is that most generally used. Messrs Smith & Wesson of Worcester, Massachusetts, were the first to popularise the hinged self-extracting revolver, and amongst many other models they now make one in which the hammer is covered, and the pistol can only be fired when firmly grasped by the hand; as a safety bolt, which effectually and automatically bolts the firing mechanism, projects through the haft, and has to be pressed in before the trigger can be drawn back to raise the hammer and fire the weapon. This pistol is perfectly safe, and insures immunity from such accidents as arise from careless handling. For military purposes the revolver is generally made of half-inch calibre, and such a weapon has a range of from 100 to 300 yards, whilst at 50 yards ten consecutive shots have been placed in a 4-inch bull's-eye. At shorter ranges its precision is equal to that of the finest duelling pistol. Revolving arms of large size are used as Cannon (q.v.) and Machine Guns (q.v.); and for further particulars of revolving firearms consult Galand, *Le Revolvre de Guerre* (2d ed. 1873); Gould's *Modern American Pistol and Revolver* (Boston, 1888); and British service publications.

Revue des Deux Mondes, the best known of the French magazines devoted to literature, art, and general criticism, was founded in Paris in 1831 by François Buloz. It had appeared during 1829, but was languishing until purchased by Buloz, who firmly established it. Many of the best French writers have contributed to its pages.

Rewa, a state of India, called also Baghelkhand (q.v.).—REWA KANTHA is the name of a political agency under the government of Bombay, containing sixty-one small states, of which five are tributary to the British government, and most of the remainder to Baroda. The territory included, covering an area of 4792 miles, with a total population of 543,452, lies mainly along the south bank of the lower Nerbudda with patches north of it, and on the west borders on Broach, Baroda, and Ahmadabad.

Reward, in a legal sense, means some encouragement which the law holds out for exertions in bringing certain classes of criminals to justice. By statute 7 Geo. IV. chap. 64, the courts of assize may order the sheriff of the county, in which certain offences have been committed, to pay to persons who have been active in securing the apprehension of offenders charged with murder, or with feloniously shooting, cutting, stabbing, wounding, or poisoning, or with rape, burglary, housebreaking, robbery, arson, or cattle-stealing, or with being accessary before the fact to any of such offences, or to receiving any stolen property, a reasonable sum to compensate them for expense, exertion, and loss of time. So by a later statute (14 and 15 Vict. chap. 55) courts of quarter sessions are authorised, in the case of any of the above offences which they have jurisdiction to try, to order such compensation; but the payment to one person must not exceed £5. If any one is killed in endeavouring to apprehend a person charged with one of these offences, the court may order compensation to be made to the family. The amount to be paid in all such cases is subject to regulations which may be made from time to time by the Secretary of State. By statute (24 and 25 Vict. chap. 96) it is a felony, punishable by penal servitude to the extent of seven years, to corruptly take any reward for helping a person to property stolen or embezzled, unless all due diligence to bring the offenders to trial has been used. In Britain an advertisement offering a reward for the return of stolen or lost property, using words purporting that no questions will be asked or inquiry made after the person producing the property, renders the advertiser, printer, and publisher liable to forfeit £50. For several years the offering of rewards by the government has in England been discontinued on grounds of public policy. For example, during the series of murders in Whitechapel in 1888-90, the Home Office, though urgently requested to offer a reward for the discovery of the criminal, steadily refused to do so.

Rewari, a town of the district of Gurgaon, in the extreme south of the Punjab, 50 miles SW. of Delhi by rail, an important centre for trade between Punjab and Rajputana. Pop. 23,900.

Reybaud, MARIE ROCH LOUIS, a clever French writer, was born at Marseilles, 15th August 1799, travelled in the Levant and India, and returned to Paris in 1829 to write for the Radical papers and edit the *Histoire scientifique et militaire de l'Expédition Française en Egypte* (10 vols. 1830–36), Dumont d'Urville's *Voyage autour du Monde* (1833), and Orbigny's *Voyage dans les deux Amériques* (1836). His studies in social science bore fruit as *Études sur les Réformateurs ou Socialistes modernes* (2 vols. 1840–43; 7th ed. 1864), which gained him the Montyon prize (1841) and a place in the Academy of Moral Sciences (1850). His unusually original satiric novel, *Jérôme Paturot à la recherche d'une Position sociale* (1843), became widely popular, and was followed by the less successful *Jérôme Paturot à la recherche de la meilleure des Républiques* (1848). Reybaud took an active part in politics, first voted with the Left, but after the July revolution with the Right, and was sent by the Assembly to Algeria to visit the agricultural colonies established there. His last thirty years were devoted to studies in economics. From 1850 a member of the Academy, he died at Paris 28th October 1879. Among his later works were *Marines et Voyages* (1854), *Scènes de la Vie moderne* (1855), *L'Industrie en Europe* (1856), and *Études sur le Régime des Manufactures* (1859).

Reyk'javik. See ICELAND, Vol. VI. p. 62.

Reynard the Fox, a well-known popular epic the characters of which are animals instead of men. It belongs to the series of Beast-fables (q.v.) which have delighted the popular imagination from early ages and in all lands, from India to the Bushmen's country in South Africa (see FABLE). The stories that relate the knaveries of Reynard the Fox seem to have originated for the most part in northern France and Flanders from the 10th century onwards, and to have been composed and recomposed repeatedly in various forms in the 12th and following centuries. The authors or editors, so far as they are known, belonged chiefly to the ecclesiastical orders. The several versions differ not only in respect of language and of style, but also in the choice and arrangement of the episodes and incidents narrated. All turn upon the knaveries of Reynard the Fox, as practised by him in his quarrel with Isengrim the Wolf, who in all encounters generally comes off second best. The best versions, as the typical Flemish and Low German (to be referred to in detail lower down), reach a high level of literary excellence. The episodes are woven together into a veritable epic; the versification is agreeable and easy; the characters are consistent and well-sustained; the contemporary manners, and the localities and circumstances, that make the background of the story are true and realistic; and the story is told without any other obvious purpose beyond that of affording honest amusement. These features do not, however, characterise all the versions: some have been clearly written for a satirical purpose, some are loosely-connected strings of ill-told adventures, others drag out a long and weary length through innumerable indifferent verses, whilst in others still the characters are simply men disguised as animals. The earliest versions were in Latin; but they seem to have been soon supplanted by French in the 12th century, and in their new dress the stories attained a much wider popularity. Since the beginning of the 16th century nearly all the editions printed can be traced back to one of two sources, a Flemish or a Low German, both of which, however, are based upon French forms of the epic. The task of tracing the connections between the numerous versions that exist in the different tongues is one of great complexity and difficulty. It will suffice in this place to enumerate the more important, with mention of one or more trustworthy recent editions. The best Latin version, *Isengrimus* (ed. by Mone as *Reinardus Vulpes*, Stuttgart, 1832; and by Voigt, Halle, 1884), which possesses considerable literary merit, was written in Flanders about 1146–48 by an unknown author. The *Isengrimus* printed in J. Grimm's *Reinhart Fuchs* (Berlin, 1834) is not an older, but a later and abbreviated, form of the same poem. The best French versions that survive were edited by Méon (4 vols. Paris, 1826), with a supplement by Chabaille (1835), and by Martin (4 vols. Strasburg, 1882–88). They were written between the middle of the 13th and the middle of the 14th century, and run to enormous length, the separate cycles or groupings of the episodes being called 'branches.' Méon's work includes three cycles: (1) *Roman du Renart*, apparently the work of three if not more authors, Pierre de St Cloud, a priest of Lacroix in Brie, and a Norman priest Robert de Lison; (2) *Le Couronnement de Renart*, attributed to Marie de France; and (3) *Renart le Nouvel*, by Jacquemars Gielée of Lille, about 1290. The last two are transparent satires upon certain of the monastic orders. There is a fourth cycle, a voluminous compilation or imitation by a priest of the neighbourhood of Troyes, made near the middle of the 14th century, and entitled *Le Renart Contrefait* (ed. F. Wolf, Vienna, 1861). The oldest extant High German version, *Reinhart Vuhs* or *Fuchs* (ed. Reissenberger, Halle, 1886), more usually called *Reineke Fuchs*, was adapted by some one unknown, early in the 13th century, from a still older version, *Isengrimes Nôt*, itself a translation made from old French sources about 1180 by an Alsatian, Heinrich der Glichesaere. The Flemish version which has been the basis of most of the translations, continuations, and editions that have been made since the invention of printing is entitled *Reinaert de Vos* (ed. Martin, Paderborn, 1874). It was written by one William, but whether William de Matoc, William Utenhove, or more probably an unknown William, is uncertain, and dates apparently from the middle of the 13th century. The source upon which it is built is the nineteenth 'branch' in the *Roman de Renart* (last in vol. i. of Méon). The text that has been almost exclusively used in the later translations, &c., is that of a second edition, deviating in some respects from William's own, notably in the infusion of a didactic, satirical tendency; the author of this second edition is not known. It was from a prose version of this second edition, published at Gouda in 1479, that Caxton made his translation of *The History of Reynard the Fox* (1481; reprinted Edin. 1884). Upon this same edition was based the Low German version, *Reinke de Vos* (ed. Prien, Halle, 1887), which has been more often translated perhaps than any other version. Who the Low German translator was is not known, in spite of the question having greatly exercised many specialists. The *editio princeps* of *Reinke* is that of Lübeck (1498), and next to it stands that of Rostock (1517). There are Danish (by A. H. Weigere, Lübeck, 1555), Swedish (Stockholm, 1621), and several other High and Low German editions, for which, however, see the bibliography prefixed to Prien's *Reinke*. Nevertheless special mention must be made of Gottsched's High German prose version (1752) and Goethe's well-known High German poem, with Kaulbach's scarcely less known illustrations to the same. Popular High German translations are contained in Simrock's *Deutsche Volksbücher* (vol. i. 1845) and Marbach's *Volksbücher* (vols. xv.–xvii.).

The outline of the story, according to the Flemish *Reinaert*, is as follows: Nobel the Lion, king of animals, was holding court one Easter-tide. All the animals, great and small, came and paid homage to him except Reynard the Fox. Several amongst them complained of the knaveries of Reynard, the loudest being Isengrim the Wolf, Reynard's old comrade and enemy. He was followed by Tibert the Cat and Pancer the Horse; but Grimbart the Badger spoke up for his uncle Reynard. Then came Chanticleer the Cock, bringing his dead daughter slain by Reynard. For this and his other misdeeds the Fox shall, it is resolved, be cited to appear before the Lion and be tried. Bruin the Bear is sent to summon him. Reynard received him with soft words, told him of some honey hidden in a split tree, and contrived to get Bruin caught fast in the cleft of the tree; there the peasants found him and nearly beat him to death, but at last he got away and went back to court. The next messenger sent was Tibert the Cat. Him, however, Reynard persuaded to catch mice in a place where a noose hung, in which the Cat got caught; and he too was terribly beaten before he got away. At last Grimbart the Badger offered to undertake the office of messenger; and he persuaded Reynard to go with him to court. On the way the Fox makes a sort of private confession of his rascalities and misdeeds to his relative the Badger, especially of the tricks he has played off upon the Wolf. The animals again came forward with their accusations. Reynard defended himself, but was condemned to death. As he was about to be hanged on the gallows, he begged leave to make a public confession of his evil deeds. In the course of his speech he dropped a hint that he knew where an immense treasure was hidden, and then, at the Lion's request, tells all about it. His father, old Reynard, and Isengrim the Wolf, and Bruin the Bear had conspired together to slay the Lion and make Bruin king in his stead; but he (Reynard) had stolen their treasure, with which they thought to hire soldiers, and had gone and hidden it. He could not suffer the noble Lion to be slain and the wicked Bear to be made king in his place. The Lion thereupon pardoned him, and caused Bruin and Isengrim to be seized and evilly entreated. But when he asked Reynard to go and show him where the treasure was, Reynard excused himself, saying he was under an oath to make a pilgrimage to Rome. The Lion then let him go; and Reynard, taking with him Cuwaert the Hare and Belin the Ram, set out on his pilgrimage. On the way he passed his own home, and induced Cuwaert to go into the house with him, and there killed him. And he put his head in a satchel (made from the skin of the Bear) and gave it to Belin, and bade him carry it back to the Lion, telling him it contained valuable letters. When the Lion saw Cuwaert's head he was exceeding wroth, and bade them let the Wolf and the Bear go free out of prison; and he gave the Ram into their power, and decreed Reynard to be an outlaw.

To this the Low German version adds a continuation, partly a repetition of the same incidents under disguise and partly an actual continuation of the story, ending in a single combat between the Fox and the Wolf, in which the former by trickery beat his antagonist. Finally he returned to his own home, honoured with the favour and protection of the Lion.

English readers should consult the Introduction to W. J. Thoms' edition of Caxton's *Reynard* (1845), Carlyle's *Miscellaneous Essays* (not quite accurate), and F. S. Ellis's *History of Reynard the Fox* (1894). See also L. Sudre, *Les Sources du Roman de Renart* (1893).

Reynolds, JOHN FULTON, an American general, was born in Lancaster, Pennsylvania, 20th September 1820, graduated at West Point in 1841, and became commandant there in 1859. As brigadier-general he fought at Mechanicsville and Gaines's Mills, and was taken prisoner at Glendale, but exchanged in August 1862. At the second battle of Bull Run his own bravery induced his brigade to stand fast, and so prevented a complete rout. In November he was commissioned major-general, and in 1863 commanded a corps at Fredericksburg. He was killed at Gettysburg, where he commanded the left wing, on 1st July 1863. The state erected a granite shaft on the spot where he fell, and his men a bronze heroic statue on the field; and in 1884 an equestrian statue was unveiled in Philadelphia.

Reynolds, Sir JOSHUA, P.R.A., portrait and subject painter, was born at Plympton Earls, near Plymouth, on 16th July 1723, the year of Kneller's death. His father, a clergyman and master of Plympton grammar-school, intended him for the medical profession; but he developed a strong aptitude for painting, was continually studying the plates in Cats's *Book of Emblems*, Dryden's *Plutarch*, and the other volumes that came in his way, and at the age of eight had mastered the *Jesuit's Perspective*, and applied its principles to drawings executed by himself. In October 1740, accordingly, he was sent to London to study art, and placed in the studio of Thomas Hudson, a portrait-painter, of very moderate abilities, much employed at the time. In 1743 he returned to Devonshire, and some of the portraits of local worthies which he then produced still exist. In the following year he was again in London pursuing his art; but in the beginning of 1747, after the death of his father, he settled in Plymouth Dock, now Devonport, where he learned much from a study of the works of William Gandy of Exeter. In 1749 he made the acquaintance of Commodore, afterwards Lord, Keppel, who invited him to accompany him on a cruise in the Mediterranean; and, after painting many of the British officers in Minorca, he made his way to Rome, where he studied Raphael and Michael Angelo, and in the Vatican caught a chill which permanently affected his hearing, and necessitated his use of an ear-trumpet during the rest of his life. He also visited Bologna, Genoa, Florence, Parma, and Venice. Returning to England in October 1752, he soon afterwards established himself in a studio in St Martin's Lane, London, and attracted notice by his portraits of the second Duke of Devonshire and Commodore Keppel. Before long he was in excellent practice, and in the year 1755 he had no fewer than a hundred and twenty sitters, of whom he produced portraits in which the influence of the Italian masters, and especially of Correggio, is clearly visible; works in which he was certainly aided by such assistants as Marchi, but which he impressed with his own character and individuality. He soon removed to Great Newport Street; and finally, in 1760, he purchased a mansion on the west side of Leicester Square, to which he added a studio and reception-room.

He was now at the height of his fame, and a valued friend of his most celebrated contemporaries. In 1764 he founded the famous literary club of which Dr Johnson, Garrick, Burke, Goldsmith, Boswell, and Sheridan were members; all of whom were portrayed by his brush. He was one of the earliest members of the Incorporated Society of Artists, and contributed to its exhibitions till 1768, when, on the establishment of the Royal Academy, he was elected its first president; and in the following year he received the honour of knighthood from the king. In 1769 he delivered the first of his Discourses to the students of the Academy, fifteen of which have been published. They are full of valuable and well-considered instruction, and, along with his papers on art in the *Idler*, his annotations to Du Fresnoy's *Art of Painting*, and his *Notes on the Art of the Low Countries* (the result of a visit to Belgium and Holland in 1781), show a correct and cultivated literary style. He contributed his picture of Miss Morris as 'Hope nursing Love' to the first exhibition of the Royal Academy, along with his portraits of the Duchess of Manchester, Mrs Blake, Mrs Crewe, and Mrs Bouverie; and in 1771 completed his subject of 'Count Ugolino and his Children in the Dungeon,' usually regarded as his most successful effort in the direction of historical art. In 1784 he succeeded Allan Ramsay as painter to the king; in the same year he finished and exhibited his portrait of Mrs Siddons as the 'Tragic Muse,' in the possession of the Duke of Westminster, undoubtedly his greatest portrait, a work existing in several versions, of which one is in the Dulwich Gallery; and in 1787 he undertook three subjects for Boydell's Shakespeare Gallery, executing 'Puck,' 'The Witch Scene from Macbeth,' and 'The Death of Cardinal Beaufort.'

Hitherto he had devoted himself with little interruption to his art, having speedily recovered from a slight attack of paralysis from which he suffered in 1782; but in July 1789 his sight became affected, and he ceased to paint, though he was still able to enjoy intercourse with his friends. The following year was embittered by an unfortunate dispute with the Academy regarding the appointment of a professor of Perspective, which led to his resignation of the presidentship, a resolution which he afterwards reconsidered and rescinded; and on the 10th of December 1790 he delivered his last Discourse to the students. Gradually his strength sank—for, unknown to his physicians, he was suffering from a painful form of liver complaint—and he peacefully expired on the 23d February 1792.

It is in virtue of his portraits that Reynolds ranks as the head of the English school of art. In the dignity of their style, the power and expressiveness of their handling, the variety and appropriateness of their attitudes, in the beauty of their colouring and the delicacy of their flesh-painting, his portraits have never been surpassed. He was at home alike in portraying the strength of manhood and the grace of the gentler sex; and his pictures of children have an especial tenderness and beauty which have given a world-wide celebrity to works like 'Master Bunbury,' 'The Strawberry Girl,' and 'Simplicity.' His efforts in the higher departments of historical and imaginative art were less successful, and too often these can be regarded only as among the failures of a great artist. In his technical methods Reynolds was unfortunately most careless and uncertain. He was continually experimenting in new processes and untried combinations of pigments, with the result that even in his own lifetime his works deteriorated, especially in their flesh-tints.

Personally Reynolds was a man of fine and varied culture, and he was distinguished by an exquisite urbanity, the expression of a most amiable and equable disposition, which was exceptionally fitted to win and retain friendship. His dignified gentleness, his mild reasonableness, tamed even the fierceness of Dr Johnson; and there was more of truth than is usual in poetic panegyric in the lines of Goldsmith which speak of this painter as

> Still born to improve us in every part,
> His pencil our faces, his manners our heart.

The first great collection of the works of Reynolds was brought together by the British Institution in 1813, and numbered 142 pictures; another gathering was formed by the same body in 1823; 154 examples of his art were included in the South Kensington Portrait Exhibition of 1867; and 231 were exhibited in the Grosvenor Gallery in 1883–84. His authentic works have been estimated by Taylor to number between two and three thousand; and from these some 700 engravings have been executed, some of them—such as the mezzotints of J. R. Smith, John Dixon, William Dickinson, Valentine Green, and James M'Ardell—ranking among the finest examples of the art.

See *Memoirs of Sir Joshua Reynolds, Knight, &c.*, by James Northcote, R.A. (1813); *The Literary Works of Sir Joshua Reynolds: with Memoir of the Author, &c.*, by William Beechey, R.A. (1835); *Life and Times of Sir Joshua Reynolds*, by C. R. Leslie, R.A., and Tom Taylor (2 vols. 1865); *A Catalogue Raisonné of the Engraved Works of Sir Joshua Reynolds*, by Edward Hamilton, M.D. (2d ed. 1884); W. M. Conway, *Artistic Development of Reynolds and Gainsborough* (1886); and the monograph by Claude Phillips (1894).

Rhabdomancy. See DIVINATION, DIVINING ROD.

Rhadamanthus, in Greek Mythology, the son of Zeus and Europa, and brother of Minos of Crete. He settled in Bœotia, where he married Alcmene. So great was his reputation during life for the exercise of justice that after death he was appointed a judge in the under-world, along with Minos and Æacus.

Rhætia, an ancient Roman province embracing a large part of the Alpine tract between the basins of the Po and the Danube, now included in Grisons and the province of Tyrol. Its inhabitants were brave and turbulent, and were only subdued by Drusus and Tiberius after a desperate resistance. The province was then formed, to which Vindelicia was soon added; but later Rhætia was subdivided into Rhætia Prima and Rhætia Secunda (Vindelicia). The only important town in Rhætia was Tridentinum (*Trent*); the colony of Augusta Vindelicorum (*Augsburg*) was in its northern part. —For Rhætic Beds, see TRIASSIC SYSTEM.

Rhamnaceæ (*Buckthorns*), a natural order of exogenous plants, consisting of trees or shrubs; often spiny; with simple, generally alternate leaves, and stipules minute or wanting. This order contains about 250 known species, natives of temperate and tropical countries, and very generally distributed over the globe. The prevailing principle in the buckthorns is a bitter extractive which is acrid or astringent, tonic and antifebrile. Some of them are used in dyeing (see BUCKTHORN, and FRENCH BERRIES), some in medicine (see RED ROOT), and the fruit of some is pleasant (see JUJUBE); whilst *Hovenia dulcis*, a native of China and Japan, is remarkable for the thickening of its flower-stalks after flowering, so as to form a succulent sweet red pulp, with a flavour resembling that of a pear. The lotus of the ancient Lotophagi, celebrated by Homer, is the fruit of *Zizyphus lotus*, a small shrub abundant in Spain, Sicily, Barbary, Tunis (see LOTUS). The wood of *Rhamnus frangula* yields a superior charcoal for the manufacture of gunpowder.

Rhampsini'tus, a Grecised form of the Egyptian name Rameses, apparently Rameses III., the builder of the pavilion of Medînet Abu at Thebes. Brugsch makes Rhampsinitos a Greek form of *Ramessu pa nuter* ('Rameses the God'); Maspero, *Ramsis-si-nit* ('Ramses, son of Neith'), a title never borne by the Theban kings, but first used by the Saitic princes, which fixes the date of the tale to the period of Psammetichus and his dynasty. Of him Herodotus (II., 121 *et seq.*) relates a story substantially the same as one of the most wide-spread folk-tales of the Aryan world. The king acquired an enormous treasure, and to secure it built a treasury of stone. The architect left one stone loose, so nicely adjusted as to be unnoticed, yet capable of being taken out and replaced without difficulty. Before death he entrusts the secret to his two sons, who from time to time plunder the king's treasure at their will, until at length the elder is caught in a snare set by the king. According to his desire, the younger brother cuts off and carries away his head, so that he may remain unknown. The king now orders the headless body to be exposed unburied, protected by a guard of soldiers, but the younger brother lades an ass with skins of wine, allows some of it to run out, and is relieved in his distress by the soldiers, to whom in gratitude he gives his wine so freely that they all sink into a drunken sleep. Thereupon he shaves the right half of all their beards, and carries his brother's body to his mother. The king next sends his daughter to find out the clever thief. She promises her love to those who reveal to her the most extraordinary things that have ever happened to them, and when the young man in his turn relates the strange passages of his life she seizes him; but he cunningly slips his brother's dead hand into hers, and so escapes. The king is so much struck with wonder and admiration that he promises the clever thief his daughter in marriage, since he surpassed all mankind in knowledge; for, while the Egyptians surpassed all the world, he surpassed the Egyptians.

Such is the oldest recorded version of Asbjörnsen's 'Master-thief' and Campbell's 'Shifty-lad,' Dr Barbu Constantinescu's Roumanian gypsy story of 'The Two Thieves,' a variant of the story of Trophonios and Agamedes in the treasury of Hyrieus at Hyria (Paus. ix. 37), of Augeias in Elis, and of Hermes (ἀρχὸς φηλητῶν), as well as of the Hindu legend of Karpara and Gata, or that of Ali Baba and the Forty Thieves in the *Arabian Nights*. The story occurs in the oldest version (12th century) of the romance of the 'Seven Wise Masters,' the *Dolopathos, sive de Rege et Septem Sapientibus*, from which Ser Giovanni probably derived the story as found in his *Pecorone* (written *circa* 1378), where it is related of an architect named Bindo who stole a golden vase from the treasury of the Doge of Venice. It will be found, more or less perfect, in every collection of European folk-tales, whether Norse, Gaelic, modern Greek, French, Breton, Albanian, Sicilian, Hungarian, Dutch, Tyrolese, Danish, or Russian, as well as Kabyl, Mongolian, Tibetan, and Singhalese.

Maspero defends the story as fundamentally Egyptian, or at least Egyptianised long before Herodotus, in spite of the Greek dress in which the historian has clothed it. It has been objected by some that the idea of a movable stone is not Egyptian, and is but ill adapted to the size of the stones used in building; but at Dendera have been found a series of crypts communicating with the temple by narrow passages formerly opened and closed in a similar manner, the stone sculptured like the rest of the wall. Again, Wilkinson objected that the soldiers wore no beards; but bas-reliefs and statues show that Egyptians of pure race wore beards according to individual taste; and besides the soldiers of police in question belonged to a tribe of Libyan origin, named Maziou, who usually wore the beard.

See Liebrecht's translation (1851) of Dunlop's *History of Prose Fictions*; A. Schiefner in vol. xiv. of the *Bulletin* of the St Petersburg Academy of Sciences; W. A. Clouston's *Popular Tales and Fictions* (1887); and Maspero's *Contes Populaires de l'Égypte Ancienne* (2d ed. 1889).

Rhapsodists (Gr., from *rhaptein*, 'to stitch together,' and *ōdē*, 'an ode'), a class of men in ancient Greece who travelled from place to place reciting poetry. They are distinct from the professional minstrels (*aoidoi*) of the *Odyssey*, although their legitimate successors; but they also seem, at first at least, to have been composers of epic poetry, although it is hardly probable that this was often the case after the 6th century B.C. We find distinct traces of the public recitation by rhapsodists of the Homeric poems as early as 600 B.C., at places so far apart as Sicyon, Syracuse, Delos, Chios, Cyprus, and Athens. Indeed at Athens ancient law prescribed the recitation of Homer once every four years at the festival of the Great Panathenæa. To the early rhapsodists mainly belongs the credit of the wide diffusion of the Homeric poems throughout the Greek world. They themselves were held in high esteem and richly rewarded; but in later days the art came to be practised in a mere mechanical manner, and the influence of the rhapsodists ebbed accordingly. In Plato's *Ion* we get a picture of the rhapsodist as he was about the middle of the 4th century B.C. Ion is a native of Ephesus who goes from city to city reciting Homer to crowds of hearers, appearing on a platform in a richly-embroidered dress, a golden wreath on his head. He adds dramatic force to his declamation, and brings Homer home to his hearers' hearts, being himself *possessed* by Homer. Moreover, he interprets Homer in a continuous exposition, and is proud of his fluency of ideas. Ion is described as devoted exclusively to Homer, but there were a few of his brethren who gave themselves also to Orpheus, Musæus, Hesiod, Archilochus, or Simonides. It is unlikely that Homer was ever sung to music, although in earlier times there were heroic lays which were sung to the accompaniment of the lyre. As lyric poetry became more distinctly cultivated, such epic lays came to be simply declaimed, the rhapsodist holding a branch of bay in his hand instead of a lyre.

Rhatany, or RATTANY, a half-shrubby plant, of the natural order Polygaleæ, a native of the cold sterile tablelands of the Andes in Peru and Bolivia. It is called *Ratanhia* in Peru. It is valued for the medicinal properties of the root, which are shared more or less by other species of the same genus, also natives of South America. In the British Pharmacopœia the dried roots of two species (*Krameria triandra*, Peruvian Rhatany, and *K. ixina*, Savanilla Rhatany) are officinal under the name Krameriæ Radix. The roots vary a good deal in size and thickness, but are always rough-looking, and reddish in colour. The bark has a strongly astringent taste, and when chewed tinges the saliva red; the wood is nearly tasteless. The dried root is a powerful astringent, and is employed in diarrhœa, mucous discharges, passive hæmorrhages, and cases where an astringent or styptic action is indicated. The finely-powdered root is also a frequent constituent of tooth-powders. Rhatany root is imported from various parts of South America, but chiefly from Lima. It is extensively imported into Portugal in order to communicate a rich red colour to wines. Its peculiar properties are due to rhatany-tannic acid, found in the root-bark to the extent of 20 per cent.; it also contains a red colouring matter.

Rhazes, or RÂZI, Persian physician and alchemist. See MEDICINE (p. 117) and ARABIA (p. 366).

Rhé, ÎLE DE. See RÉ.

Rhea, an ancient Cretan earth-goddess, daughter of Uranus and Gæa, wife of her brother the Titan Cronus, and by him mother of the Olympian deities Zeus, Hades, Poseidon, Hera, Hestia, Demeter. She was early identified with the Asiatic nature-goddess Cybele, the Great Mother, who was worshipped on mountains in Mysia, Lydia, and Phrygia. Her Cretan *Curetes* corresponded to the Phrygian *Corybantes*, many of whom mutilated themselves like Attis in the frenzy of their orgies. The regular priests of Cybele, the Galli, made themselves eunuchs for conscience' sake. A Sibylline oracle decreed the introduction of the worship of the Great Mother at Rome in 204 B.C., and in 217 a temple was dedicated on the Palatine. The cult became widely extended under the Empire. In the 2d century A.D. the rites of the *Taurobolia* and *Criobolia* were added, in which candidates were baptised for purification and regeneration with the blood of sacrificial bulls and rams. See the article CYBELE.—RHEA SYLVIA was the mother of Romulus (q.v.).

Rhea, also called Nandu and American Ostrich, a genus of South American birds, which form, according to the most recent researches, a somewhat isolated group, though nearer to the ostriches than to any other birds. They are incapable of flight, but the wings are rather better developed than in any other of the so-called 'Struthious' birds; they present an interesting archaic character in the persistence of a claw upon each of the three digits, thus recalling very forcibly the origin of the wing from a prehensile forelimb. As in the ostrich and the apteryx, the feathers have no aftershaft, and the colour of the eggs is white. The male bird incubates. There are three distinct species—viz. *R. americana*, *R. macrorhyncha*, and *R. Darwini*, which are to be distinguished by their geographical range as well as by external and internal differences of structure. The first-named species inhabits the southern half of the continent. *R. macrorhyncha*, which is darker coloured, especially on the head, is found in north-east Brazil. *R. Darwini*, in which most of the feathers have white tips, is found in south-eastern South America. They all prefer grassy plains (*campos*), herd in troops, and run with great rapidity.

Rhea Fibre. See BŒHMERIA.

Rhegium. See REGGIO.

Rheims, or REIMS, a city in the French department of Marne, situated on the Vesle (a tributary of the Aisne), 100 miles ENE. of Paris by rail. Strongly fortified with detached forts since the Franco-German war, when it was for a time the German headquarters, it is well built, and from the material employed in building, which is the chalkstone of the district, and from the prevalence of the older style of domestic architecture, has a picturesque appearance. It is built on the site of *Durocortorum*, which is mentioned by Cæsar as the capital of the Remi, from which people it subsequently took its present name. Christianity may have found an entrance into Rheims at an earlier period, but it was not till about 360 that it became a bishop's see. Under the Frank rule it was a place of much importance, and it acquired a deeply religious interest from its having been the scene in 496 of the baptism of Clovis and his chief officers by the bishop, St Remy (*c.* 438–533). In the 8th century it became an archbishopric, and from 1179, when Philip Augustus was solemnly crowned here, it became the place for the coronation of the kings of France, who were anointed from a vessel of sacred oil, called the *Sainte Ampoule*, which a dove was said to have carried to St Remy from heaven. Joan of Arc brought the dauphin hither, and the only sovereigns in the long series, down to 1825, not crowned at Rheims were Henry IV., Napoleon I., and Louis XVIII. In 1793 the cathedral was attacked by the populace, and the sainte ampoule smashed by a sans-culotte; and in 1830 the ceremony of coronation at Rheims was abolished. The cathedral, although the towers of the original design are still unfinished, is one of the finest extant specimens of Gothic architecture. It was built between 1212 and 1430, and in 1877 the government voted £80,000 towards restoration. Its nave is 466 feet long by 99 in breadth, with a transept of 160 feet, and the height is 144 feet. Its grandest features are the west façade, which is almost unrivalled, with its magnificent doorway (figured in Vol. IV. p. 59), and the so-called Angel Tower, which rises 59 feet above the lofty roof. The stained glass is remarkable for its beauty; the organ is one of the finest in France; and two survive out of six magnificent tapestries. The Romanesque church of St Remy (mainly 1160–80), with the saint's shrine, is nearly of equal size, but of less architectural pretension. Also noteworthy are the hôtel-de-ville (1627–1880); the ancient 'Maison des Musiciens' and archiepiscopal palace; the Porta Martis, a Roman triumphal arch; the Lycée, representing a former university (1547–1793); and statues of Louis XV. and two natives, Colbert and Marshal Drouet. Rheims is one of the principal entrepôts for the wines of Champagne (q.v.), and the hills which surround the town are planted with vineyards. It is one of the great centres of the woollen manufacture in France, and its manufactures, embracing woollen goods (especially merinoes), mixed fabrics in silk and wool, &c., are known in commerce as *Articles de Reims*. Pop. (1886) 93,922; (1891) 98,107. See the article Douay; and Justinus, *Rheims, la ville des sacres* (1860).

Rheingau, a district, 14 miles long, stretching along the right bank of the Rhine, from opposite Mainz to the village of Lorch, 8 miles below Bingen, formerly belonged to the archbishopric of Mainz, and now forms part of the administrative district of Wiesbaden in Prussia. Protected by mountains from the north and east winds, and exposed to the mid-day sun, the Rheingau produces wines of the best quality, as Johannisberger, Rüdesheimer, Marcobrunner, Assmanshäuser, &c.

Rhenish Architecture, the style of the countries bordering on the Rhine when the arts first revived after the fall of the Roman empire. They and Lombardy being at the time of Charlemagne part of the same empire, Lombard Architecture (q.v.) has considerable affinity with those north of the Alps. Some very early examples of this style are still to be found in Switzerland. Architecture received great encouragement from Charlemagne and his successors, and the Rhenish style made great progress up to the beginning of the 13th century, when the fashion of copying the Gothic architecture of France superseded it. It is, however, a well-marked style, and is complete and perfect in itself. Like the Lombard style, it is round-arched, and has some remarkable peculiarities. Many of the earliest churches seem to have been circular (like the cathedral at Aix-la-Chapelle, built by Charlemagne), but in course of time the circular church was absorbed into the Basilica, or rectangular church (see Romanesque Architecture), in the form of a *western* apse. Most German churches thus have *two apses*—an eastern and a western. They also have a number of small circular or octagonal towers, which seem to be similar in origin to the Round Towers of Ireland. They exemplify in a remarkable manner the arrangements of an ancient plan of the 9th century, found in the monastery of St Gall, and supposed to have been sent to the abbot, as a design for a perfect monastery, to aid him in carrying out his new buildings. The arcaded galleries at the eaves, and the richly-carved capitals, are among the most beautiful features of the style. Examples are very numerous from about 1000 to 1200 A.D. The three great specimens of the style are the cathedrals of Mainz, Worms, and Spires. The last is a magnificent building, 435 feet long by 125 feet wide, with a nave 45 feet wide, and 105 feet high. It is grand and simple, and one of the

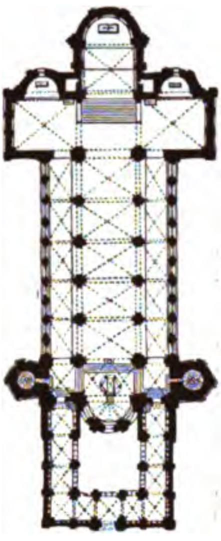


Fig. 1.—Plan of Church at Laach.

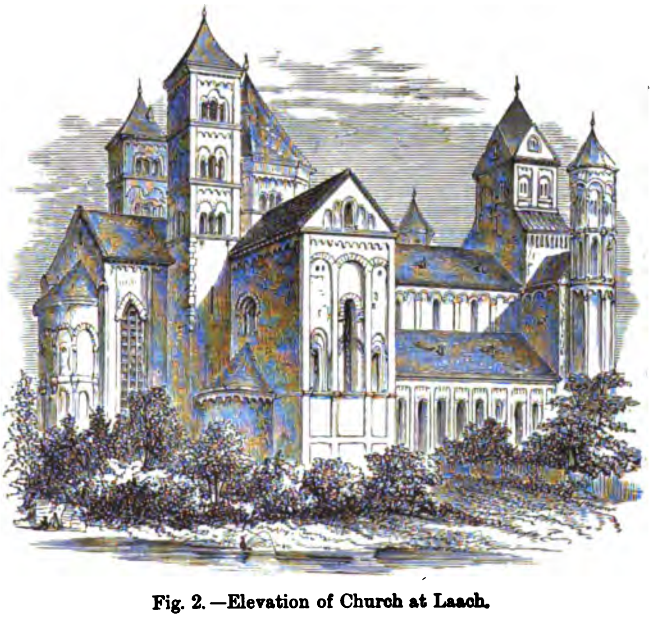


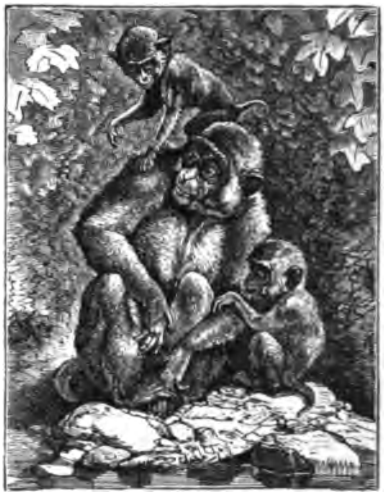
Fig. 2.—Elevation of Church at Laach.

most impressive buildings in existence. There are also numerous fine examples of the style at Cologne—the Apostles' Church, St Maria im Capitol, and St Martin's being amongst the most finished examples of Rhenish architecture. The illustrations of the famous church of the Benedictine abbey at Laach, near Coblenz, explain the peculiarities of plan and elevation above referred to. The vaults in this case being small, the different spans were managed (although with round arches) by stilting the springing; but in great buildings like Spires and Worms the vaults are necessarily square in plan, in this round-arched style, and the nave embraces in each of its bays two arches of the side aisles—a method also followed by the early Gothic architects. From the use of the round arch and solid walls, the exteriors are free from the great mass of buttresses used in Gothic buildings, and the real forms are distinctly seen (see APSE).

Rhenish Prussia (Ger. *Rheinprovinz*, *Rheinland*, or *Rheinpreussen*), the most western and most thickly peopled of the provinces of Prussia, lies on both sides of the Rhine and the Lower Moselle, and is bounded on the W. by Luxemburg, Belgium, and the Netherlands. Long and narrow, it extends from Cleves in the north to Saargemünd in the south, has Cologne near the middle of its area, Aix-la-Chapelle (Aachen) and Treves near its western boundary, and Coblenz (the capital), Elberfeld-Barmen, and Essen near its eastern boundary, whilst Bonn lies south-east of Cologne, and Düsseldorf and Crefeld N. by W. of it. Area, 10,419 sq. m.; pop. (1885) 4,344,527; (1890) 4,710,313, of whom about 3,400,000 are Roman Catholics, and 10,000 Walloons. The surface is everywhere more or less mountainous, except in the extreme north, reaching 2500 feet on the west of the Rhine, but only 1800 on the east side. The soil of the higher tracts is not very fertile, and is largely forest land; but the valleys of the Rhine, Moselle, and Nahe are very fruitful, and so are the flat districts in the north. Of the total area, 64 per cent. is cultivated, including meadows and vineyards, and nearly 31 per cent. under forest. Grain, potatoes, beet-root, tobacco, hops, flax, &c. are the more important crops. Much wine and large quantities of vegetables are grown. More than sixteen million tons of coal are mined in the year, also large quantities of iron, zinc, and lead ore. The sulphur-springs of Aix-la-Chapelle and Burtscheid have a European reputation. Industry and manufactures are prosecuted with the greatest energy and success, this province ranking first in all Prussia in this respect. Iron, lead, zinc, and sulphuric acid (at Essen, Solingen, Remscheid, &c.); cloth and buckskin (Aix-la-Chapelle and Burtscheid); silk, velvet, and similar wares (Crefeld, Elberfeld-Barmen, Mülheim), cottons (Cologne, München-Gladbach, and Elberfeld-Barmen), linen (Gladbach and Neuss), leather (Malmedy), glass and pottery, paper, chemicals (Duisburg, Aix-la-Chapelle), soap, sugar, beer, spirits, and perfume (eau de Cologne) are all manufactured on a large scale. There is a university at Bonn. This province was formed in 1815 out of the duchies of Cleves, Jülich (Juliers), Guelders, and Berg, and numerous minor territories. It is defended by the four fortresses of Cologne, Coblenz (Ehrenbreitstein), Wesel, and Saarlouis.

Rheostat, the name given by Wheatstone to an instrument for varying an electric resistance between given limits. Many forms have been suggested and used by Pouillet, Jacobi, Poggendorff, Wheatstone, and others. The most serviceable is perhaps Sir W. Thomson's modification of Wheatstone's double-cylinder rheostat. In it a platinum or platinoid wire is wound round two parallel cylinders, one of which is metal and the other of some insulating material. In any position the part of the wire which is effective as a resistance is the part that is on the insulating cylinder up to where it comes in contact with the metal cylinder. By means of a gearing of toothed wheels and screw shaft the two cylinders are turned simultaneously in one or the other direction, while at the same time a nut travels to or fro and guides the wire as it leaves the one cylinder and coils itself round the other. See ELECTRICITY.

Rhesus Monkey, or BOONDER (*Macacus rhesus*), a widely distributed and common Indian monkey. Like the Entellus (q.v.) or Hanumân, it is in part migratory, visiting the Himalayas in summer, and sometimes found at a level of 8000 feet. The body is stout, the limbs are strong, the skin hangs in loose folds about the neck, breast, and abdomen. The hair is grayish or brownish on the back and lighter beneath; the naked parts are copper-coloured; the large ischial callosities are bright red. It is a very intelligent and mischievous monkey, and readily tamed when young. It is held in almost as great veneration by the natives of India as the Hanumân itself; and the killing of one of these animals is apt to arouse the greatest popular indignation. The monkeys live in troops in the forests, chiefly in hilly districts, and visit the cultivated grounds to carry away grain and other produce, which they store up for themselves among rocks. The native farmers leave a share for the monkeys, believing this to be necessary to avert their anger, as otherwise they would next year destroy the whole crop whilst green.



Rhesus Monkey (*Macacus rhesus*).

Rhetoric (Gr. *rhētorikē*) in its broadest sense may be regarded as the theory and practice of eloquence, whether spoken or written. It aims at expounding the rules which should govern all prose composition or speech designed to influence the judgments or the feelings of men, and therefore treats of everything that relates to beauty or force of style, such as accuracy of expression, the structure of periods, and figures of speech. But in a narrower sense rhetoric concerns itself with a consideration of the fundamental principles according to which particular discourses of an oratorical kind are composed. The first to reduce oratory to a system were the Sicilian Greeks; its actual founder is said to have been Corax of Syracuse (*c.* 500 B.C.). He divided the speech into five parts, proem, narrative, arguments, subsidiary remarks, and peroration; and he laid great stress on the rhetorical capabilities of general probability. Later masters of rhetoric were Tisias; Gorgias of Leontini, whose style was burdened with too much ornament and antithesis; Antiphon, the earliest of the so-called 'Ten Attic Orators,' and the first writer of speeches for others to deliver in court. The speeches given by his great pupil Thucydides throughout his history, and the orations of Andocides, second of the Ten, are severely free from the florid ornament of later days. Lysias was an orator rather than a rhetorician; Isocrates first thoroughly taught rhetoric, which he defined as the 'science of persuasion,' as a technical method and discipline. His most celebrated pupils were Hyperides, Speusippus, and Isæus. The great Demosthenes was a pupil of the last. His opponent Æschines, and his contemporaries Hyperides, Lycurgus, and Dinarchus complete the Ten. Anaximenes of Lampsacus composed the oldest extant manual of rhetoric, but the great classical work on this subject is the analytical masterpiece of Aristotle. According to him its function is not to persuade, but to discover the available means of persuasion in any subject. He regards it as the counterpart of logic, and arranges its uses as (1) the means by which truth and justice assert their superiority to falsehood and injustice; (2) the only method of persuasion suitable to popular audiences; (3) a means of seeing both sides of a case and of discerning the weakness of an adversary's argument; (4) as a means of self-defence. The means of persuasion he groups in two classes: (1) the inartificial proofs, such as statements of witnesses, contracts, and the like; (2) the artificial proofs, whether these are (*a*) *logical*, demonstration or seeming demonstration by argument; (*b*) *ethical*, when the speaker induces confidence by the weight of his own character; or (*c*) *emotional*, when he works persuasively on the feelings of his hearers.

Of these artificial proofs, first comes the *logical*, and this depends on the *enthymeme*, 'a syllogism from probabilities' and signs; next is the example. Of the materials of enthymemes, the topics or commonplaces of rhetoric, Aristotle distinguishes between the *common*, general heads applicable to all subjects as to their possibility or impossibility, and the *special*, those drawn from special arts or faculties.

He divides the three provinces of rhetoric thus: (1) *Deliberative* rhetoric, concerned with exhortation or dissuasion, and future time, its ends expediency and inexpediency; (2) *Forensic* rhetoric, concerned with accusation or defence, and with time past, its ends justice and injustice; (3) *Epideictic* rhetoric, concerned with eulogy or censure, and usually with time present, its ends being honour and disgrace, or nobleness and shamefulness. In his first two books Aristotle deals with *invention*, the discovery of means of persuasion; in the third, with *expression* and *arrangement;* and he begins the subject by discussing the art of *declamation* or *delivery*. Under verbal expressions he discusses the use of metaphor, simile, proverbs, rhythm, and variety of styles, as the *literary* and *controversial*, whether the *political* or the *forensic*.

Aristotle's method dominated the Peripatetic school, but later began to be modified by the florid influence of Asia, the originator of which was Hegesias of Magnesia. The school of Rhodes followed more closely Attic models, and gained great fame through its conspicuous leaders Apollonius and Molon (*c.* 100–50 B.C.). Hermagoras of Temnos (*c.* 120 B.C.) composed an elaborate system which long retained its influence. Later rhetoricians were Dionysius of Halicarnassus, Longinus, Hermogenes, Apsines, Menander, Theon, and Aphthonius. Among the earliest Roman orators were Appius Claudius Cæcus (*c.* 300 B.C.), Cato the Censor, Ser. Sulpicius Galba, Caius Gracchus, Marcus Antonius, and Lucius Licinius Crassus. The instructors in formal rhetoric were Greek, and the great masters of theoretical and practical rhetoric alike, Cicero and Quintilian, were both formed by Greek models. The former contributed to a discussion of its theories no less than three treatises, *De Oratore*, the *Brutus*, and the *Orator;* the latter's famous *Institutio Oratoria* still retains its value. Quintilian strove hard to reform the taste of the time, which had become Asiatic through exclusive attention to the form and perpetual exercises in the schools on imaginary subjects—the *suasoriæ* and *controversiæ* of the elder Seneca. The *Dialogus de Oratoribus*, long ascribed to Tacitus, was another protest against modern fashion. The younger Pliny's *Panegyric* long remained a model for later orators. During the first four centuries of the empire rhetoric continued to be taught by 'sophists' at Athens, Smyrna, Rhodes, Tarsus, Antioch, Alexandria, and Massilia. These were in most esteem under Hadrian, the Antonines, and Marcus Aurelius—among the most celebrated were Theodotus, Polemon, and Adrian of Tyre. Throughout the middle ages rhetoric formed one of the subjects of the *trivium;* its leading authorities were Martianus Capella, Cassiodorus, and Isidorus. The subject re-awoke with the revival of learning, and was taught regularly in the universities, the prescribed public exercises and disputations keeping it long alive; but in later generations it has constantly languished, in spite of more or less laborious or effective attempts to fan it into life by the sententious Blair, the solid Campbell, and the sagacious Whately. In America, however, considerable attention is paid to it as a branch of general education.

See Aristotle's *Rhetoric*, with notes by E. M. Cope and J. E. Sandys (3 vols. 1877), the Introduction and Analysis by E. M. Cope (1867), and Translation by J. E. C. Welldop (1886); C. Ritter, *Die Quintilianische Declamationen* (1881); R. Volkmann, *Die Rhetorik d. Griechen u. Römer* (1872); Book iv. of St Augustine's treatise *On Christian Doctrine;* and J. Bascom's *Philosophy of Rhetoric* (New York, new ed. 1885). For the practical art of Rhetoric or Oratory, see M. Bautin, *Art of Extempore Speaking* (1858); the Abbé M. Delaumosne, *Art of Oratory:* system of Delsarte, trans. F. A. Shaw (Albany, 1882); Professor J. H. M'Ilvaine, *Elocution: the Sources and Elements of its Power* (1870); V. A. Pinkley, *The Essentials of Elocution and Oratory* (Cincinnati, 1888); C. J. Plumptre, *Lectures on Elocution* (1869); G. L. Raymond, *The Orator's Manuul: Vocal Culture, Emphasis, and Gesture* (Chicago, 1879); and C. W. Bardeen, *Rhetoric* (New York, 1884).

Rheumatism (from the Gr. *rheuma*, 'a flux') is a term which has been, and still is, rather vaguely and extensively used in the nomenclature of disease. But there is one very definite affection to which it is always applied; after this has been discussed the other senses in which it is used will be considered.

Acute rheumatism or *rheumatic fever* is indicated by general febrile symptoms, with redness, heat, swelling, and usually very intense pain, in and around one or more (generally several, either simultaneously or in succession) of the larger joints, and the disease shows a tendency to shift from joint to joint or to certain internal serous membranes, especially the pericardium and the endocardium; rheumatism being the most common origin of pericarditis, as has been already shown in the article on that disease. The pulse is strong and full, there is headache, but seldom delirium, unless in very severe cases; the tongue is covered with a creamy thick fur, the tip and edges being red; the urine is turbid, and abnormally acid; and the skin is bathed in a copious perspiration, with so characteristic a smell (resembling that of sour milk) that the physician can often recognise the disease almost before he sees the patient. The joints are extremely painful, and the pain is much increased by pressure, and consequently by movement which gives rise to internal pressure. Hence the patient lies fixed in one position from which he dares not stir.

The usual exciting cause of acute rheumatism is exposure to cold, and especially to cold combined with moisture, and hence the greater prevalence of this disease amongst the poor and ill-clad. Sleeping in damp sheets or upon the damp ground, the wearing of wet clothes, and sitting in a cold damp room, especially if the sitter was previously warm from exercise, are examples of the kind of exposure which is apt to be followed by this disease. Rheumatism is not, however, a universal sequence to exposure to the cold. It only occurs when there is a special predisposition, or, as it is termed, a rheumatic diathesis or constitution, and the diathesis may be so strongly developed as to occasion an attack of acute rheumatism, independently of exposure to any apparent exciting cause. Acute rheumatism is often associated with Chorea (q.v.); but the exact nature of the relation between the two is not known. Scarlet fever is the only other disease which seems specially liable to be followed by acute rheumatism. Men are more subject to the disease than women, but this probably arises from their greater exposure to atmospheric changes on account of the nature of their occupations. The predisposition is certainly affected by age; children under ten years being comparatively seldom attacked, while the disease is most prevalent between the age of fifteen and forty. Above this age a first attack is rare, and even recurrences are less frequent than earlier in life. Persons once affected become more liable to the complaint than they previously were. The disease is hereditary in a considerable proportion of cases; and even when it cannot be traced in previous generations the predisposition is very apt to exist in several members of the same family. The exact nature of the disease poison is unknown. Dr Prout regarded lactic acid as the actual *materies morbi*, but, though certain facts tend to confirm this view, it cannot be regarded as satisfactorily proved.

In the great majority of cases acute rheumatism ends in recovery; and permanent damage to the affected joints is rare. It is, however, extremely apt to recur, either in the early stages of convalescence, or after an interval of months or years. The chief danger arises from implication of the heart, which very frequently occurs; probably in about one-half of those suffering for the first time either the pericardium or endocardium or both are affected. The younger the patient the greater the liability to these complications, which usually result in more or less permanent impairment of the heart's action (see HEART, PERICARDIUM). Another condition, much less common, but extremely fatal, is known as *rheumatic hyperpyrexia*, and is characterised by a very rapid rise of temperature to 108° or 110°, with head symptoms in the form either of drowsiness or of violent delirium.

The patient should be strictly confined to bed between blankets (i.e. without sheets), and be clothed in flannel; he must be carefully protected from draughts, and from undue pressure of the bedclothes, and supplied with light nourishment and diluent drinks. Under such conditions, without other treatment, most cases recover in the course of time. Till the last quarter of the 19th century there was no general agreement as to what more should be done. When bleeding was used for most acute diseases this one was no exception. When that practice was abandoned numerous drugs were used, in some cases with apparent success. Quinine, iron, lemon juice, colchicum, large blisters to all the affected joints, were all recommended; more in favour than any of these were alkalis in large doses. But in 1876 Stricker in Berlin and Maclagan in England called attention to another method of treatment which is now almost universally adopted. Though new to Europe it has long been in use elsewhere, for the natives of South Africa have from time immemorial treated the disease by willow-top infusion. This method consists in the administration of Salicin (q.v.), or one of its derivatives (salicylic acid, salicylate of soda, &c.). The last is at present most largely used. It is usually given in doses of 15 or 20 grains every two or three hours at first; but its action needs to be carefully watched, as it often causes considerable depression and other uncomfortable symptoms. It is admitted by almost all observers that it has a remarkable effect in reducing the fever, relieving the pains, and cutting short the attack; but under this treatment, as without it, relapses are frequent. In rheumatic hyperpyrexia the only treatment that has been found effectual is immersion in a tepid bath as often as the temperature rises to a dangerous point. Convalescence is usually very slow, and it is necessary to keep the patient in bed and on low diet for some time after the fever has disappeared to diminish the tendency to relapse. At this stage tonics, especially quinine and iron, are generally useful.

Chronic Rheumatism.—Chronic painful affections of the joints sometimes follow rheumatic fever and are clearly a consequence of it. The name is often erroneously applied to chronic and insidious forms of gout. There is another form of disease to which most of the cases of so-called 'chronic rheumatism' belong, probably distinct from both rheumatism and gout, popularly so called, though it is often called 'rheumatic gout,' which deserves separate mention.

Osteo-arthritis (chronic rheumatic arthritis and rheumatoid arthritis are among its many other names) is characterised in most cases by a very chronic course, by pain and stiffness in one or more of the joints, with creaking on movement, and by destructive changes of the cartilages of the affected joints, with enlargement of the ends of the bones in their neighbourhood. It is more common in women than in men; most often begins at or after middle life, though occasionally even in childhood; and is apt to affect those who are weakly and who have had a life of hard work with defective nourishment. There is no special liability to affection of the heart as in true rheumatism. In the treatment of this ailment hot baths and douches, particularly with certain mineral waters (e.g. those of Bath, Aix-les-Bains), and a warm dry climate are very valuable; a generous diet is essential. Of drugs, cod-liver oil and arsenic are most often serviceable; but many others, iron, quinine, guaiacum, &c., are also of use. Under any treatment, however, complete recovery is exceptional; but the disease, even when severe, does not much shorten life.

Gonorrheal rheumatism is a form of joint-disease closely simulating acute rheumatism which occurs in some cases of Gonorrhea (q.v.). The affection does not, however, flit from joint to joint in the same way, and is not amenable to the same treatment.

Muscular rheumatism is the name usually given to painful affections of the muscles for which no clear cause is discoverable; it usually depends either on defective digestion or imperfect excretion of waste products from the system, and eliminant treatment, by alkalis, purgatives, or diaphoretics, is usually indicated. But it is very doubtful whether the cause is the same as in acute rheumatism.

RHEUMATIC DISEASES OF ANIMALS.—These are less common than the corresponding affections of men. Horses are not very liable to acute rheumatism, but suffer from a chronic variety, which occurs especially in conjunction with influenza. When affecting the limbs it often exhibits its characteristic tendency to shift from one part to another. In cattle and sheep rheumatic disorders are more common and acute than in horses. The specific inflammation sometimes involves most of the fibrous and fibro-serous textures throughout the body, inducing general stiffness, constipated bowels, and high fever. This is rheumatic fever—the chine-felon or body-garget of the old farriers. Sometimes the disease mainly affects the larger joints, causing intense pain, lameness, and hard swellings; occasionally it is confined to the feet and fetlocks, when it is recognised as bustian-foul. Cattle and sheep on bleak exposed pastures, and cows turned out of the dairy to feed on strong alluvial grazings are especially subject to rheumatism in its several forms. Amongst dogs rheumatism is known under the name of kennel lameness, and is very troublesome and intractable in low, damp, cold situations. Blood-letting is rarely admissible except in the most acute cases amongst cattle. In all animals a laxative should at once be given, with some saline matters and colchicum, and when the pain and fever are great a little tincture of aconite may be added. For cattle a good combination consists of one ounce of nitre, two drachms of powdered colchicum, and two fluid drachms of the Pharmacopœia tincture of aconite, repeated in water or gruel every three hours: half this dose will suffice for horses. With a simple laxative diet dogs should have a pill night and morning containing five grains of nitre and two of colchicum. Comfortable lodgings, a warm bed, horse-rugs on the body, and bandages on the legs will greatly expedite a cure. In chronic cases, or after the more acute symptoms are subdued, an ounce of oil of turpentine and two drachms each of nitre and powdered colchicum should be given for a cow, half that quantity for a horse, and one-fourth for a sheep. Hartshorn and oil, or other stimulating embrocations, diligently and frequently rubbed in, will often abate the pain and swelling of the affected joints.

Rheydt, a town of Rhenish Prussia, 19 miles by rail W. by S. from Düsseldorf, has manufactures of silks, velvets, cottons, machinery, hardware, paper, dyeworks, and breweries. Pop. (1880) 19,087; (1890) 26,962.

Rhime. See RHYME.

Rhin, BAS and HAUT, until 1871 frontier departments of France, corresponded pretty nearly to what are now the two administrative districts of Lower and Upper Alsace, in the German imperial territory of Alsace-Lorraine (q.v.)—Bas Rhin corresponding to Lower Alsace, and Haut Rhin to Upper Alsace.

Rhine (Ger. *Rhein*, Fr. *Rhin*, Dutch *Rhijn*, Lat. *Rhenus*), in every way one of the most important rivers of Europe. A large number of rivulets, issuing from glaciers, unite to form the young Rhine; but two are recognised as the principal sources—the Nearer and the Farther Rhine. The former emerges on the north-east slope of the Gotthard knot (7690 feet above sea-level), and only a dozen miles from the cradle of the Rhone, on the other side of the same mountain-knot; the Farther Rhine has its origin on the flank of the Rheinwaldhorn (7270 feet), not far from the Pass of Bernardino. The two mountain-torrents meet at Reichenau, 6 miles SW. of Coire (Chur) in the Grisons canton, after they have descended, the Nearer Rhine 5767 feet in 28 miles in a north-east direction, the Farther Rhine 5347 feet in 27 miles along a northerly course. At Coire the united stream strikes due north, and, after ploughing its way for 45 miles between Switzerland and Austrian Vorarlberg, enters its clearing basin, the Lake of Constance (1306 feet above the sea). It leaves this lake at its north-western extremity, a little below Constance, its water a deep transparent green, and flows generally westwards, in three or four wide curves, to Basel, separating Baden on the north from Switzerland on the south. Along this stretch the river (490 feet wide) plunges down the falls of Schaffhausen, nearly 70 feet in three leaps, and races over narrow rapids at three separate places where the terminations of the Jura Mountains intrude into the bed of the river; from the left it receives the waters of the Swiss Aar. Basel is 280 miles distant from the source of the Nearer Rhine following the windings of the channel, but only 85 miles as the crow flies.

At Basel (742 feet) the river, now 225 yards wide, wheels round to the north, and traversing an open shallow valley that separates Alsace and the Bavarian Palatinate from Baden, reaches Mainz (50° N. lat.) in Hesse-Darmstadt, north-north-east from Basel. This valley is fenced in by the Black Forest on the east and by the Vosges on the west; in it stand the cities of Mülhausen, Colmar, Strasburg (on the Ill, 2 miles from the Rhine), Germersheim, Spires, Ludwigshafen, and Worms, all on the Alsatian side, and Freiburg, Baden, Rastatt, Carlsruhe, Mannheim, Heidelberg, and Darmstadt on the opposite side of the river. Along this section the Rhine splits into many side arms that flow parallel to the main stream, and is studded with green islands. Navigation, however, which begins at Basel (although boats ply for short stretches on the upper waters above that point, even as high as Coire) is facilitated by artificial means, in that the current is made to flow in a carefully kept, straightened channel. Of the numerous affluents which add their waters to the volume of the Rhine along this section the largest are the Neckar and the Main, both coming from the right, and both navigable; the Ill, which falls into it from the left, is also navigable. A little below Mainz the Rhine (685 yards wide) is turned west by the Taunus range; but at Bingen it forces a passage through, and pursues a north-westerly direction across Rhenish Prussia, past Coblenz, Bonn, Cologne, Düsseldorf, Ruhrort, and Wesel as far as the Dutch frontier, which it reaches a little below Emmerich, and opposite Cleves; here it is 1085 yards wide and 36 feet above sea-level. The first half of this portion of the river from Bingen to Bonn is the Rhine of song and legend, the Rhine of romance, the Rhine of German patriotism. Its banks are clothed with vineyards that yield wine esteemed the world over (see below); the rugged and fantastic crags that hem in its channel are crowned by ruined castles; the treasure of the Nibelungs rests at the bottom of the river, but higher up, at Worms; the Bingerloch (see BINGEN) and the Mouse Tower of Bishop Hatto, the fortress of Ehrenbreitstein, the rock of the siren Lorelei, the commanding statue of Germania (the trophy of German victory in 1870), and innumerable other features lend interest to this the middle course of 'Father Rhine,' as his German children call him. It still inspires them, as in 1870, when Max Schneckenburger's *Wacht am Rhein* (written in 1840; the music by K. Wilhelm, 1854) was sung by them with the greatest enthusiasm as they poured into France. There is the *Rheinlied*, too, of Nikolaus Becker, with Alfred de Musset's retort, *Nous l'avons eu, votre Rhin allemand*, both of them written in 1841. Between Bingen and Bonn the steep rocky walls that fence in the river approach so closely together that in many places there is not room for the carriage-road and the railway to run alongside; they have to find a way through tunnels. Mainz (269 feet) is the head of steamboat navigation from Rotterdam. The Nahe enters the Rhine at Bingen, the Moselle at Coblenz; from the opposite (right) side the Lahn enters just above Coblenz. A few miles below this town gigantic rafts are formed out of smaller ones, floated down from the Black Forest and the woods towards Lorraine and the Palatinate, and are then steered by the numerous men who live on them right down to Dordrecht in Holland, where they are sold. Below Bonn the Rhine is joined by the Sieg, Wupper, Ruhr, and Lippe, all from the right.

At Bonn the river enters the plains, and almost immediately after passing the Netherlands frontier its delta begins. The principal arm, carrying two-thirds of the volume, flows under the name of the Waal, and later the Mermede, due west past Nimeguen until it reaches Dordrecht. East of the Biesbosch it picks up the Maas (Meuse) from the left. At Dordrecht the river again divides, one branch, the old Maas, running out to sea; the other, the Noord, going up north-west to Rotterdam, just above which town it is joined by the Lek, another main arm of the deltaic complex, and below which town it once more unites with the Old Maas. The arm that strikes off northward at the point where the delta begins soon divides, sending one branch, the Yssel, due north to the Zuider Zee, which it reaches on the east side near Kampen; the other branch is the Lek, which runs into the Waal-Maas arm above Rotterdam. A thin stream called the 'Winding Rhine' leaves the Lek half-way between Arnheim and Rotterdam; but it again splits at Utrecht into two channels, of which the Old Rhine, a mere ditch, comparatively speaking, manages with the help of a canal and locks to struggle into the North Sea at Katwyk, a little to the north-west of Leyden, while the other channel, the Vecht, flows due north from Utrecht until it enters the Zuider Zee, a short distance from Amsterdam. For considerable distances in these delta regions the rivers are only kept from overflowing the country by artificial banks or dykes.

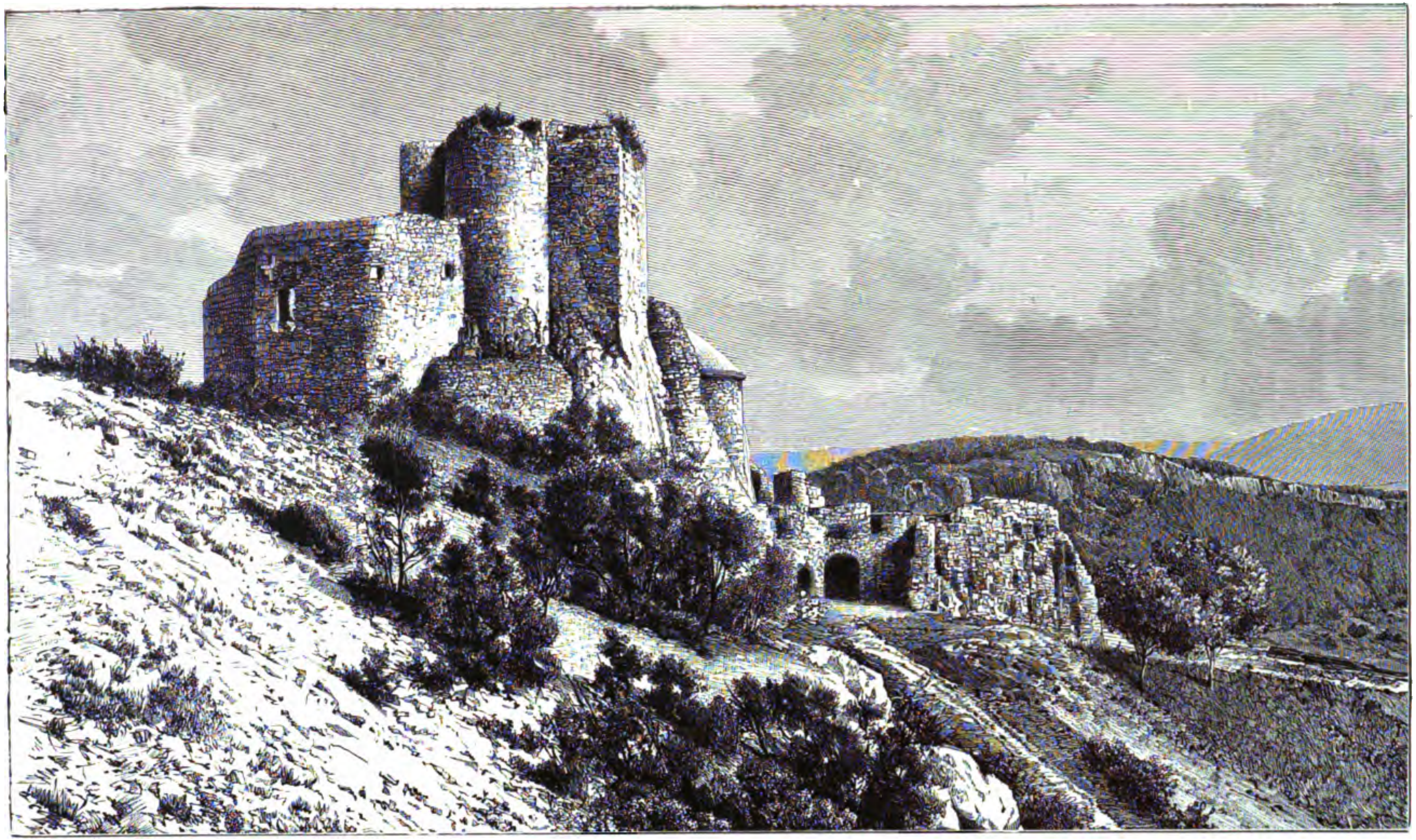
The area drained by the Rhine is estimated to be 75,773 sq. m., and its total length to be 760 miles, of which 550 in all are navigable. By means of the Ludwigs Canal it is connected with the Danube; the Rhone and Rhine Canal unites it with the Rhone, and so with the Mediterranean; another canal provides a waterway between it and the Marne, a tributary of the Seine; and yet a fifth unites it with the Zuider Zee at Amsterdam. The fisheries of the Rhine are of considerable importance; salmon, carp, pike, sturgeon, and lampreys—the fish of greatest value—are taken principally near St Goar, between Bingen and Coblenz. The waters are partly re-stocked from the fish-hatcheries of Hüningen in Upper Alsatia (see PISCICULTURE).

Commercially and historically the Rhine is one of the principal rivers of Europe. It was the Romans' strongest bulwark against the Teutonic invaders. The Romans, and after them the Franks, encouraged commerce to travel up and down its waters, and kept its channel open. Under Charlemagne the ravages caused by the Teutons having broken through the Roman guard along the Rhine and inundated Gaul were rapidly obliterated, and the Rhine valley became the principal focus of civilisation in the early empire. Except between 1697 and 1871 the Rhine was always a purely German river; at the peace of Ryswick, Alsace-Lorraine was appropriated by France, and the Rhine became part of the dividing line between France and Germany. In 1801 Napoleon incorporated the whole of the left bank with France; and in 1815 the arrangement in force before 1801 was restored; and after 1871 the Rhine became once more wholly German. From the days of the Roman supremacy down to the beginning of the 19th century navigation was always more or less hampered by the riparian sovereigns, during the greater part of the time a large number of duodecimo princelings, who levied vexatious dues on the shipping that sailed up and down past their towns and territories. From 1803 all the powers concerned, except Holland, abolished most of the shipping dues on their own vessels navigating the Rhine, and Holland followed suit in 1831; but it was not until 1st July 1869 that the river was declared an absolutely free waterway to the ships of all nations. The first steamboat churned up its waters in 1817; now some scores ply all the way between Rotterdam and Mainz, and others along other stretches. More than 18,000 vessels of about 2,000,000 tons burden pass the frontier town of Emmerich going up stream every year. There have been various schemes for utilising the mechanical power of the Rhine current by means of turbines and electro-motors. For the political organisation (1805–13) taking its name from the Rhine, see CONFEDERATION OF THE RHINE.

RHINE-WINE indicates, strictly speaking, the wines produced in the Rheingau (q.v.), the most valued and costly being those of Castle Johannisberg, Hochheim (whence the word *Hock*, applied in England promiscuously to all white Rhine wines), Rüdesheim, Steinberg, Gräfenberg, Rauenthal, Marcobrunn, Assmannshausen, and Geisenheim. Except the wine of Assmannshausen (Assmannshäuser), which is red, these wines are of a white or light golden colour, and have an exquisite bouquet and a dry piquant flavour. In a wider sense the term Rhine-wine includes the wines of nearly all the valleys lying contiguous to the Rhine—those of Baden, Alsace, the Moselle, Hesse-Nassau, and the Palatinate.

See the illustrated *Rhine*, by K. Stieler (Eng. trans. 1878; new ed. 1887); the guidebooks of Murray and Baedeker; Simrock's *Rheinsagen* (9th ed. 1883) and *Das malerische und romantische Rheinland* (4th ed. 1865); and the history of the river from Celtic to modern times, by Mehlis (3 vols. Berlin, 1876–79).

Rhinoceros. This genus, representing a distinct family of ungulate mammals, contains only five distinct species, to which another (*R. lasiotis* Sclater) may be perhaps (at present, however, doubtfully) added. These five species are distributed in the hotter parts of the Old World as follows: Africa contains two forms, which are often called the 'Black' and the 'White' rhinoceros. These terms are, however, very inapt, since both of them are of a grayish black; in colour there is but little difference between *R. simus* and *R. bicornis*. They may, however, be distinguished by other points—the first species is much larger, and has a flat nose and square upper lip, while *R. bicornis* has the upper lip prolonged so as to enable it to seize and break off branches. Correlated with this structural difference is one of habit; *R. simus* grazes, while *R. bicornis* feeds chiefly upon shrubs. A number of other species have been stated to occur in Africa, but it appears that these 'species' have been for the most part founded upon unimportant differences in the length of the two horns with which these animals are furnished. In Asia there are at least three well-marked species of rhinoceros. The large one-horned species, *R. unicornis*, occurs only in Nepal, Bhotan, and Assam; it is a very big species. A specimen in the Zoological Society's Gardens measured over 10 feet in length and a little more than 5 feet in height at



AN ANCIENT CASTLE ON THE RHINE, LANDSKRON.

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the shoulder. It has enormous folds of skin, which give it the appearance of being 'armour-plated.' The African species have a smooth, though of course very thick, skin. The second Asiatic rhinoceros is *R. sondaicus*, which is smaller than the last, though also one-horned; it occurs in Java, Burma, and the Sundarbans near Calcutta. The two-horned Asiatic rhinoceros (*R. sumatrensis*) is found in Malacca, and *R. lasiotis*, from Chittagong, eastern Bengal, is hardly separable from it.

Rhinoceros unicornis.
(From a Photograph by Gambier Bolton, F.Z.S.)

Rhinoceroses were more abundant in earlier periods of the earth's history than they are at present; one form (*Aceratherium*) existed without the characteristic horn or horns, while another (*Diceratherium*) had the horns placed side by side instead of following each other. The animals are now a waning race, and African hunters report their diminished numbers in that continent. One of the principal authorities upon African rhinoceroses—Mr F. C. Selows—has brought forward facts which tell of the approaching extinction of these great quadrupeds in South Africa. 'Twenty years ago,' he says, 'this animal [*R. simus*] seems to have been very plentiful in the western half of South Africa; now (1881), unless it is still to be found between the Okavango and Cunene rivers, it must be almost extinct in that portion of the country. And this is not to be wondered at when one reads the accounts in Andersson's and Chapman's books of their shooting as many as eight of these animals in one night as they were drinking at a small water-hole; for it must be remembered that these isolated water-holes at the end of the dry season represented all the water to be found over an enormous extent of country, and that therefore all the rhinoceroses that in happier times were distributed over many hundreds of square miles were in times of drought dependent upon perhaps a single pool for their supply of water. In 1877, during several months' hunting in the country to the south of Linyanti, on the river Chobe, I only saw the spoor of two square-mouthed rhinoceroses, though in 1874 I had found them fairly plentiful in the same district; whilst in 1879, during eight months spent in hunting on and between the Botletlie, Mababe, Machabe, Sunta, and Upper Chobe rivers, I never even saw the spoor of one of these animals, and all the Bushmen that I met with said they were finished.' The rhinoceros has got the reputation of being a savage creature, and there are terrible stories of encounters; these, however, appear to have been greatly exaggerated, though individuals may be vicious at times. All the species of rhinoceros have been exhibited in Europe with the exception of *R. simus*.

The rhinoceros, united with the horse and tapir, forms the Perissodactyle division of the Ungulata (q.v.). The Asiatic rhinoceroses are distinguished from the African forms by the presence throughout life of functional incisor teeth. Professor Flower has shown that in other (osteological) characters the African species are to be contrasted with the Asiatic; in spite of its two horns, *R. sumatrensis* is more closely allied to *R. unicornis* than to *R. bicornis;* even the fossil species are referable for the most part to one or the other group. The Siberian *R. tichorhinus*, of which a specimen, partly preserved through its being frozen, was found by the Russian naturalist, Pallas, belongs to the African group, which is sometimes separated under the generic name of *Atelodus*.

Rhinoplastic Operations. When a portion or the whole of the nose has been destroyed by accident or disease, the deficiency may be restored by a transplantation of skin from an adjoining healthy part. When the whole nose has to be replaced, the following course is usually adopted. A triangular piece of leather or gutta-percha is cut into the shape of the nose, and is extended on the forehead with its base uppermost; its boundaries, when thus flattened, are marked out on the skin with ink. Any remains of the old nose are then pared away, and a deep groove is cut round the margins of the nasal apertures. When the bleeding from these incisions has stopped, the marked portion of the skin of the forehead must be carefully dissected away, till it hangs by a narrow strip between the eyebrows. When the bleeding from the forehead ceases, the flap must be twisted on itself, so that the surface which was originally external may remain external in the new position, and its edges must be fastened with stitches into the grooves prepared for their reception. The nose thus made is to be supported with oiled lint, and well wrapped in flannel to keep up the temperature. When complete adhesion has taken place, the twisted strip of skin may be cut through, or a little slip may be cut out of it, so that the surface may be uniformly smooth. Either at the first operation or subsequently a new columna (the front part of the septum) is usually formed from the skin of the upper lip. When only a part of the nose, as one side only, or the septum, requires to be restored, modifications of the above operation are required, and the skin, instead of being taken from the forehead, is taken from the cheek or the upper lip. This operation is called the *Indian Method*, having been introduced from the East and first successfully performed in Europe by Carpue in 1814. It has almost entirely superseded the *Taliacotian Operation*, first performed by Tagliacozzi or Taliacotius (1546–99), professor of Anatomy and Surgery at Bologna, and described in his famous work *De Curtorum Chirurgia per Insitionem* (1597). He took the skin for the new nose from the arm of his patient; and there is no reason why the operation which he describes, although inferior in many respects to that at present adopted, should not be successful. The difficulty and irksomeness of keeping the arm sufficiently long in apposition with the face (a period of about twenty days) is the chief objection to his method. For further details, see Holme's *System of Surgery*, or Erichsen's, or any other surgical manual.

Rhizantheæ, one of the five classes into which Lindley divides the vegetable kingdom. There are three natural orders comprised in the class—viz. Balanophoraceæ, Cytinaceæ, and Rafflesiaceæ, but they have been placed widely apart in the botanical systems of other botanists. The species comprising them agree only in being destitute of true leaves, in having short amorphous stems or none, and in being parasitical on roots. The structure of the flowers, which are in some instances very large, is extremely diverse. *Cynomorium* (q.v.), belonging to the Balanophoraceæ, is a most interesting plant, the *Fungus Melitensis* of apothecaries, long celebrated for arresting hæmorrhages. Others likewise are used as styptics. *Cytinus hypocistis* (Cytinaceæ) grows on the roots of species of Cistus in the south of Europe; its extract is used as an astringent in hæmorrhages and dysentery. A species of Ombrophytum (Balanophoraceæ) springs up suddenly after rain in Peru, like a fungus. Various species of Balanophora abound in Northern India. They are found in the Himalayas at an elevation of 10,000 feet, producing great knots on the roots of maple trees, oaks, &c.

Rhizocarps. See SALVINIA.

Rhizome. See ROOT.

Rhizo'poda (Gr. *rhizon*, 'a root,' and *poda*, 'feet'), a division of the Protozoa, in the members of which the living matter of the cell flows out in changeful processes as 'pseudopodia.' In other words, the rhizopods are Protozoa in which the Amœboid phase of cell-life predominates. The division includes several classes, of which the most important are the Lobosa, with the Amœba as type, the Heliozoa or Sun-animalcules, the Radiolaria, and the Foraminifera. See AMŒBA, FORAMINIFERA, PROTOZOA, RADIOLARIA.

Rhode Island, the smallest of the United States, and one of the original thirteen states of the Union: the state takes its name from the *island* of Rhode Island in Narragansett Bay. Its length from north to south is not quite 50 miles, and its width is about 40 miles; land area, 1085 sq. m. Rhode Island has thus a land surface only about $\frac{1}{240}$th as great as that of Texas, the largest state; but, while it ranks only thirty-fifth among the forty-nine states and territories in order of population, in density of population (318 per sq. m.) it holds the first place. Its name is referred by some to a supposed resemblance of the island of Rhode Island to Rhodes in the Mediterranean, while by others it is considered to be a corruption of *Roodt Eylandt* ('Red Island'), a name bestowed upon this island by the early Dutch.

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There are no mountains in the state, but the surface is considerably diversified. The northern and eastern sections are hilly, and the land slopes toward a level region in the south. The most important elevations are Woonsocket Hill, Mount Hope, Diamond Hill, and Hopkins Hill. The coast along the Atlantic Ocean measures about 45 miles, but Narragansett Bay, which penetrates inland some 30 miles, affords with its various inlets about 350 miles of shore washed by tide-water. The southern coast west of Point Judith is low and sandy, with numerous fine beaches, and many marshes and ponds of salt water. To the west the shores are formed by high rocky cliffs interspersed with beaches of sand. Newport, Narragansett Pier, and Watch Hill, on the ocean coast, are among the most famous seaside resorts of the country; and Block Island, about 10 miles SW. of Point Judith, is also a favourite watering-place.

The western part of the state is marked geologically by the Archæan formation which is characteristic of much of New England, but an extensive coal-bearing area of the Carboniferous period stretches under the bay across the eastern part of the state into Massachusetts. It is the most eastern bed of anthracite in the United States, but thus far the coal which has been mined has been of inferior quality. There are deposits of iron ore, and excellent limestones and granite. Traces of the terminal moraine of the glacial period are visible in the state, and in many places the soil is stony or rocky, though in some localities it is moderately fertile. Agriculture, however, except in the way of market-gardening, is by no means a leading occupation.

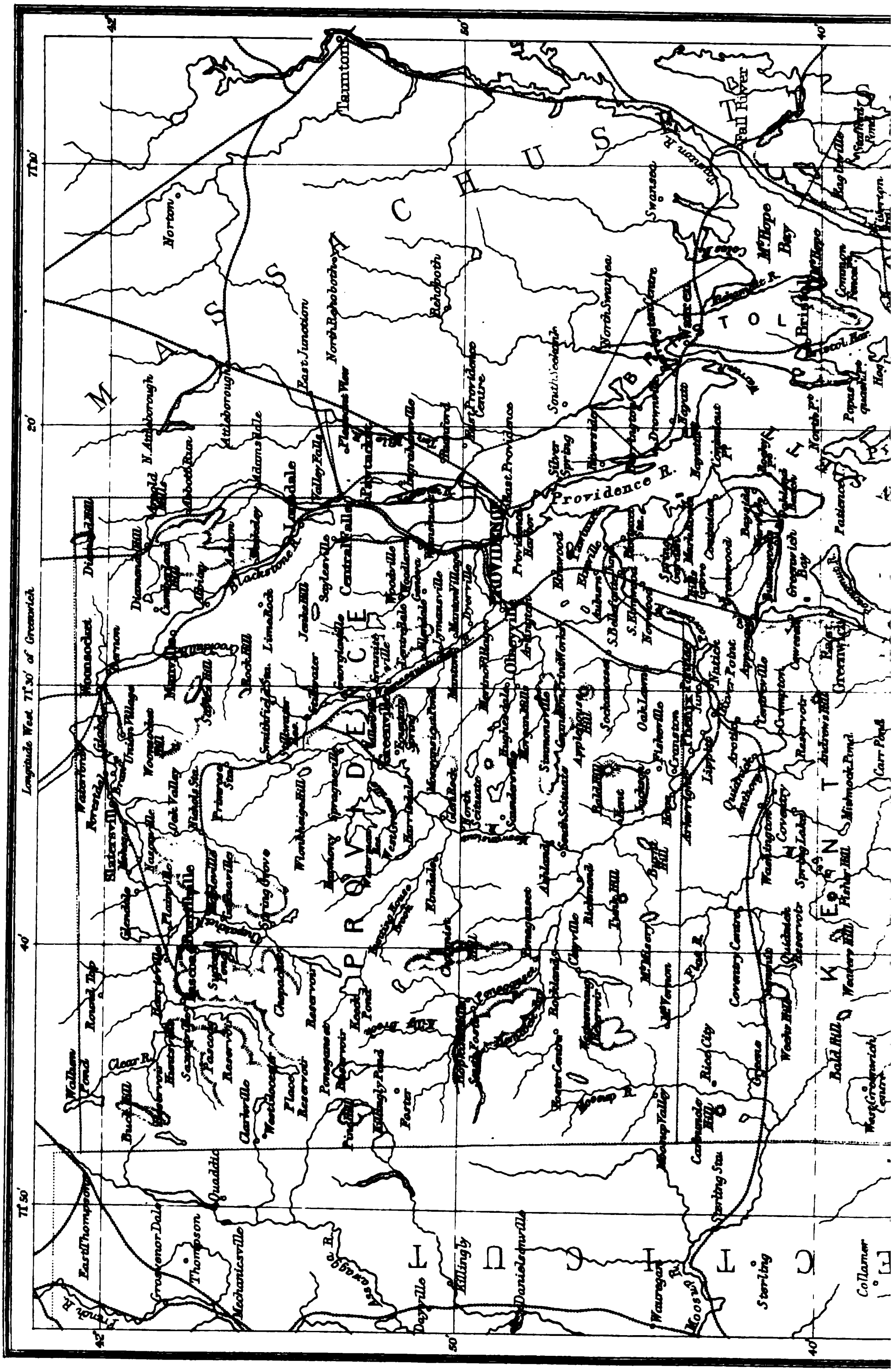
Rhode Island enjoys a maritime climate, milder and more equable than that of other portions of New England. The rivers of the state are of little importance for navigation, but are of great value in furnishing water-power, and have played a prominent part in developing the industries of the state. The principal rivers are the Seekonk, navigable to Pawtucket, the Woonasquatucket, the Pawtuxet, and the Pawcatuck.

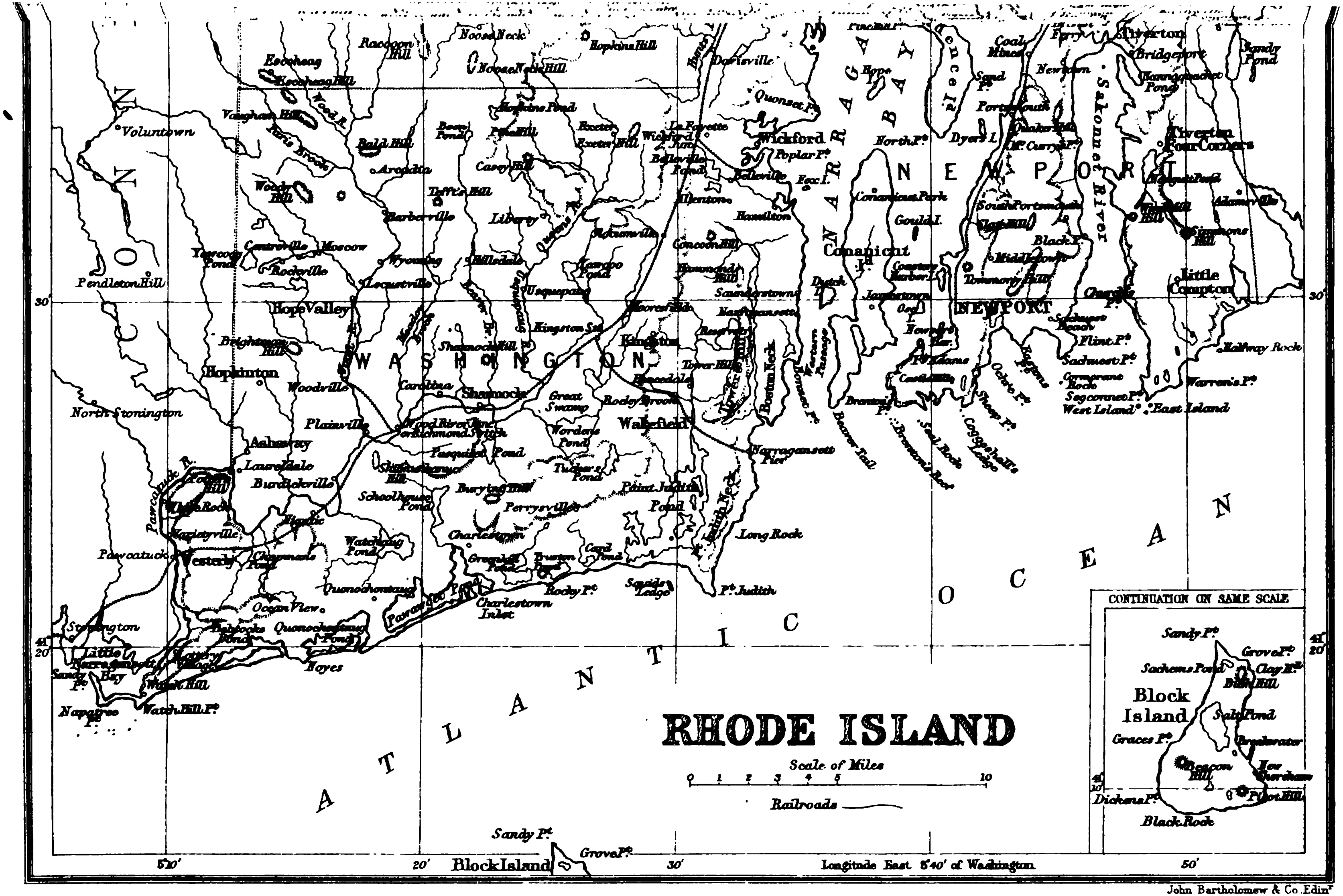
Newport has one of the finest harbours in the world, and the bay affords an extensive area of safe anchorage, with excellent ports at Bristol, Warren, and Providence. Formerly these places enjoyed a large foreign commerce, which finally disappeared with the war of 1812, and, though a considerable coasting trade is still carried on, commerce from that time ceased to be a prominent industry. It was replaced by manufacturing, which has ever since been the characteristic occupation of the people. The cotton manufacturing industry of the United States had its birth in Rhode Island. In 1790 Samuel Slater, who had been an apprentice in England, built at Pawtucket Falls the first cotton-mill of America. He equipped the mill throughout with a complete set of machinery which he constructed from memory, and by the time Rhode Island had ceased to be a commercial state it had already upwards of fifty cotton-mills. Cotton manufacturing, with dyeing, bleaching, and calico-printing, still holds the first place among the industries of the community, followed in importance by the manufacture of woollen and iron goods—especially screws, locomotives, and firearms—and of jewellery (see PROVIDENCE), rubber and leather goods, &c.

There are five counties in Rhode Island and four cities, Providence, Newport, Pawtucket, and Woonsocket. Of these Providence and Newport are both capitals of the state. The common school system, established in 1828, is of the highest order; but on account of the number of foreign-born persons attracted to the mill villages, and the difficulty in such communities of securing regular attendance at the schools, there is a remarkable prevalence of illiteracy. In 1889 there were 51,895 pupils enrolled, with an average attendance of 33,827; the educational expenditure amounted to $907,286. There are many private institutions of great merit, and Brown University (1764) is one of the oldest and best colleges of the country.

The Northmen are supposed to have visited Rhode Island in the 10th century; and the 'Old Stone Mill' at Newport (q.v.) has been claimed as their work. The first permanent settlement was made at Providence by Roger Williams in 1636. He and other settlers purchased lands from the Indians, and, as a result of the wise policy displayed toward the natives, Rhode Island suffered less from trouble with the Indians than many of her sister colonies. Rhode Island was the last (1790) of the original thirteen states to ratify the constitution. In the war of the revolution, in that of 1812, and in the civil war of 1861–65, she took an active part. Pop. (1730) 17,935; (1830) 97,199; (1880) 276,531; (1890) 345,506.

Rhodes, an island of the Mediterranean belonging to Turkey, formerly an important, wealthy, and independent state of ancient Greece, lies 12 miles distant off the south-west coast of Asia Minor. It is 49 miles long and 21 broad, and is traversed in the direction of its greatest length—north-east to south-west—by a chain of mountains, which in Mount Artemira (the ancient *Atabyris*) reach a height of 4070 feet. The soil is on the


Longitude West 71°30' of Greenwich
42°
50'
40'
71°50'
71°10'
20'
M A S S A C H U S E T T S
P R O V I D E N C E
K E N T
B R I S T O L
C O N N E C T I C U T
Taunton
Fall River
Norton
Attleborough
N. Attleborough
East Junction
North Rehoboth
Rehoboth
Swansea
North Swansea
Providence R.
Blackstone R.
PROVIDENCE
East Providence
Pawtucket
Central Falls
Valley Falls
Lonsdale
Woonsocket
Greenwich Bay
East Greenwich
Warwick
Bristol
Mt Hope Bay
Foster
Scituate
Coventry
Quaddic
Grosvenor Dale
East Thompson
Thompson
Mechanicsville
Killingly
Dayville
Danielsonville
Sterling
Moosup R.
Collamer


RHODE ISLAND
Scale of Miles
0 1 2 3 4 5 10
Railroads
Longitude East 5°40' of Washington
51°0' 20' 30' 50'
41° 20'
41° 10'
30'
ATLANTIC OCEAN
CONNECTICUT
WASHINGTON
NEWPORT
NARRAGANSETT BAY
Sakonnet River
CONTINUATION ON SAME SCALE
Block Island
Sandy Pt.
Grove Pt.
Sachems Pond
Clay Hd.
Salt Pond
Breakwater
Graces Pt.
Beacon Hill
New Shoreham
Dickens Pt.
Pilot Hill
Black Rock
Voluntown
Pendleton Hill
North Stonington
Pawcatuck
Stonington
Little Narragansett Bay
Sandy Pt.
Napatree Pt.
Watch Hill
Watch Hill Pt.
Westerly
Pawcatuck R.
Ashaway
Laurel Dale
Burdickville
Hopkinton
Hope Valley
Woodville
Plainville
Wood R.
Escoheag
Escoheag Hill
Vaughan Hill
Bald Hill
Arcadia
Woody Hill
Barberville
Centreville
Moscow
Rockville
Yawgoo Pond
Wyoming
Locustville
Raccoon Hill
Noose Neck
Noose Neck Hill
Hopkins Hill
Hopkins Pond
Exeter
Exeter Hill
Beach Pond
Tefft's Hill
Liberty
Casey Hill
Hillsdale
Usquepaug
Kingston Sta.
Carolina
Shannock
Shannock Hill
Wood River Junc. or Richmond Switch
Great Swamp
Worden's Pond
Tucker's Pond
Pasquiset Pond
Burying Hill
Perryville
Charlestown
Schoolhouse Pond
Watchaug Pond
Chapman's Pond
Quonochontaug
Quonochontaug Pond
Ocean View
Babcock's Pond
Noyes
Pawawget Pond
Charlestown Inlet
Green Hill Pond
Trustom Pond
Card Pond
Rocky Pt.
Squid's Ledge
Pt. Judith
Point Judith Pond
Galilee Neck
Long Rock
Wakefield
Rocky Brook
Peacedale
Kingston
Tower Hill
Narragansett Pier
Boston Neck
Saunderstown
Hammond Hill
Concoon Hill
Allenton
Hamilton
Belleville
Belleville Pond
Wickford
Wickford Junc.
La Fayette
Davisville
Quonset Pt.
Poplar Pt.
Fox I.
North Pt.
Hope I.
Prudence I.
Conanicut
Conanicut Park
Gould I.
Jamestown
Dutch I.
Beaver Tail
Brenton's Pt.
Brenton's Reef
Castle Hill
Fort Adams
Newport Har.
Seal Rock
Coggeshall's Ledge
Sheep Pt.
Ochre Pt.
Easton's Pt.
Coal Mines
Sand Pt.
Portsmouth
Newtown
Dyer's I.
Quaker Hill
Mc Curry's Pt.
South Portsmouth
Middletown
Tommany Hill
Black Pt.
Sachuest Beach
Flint Pt.
Sachuest Pt.
Cormorant Rock
Seaconnet Pt.
West Island
East Island
Warren's Pt.
Halfway Rock
Little Compton
Tiverton
Bridgeport
Nannaquaket Pond
Tiverton Four Corners
Adamsville
Simmons Hill
Sandy Pond
Block Island

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whole fertile, and produces wine, oranges, figs, olives, and other fruits. Nevertheless, much land lies waste, and the population is decreasing—34,000 in 1843; 28,000 in 1890, all Greeks except 7000 Turks and 2500 Jews. The harbours are neglected, and the trade is inconsiderable (£140,000 a year). Sponges are the most valuable article of export.

The first historic inhabitants of ancient *Rhodos* were Dorian Greeks from Argos. Situated between the three ancient continents, a position highly favourable to the development of commercial enterprise, the Rhodians at an early period became very prosperous and affluent. Their three most ancient towns were Lindus, Ialysus, and Camirus, and they planted numerous colonies not only on the neighbouring shores, but also on the coasts of Italy, Sicily, and Spain. With Cos and Cnidus these three towns formed the Doric Pentapolis, a religious league. The island submitted to the Persians in 490 B.C., but was freed from their yoke by Themistocles after the battle of Salamis; the Athenian supremacy, however, soon took the place of the Persian. Athens and Sparta supported the democratic and the oligarchical parties in the island respectively, and struggled one against the other for power over it. But in 404 B.C. Lindus, Ialysus, and Camirus founded the city of Rhodes (see below); after this event the history of the island is comprised in that of the new city. The internecine struggle between the oligarchical party (backed by Sparta) and the democratic (supported by Athens) went on until Rhodes submitted to Alexander of Macedon in 332 B.C.; but after his death the Rhodians revolted again. Then began their most prosperous period; they became the first naval power in the Ægean, their ships being well built, and always splendidly manned and manœuvred. As allies of the Romans, they opposed the Macedonians, and later the empire of Syria, especially Antiochus the Great; but on the whole they preserved a steady neutrality. Later still they won great glory by beating off Mithridates the Great, who laid siege (88 B.C.) to the city. After coquetting with Ptolemy, the Rhodians finally sided with Cæsar; but, venturing to oppose Cassius, the city was plundered by him (43 B.C.), and her ships all carried off or destroyed. This struck a fatal blow at her naval power. Under Vespasian Rhodes was made a Roman province, and continued so, subject to Byzantium after the division of the Roman empire, until it was captured by the Saracens in 653 (or 672); who kept it, however, only five or six years. When the Crusades began, Rhodes was a convenient stopping-place for the Christian fleets. In 1125 it was plundered by the Venetians; in 1204 a Rhodian chief asserted the independence of the island, but thirty years later he felt compelled to put himself under the sovereignty of Venice. In 1248 the city was surprised by the Genoese, but they were soon turned out by the Byzantines, and so Rhodes came back to the eastern emperor. In 1309, after a three years' siege, the city fell into the hands of the Knights Hospitallers (q.v.) of St John, and they made it their headquarters. The Turks besieged them there in 1480, and again in 1522–23; on both occasions there was terrible fighting, the Turkish losses being 25,000 and 90,000 to 100,000 men during the two sieges respectively. The Knights, who under their grandmaster D'Aubusson (q.v.) beat off their enemies in 1480, were compelled, in spite of their valour and the skill of their grandmaster, De Lisle Adam, to capitulate on honourable terms in 1523; they sailed away to Crete. The island has remained a Turkish possession ever since. The city suffered severely from earthquakes in 227 B.C. (when the Colossus was thrown down), 157 A.D., 515, 1364, 1481, 1851, 1856, and 1863.

The *city* stood at the northern extremity of the island, on the slopes of a natural amphitheatre, and was built on a regular plan, the unity and harmony of its architecture being due to the circumstance that it was the work of one man, Hippodamus of Miletus, the builder of the Piræus. It was girt about by strong walls, surmounted by towers, and was provided with two excellent harbours. At the entrance of one of its ports stood the gigantic statue of Helios, the Colossus (q.v.). Besides this statue, one of the seven wonders of the ancient world, 3000 others, of which 100 were colossal, adorned the city, even in the 1st century A.D. The city was rebuilt on the same scale of architectural splendour after each successive destruction by the earthquakes. The arts were prosecuted with assiduity, the city being remarkable for the number and excellence of its paintings, sculptures, and statues; the most important survivals are the Laocoon (q.v.) and the Farnese Bull (at Naples); and intellectual activity manifested itself here long after it had declined in most parts of Greece. Parrhasius and Protogenes are celebrated amongst the painters of Rhodes, Lysippus, Chares, Agesander, Polydorus, Athenodorus amongst her sculptors, and Cleobulus (one of the seven wise men), Timocreon (the scurrilous poet), Eudemus (the Aristotelian), Panætius (the philosopher), and others amongst her writers. Her school of rhetoric was very famous. The first meridian of ancient geographers passed through Rhodes. The island produced also many celebrated athletes. The existing city dates for the most part from the period of the Knights' occupation. The streets are narrow and winding, the houses solidly built, with flat roofs; but the famous street of the Knights, running down to the harbour, is long and comparatively wide. The principal buildings that survive are the church of St John (now a mosque, but in part destroyed by a gunpowder explosion in 1856), the Knights' hospital, and the grand-master's palace. The city walls still stand; but the harbours are neglected and partly choked with sand. Rhodes is the seat of a Greek archbishop. There is a little trade. Pop. about 10,000. See C. Torr's excellent *Rhodes in Ancient Times* (1885) and *Rhodes in Modern Times* (1887), where other books are referred to.

Rhodes, the Rt Hon. Cecil John, statesman, was born 5th July 1853, the fourth son of the vicar of Bishop-Stortford in Hertfordshire, and after attending the local grammar-school was sent for his health to Natal, where his brother was a planter. He subsequently went to the Kimberley diamond diggings; there he soon became conspicuous and amassed a fortune. He came back to England and entered at Oriel College, Oxford, and though his residence was cut short by ill-health, he ultimately took his degree. He entered the Cape House of Assembly as member for Barkly. In 1884 General Gordon asked him to go with him to Khartoum as secretary; but Rhodes had just taken office in the Cape ministry, and decided to remain in South Africa. He sent £10,000 to Mr Parnell to forward the cause of Irish Home Rule. In 1890 he became prime-minister of Cape Colony; but even before this he had become the ruling spirit in recent extensions of British territory, as in securing the charter for the British South Africa Company (see Matabeleland). Zambesia (q.v.) is not unfairly called Rhodesia. His policy is the establishment of a federal South African dominion under the British flag, and the reconciliation of race prejudices, especially between those of Dutch and English blood.

Rhodian Law is an early system of marine law, said to have been compiled by the Rhodians after they had obtained the sovereignty of the sea. The only rule that we know now, although the entire code was adopted by the Romans under Antoninus Pius, is the principle of general average: 'If a cargo be jettisoned to lighten the ship, all contribute to make good the loss incurred for the benefit of all.' The mediæval naval law of the Rhodians was not of Rhodian origin. It consisted of four distinct parts, of very different dates, but mostly of practical value.

Rhodium (sym. Rh, at. wt. 104, sp. gr. 12·1) is one of the metals of the platinum group. It is a white, very hard metal, resembling aluminium rather than silver. It fuses less easily than platinum. It is ductile and malleable when pure and after fusion, and insoluble in all acids; but when alloyed in small quantity with platinum, copper, bismuth, and lead it dissolves with them in *aqua regia*. It usually forms about one-half per cent. of the ore of platinum, from which it is extracted by a somewhat complicated process. Three oxides, two sulphides, and a chloride of rhodium have been obtained and examined by chemists. The chloride unites with several soluble chlorides to form crystallisable double salts, which are of a rose colour (whence the name rhodium, from the Gr. *rhodon*, 'a rose'). The metal was discovered in 1803 by Wollaston.

Rhododendron (Gr., 'rose-tree'), a genus of trees and shrubs of the natural order Ericeæ, having ten stamens, a very small calyx, a bell-shaped or somewhat funnel-shaped corolla, and a capsule splitting up through the dissepiments. The buds in this and nearly allied genera, as Azalea (q.v.), are scaly and conical. The species are numerous; they have evergreen leaves, and many of them are of great beauty both in foliage and in flowers. A few small species are natives of continental Europe and of Siberia; but the greater number belong to the temperate parts of North America, and to the mountains of India. *R. maximum*, so designated when the far larger Indian species were unknown, is common in Britain as an ornamental shrub. It is a large shrub or small tree, which forms impenetrable thickets on many parts of the Alleghany Mountains, and has a magnificent appearance when in flower. The leaves are large, oblong, acute, stalked, leathery, dark green and shining above, rusty brown beneath. The flowers are large, in umbellate corymbs, varying in colour from pale carmine to lilac. This species is quite hardy in Britain; as is also *R. ponticum*, a very similar species, with narrower and more pointed leaves, which are of the same colour on both sides, a native of western Asia, and apparently also of the south of Spain. *R. Catawbiense*, a native of the southern parts of the Alleghanies, with large purple flowers; *R. Caucasicum*, the name of which indicates its origin; and *R. arboreum*, a native of Nepal, with very dense heads of large scarlet flowers, and leaves 4–6 inches long, attaining in its native country a height of 30 or 40 feet, are also fine species, and well known. Most of the extremely numerous varieties now common in our gardens and shrubberies have been produced from them by hybridising or otherwise.—Many splendid species of rhododendron were discovered in the Himalayas, the Khasia Hills, and other mountainous parts of India, by Dr Hooker and others; and many of them have been introduced into cultivation in Europe. *R. Falconeri* is described as in foliage the most superb of all, the leaves being 18 or 19 inches long. It is a tree 30–50 feet high, with leaves only at the extremities of the branches. It grows in eastern Nepal at an altitude of 10,000 feet. *R. argenteum* has flowers 4½ inches long, and equally broad, clustered, and very beautiful. *R. Maddeni*, *R. Aucklandii*, *R. Edgeworthii*, and others have white flowers. *R. Dalhousiæ* is remarkable as an epiphyte, growing on magnolias, laurels, and oaks. It is a slender shrub, bearing from three to six white lemon-scented bells, 4½ inches long, at the end of each branch. *R. Nuttalii* has fragrant white flowers, said to be larger than those of any other rhododendron. All these belong to the Himalayas. In more southern latitudes, as on the Neilgherry Hills and on the mountains of Ceylon, *R. nobile* prevails, a timber-tree 50 to 70 feet high, every branch covered with a blaze of crimson flowers. *R. Keysii* and *R. Thibaudiense*, also natives of the north of India, have flowers with nearly tubular corolla. *R. ferrugineum* and *R. hirsutum* are small species, shrubs from 1 to 3 feet in height, natives of the Alps, and among the finest ornaments of alpine scenery. They are called *Alpenrose* (Alpine Rose) by the Germans. They have small carmine-coloured flowers in umbellate clusters. The mountain-slopes glow with their blossoms in July and August. The flora of the Himalayas contains a number of similar small species. *R. anthopogon* and *R. setosum*, dwarf shrubs with strongly-scented leaves, clothe the mountains in eastern Nepal, at an elevation of 12,000 feet and upwards, with a green mantle, brilliant with flowers in summer. *R. nivale* is the most alpine of woody plants, spreading its small woody branches close to the ground at an elevation of 17,000 feet in Sikkim. *R. lapponicum*, a procumbent shrub, with small flowers, grows as far north as human settlements have reached in Europe, Asia, and America. Some of the species of this genus possess narcotic properties. An oil obtained from the buds of *R. ferrugineum* and *R. hirsutum* is used by the inhabitants of the Alps, under the name *Olio di Marmotta*, as a remedy for pains in the joints, gout, and stone. *R. chrysanthum*, a low shrub, with golden yellow flowers, a native of Siberia, is also used in gout and rheumatism. *R. cinnabarinum*, a Himalayan species, poisons goats which feed upon it, and when used for fuel causes inflammation of the face and eyes. But the flowers of *R. arboreum* are eaten in India, and Europeans make a palatable jelly of them.

Rhododendron arboreum.

Rhodope, the ancient name of a mountain-chain (7474 feet) extending along the borders of Macedonia and Thrace. The Turks call it *Dospad Yailasi*, the Bulgarians *Despoto Dagh*, both titles having reference to the numerous (Greek) monasteries that stud its sides. Of these the most famous is the vast fortress-monastery of Rilo, in the north-west of the range, standing on its southern side in the midst of magnificent pine forests. Rilo has for generations been the focus of the national Bulgarian church and the mainstay of Bulgarian nationality. See *Fortnightly Review* (April 1891).

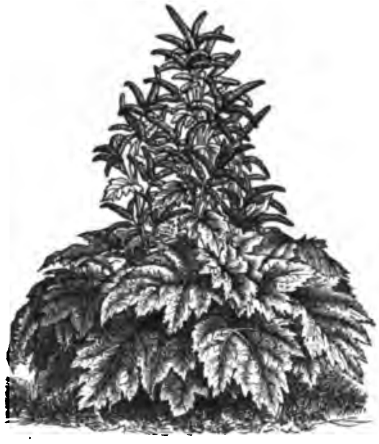
Rhondda Valley, in Glamorganshire, South Wales, is noted as a centre of coal-mining and for its fine scenery. The railway connecting the whole valley directly with Swansea through the tunnel of Blaengwynte was opened in 1890.

Rhone (Lat. *Rhodănus*), the only important French river which falls into the Mediterranean, takes its rise in the Swiss Alps, on the western side of Mount St Gothard, at an altitude of 5752 feet, and not far from the sources of the Rhine. Its entire length, from its source to its mouth in the Gulf of Lyons, is 504 miles, and the area of its river-basin 38,170 sq. m. It first runs in a south-westerly direction through the canton of Valais, along a narrow valley between the Bernese and the Pennine divisions of the Alps, until near Martigny it takes a sudden turn to the north and pours its waters into the Lake of Geneva (q.v.). It issues from the lake at its southern extremity, proceeding west, and then forces a passage through the Jura. The municipality of Geneva has taken advantage of the strong and steady current of the river where, passing through the city, it is divided by an island into two arms, to utilise it for industrial purposes. A system of 20 turbines with 4400 horse-power has been constructed in a building in the bed of one of the arms, at a cost of £285,000; and by this means, in 1890, 220 motors with some 1600 horse-power were at work. Formerly the river used to disappear for some distance near Fort l'Écluse into the subterranean channel *La Perte du Rhone;* but the vault or covering of the gorge into which it plunged has now been blown away by blasting agents. At St Génis the Rhone turns back suddenly to the north-west, and then once more flows westwards through a more level country as far as Lyons, where it is joined by its largest tributary, the Saône (283 miles long), from the north. From Lyons it follows a southern direction past Vienne, Valence, Montélimart, Avignon, and Arles, where begins its delta, embraced between two main arms, the Greater and the Lesser Rhone. Its most important affluents are, on the right, the Ain, Saône, Ardèche, and Gard; on the left, the Arve, Isère, Drôme, and Durance. From Lyons southward the Rhone is easily navigable for good-sized vessels; but the up-navigation, owing to the rapidity of the current and the sudden shifting of sandbanks, is attended with considerable difficulty, and is at times almost impracticable. On account of these and other obstructions, which are greatest near the mouths of the river, communication with the Mediterranean is in great part dependent upon canals. Canals likewise connect the Rhone with the Rhine by the Saône, with the Seine, the Loire, and the Garonne.

Rhône, a department of France, part of the former Lyonnais, has an area of 1077 sq. m. and a population (1886) of 772,912; (1891) 806,737. It lies almost wholly in the basin of the Rhone and the Saône, its eastern boundary being formed by these rivers. The surface is almost entirely hilly, being broken up in all directions by low spurs of the Cevennes. Corn, potatoes, wine, and fruits are the principal products. Nearly one-half the area is cultivated, one-eighth is vineyards, one-ninth under forest, and nearly one-sixth meadows. Some 13 million gallons of wine are made annually. The department is industrially one of the most important in France; all the branches are carried on at Lyons (q.v.), the capital of the department. Arrondissements, Lyons and Villefranche. See also BOUCHES-DU-RHÔNE.

Rhubarb (Low Lat. *rheubarbarum*, from Gr. *rhēon barbaron*, literally 'barbarian rheum;' *rhēon* is an adjective from *rha*, 'the plant found near the river *Rha*'—i.e. the Volga; the botanical name being simply *rheum*), a genus of plants of the natural order Polygonaceæ, closely allied to Rumex (dock and sorrel), from which it differs in having nine stamens, three shield-like stigmas, and a three-winged achenium. The species, about twenty, are large herbaceous plants, natives of the central regions of Asia, with strong, branching, almost fleshy roots; erect, thick, branching stems, sometimes 6 or 8 feet high; the stems and branches whilst in the bud covered with large membranous sheaths. The leaves are large, stalked, entire or lobed; the flowers are small, whitish or red, generally very numerous, in large loose panicles of many-flowered clusters. The roots are medicinal; but it is not definitively known what species of rhubarb yields the valued rhubarb of commerce, which comes from inland parts of China or Chinese Tartary. The bulk of it reaches Europe now direct from China, but the best, in limited quantities, is brought through Russia. It is commonly known in Britain as *Turkey Rhubarb*, because it was formerly brought by way of Asiatic Turkey.

The leaf-stalks of rhubarb contain an agreeable mixture of citric and malic acids, and when young and tender are much used, like apples, for tarts and various kinds of preserves. A kind of wine may also be made of it. For these purposes different kinds of rhubarb are now very extensively cultivated in Britain, and in other temperate and cold countries. A number of species have been introduced into cultivation for their leaf-stalks. The cultivated kinds, *R. undulatum*, *R. rhaponticum*, and *R. hybridum*, with endless varieties produced by the art of the gardener, all have broad, heart-shaped, undivided leaves, and the leaf-stalks flattened and grooved on the upper side. The leaf-stalks are often also of a reddish colour, which in some of the finest varieties pervades their whole flesh. Rhubarb is cultivated on a most extensive scale by market-gardeners. It is forced in winter and early spring by being placed in pots within houses, or by having pots inverted over it, and dung and straw heaped around; and forced rhubarb is more tender and delicate than that which grows in open air. The stalks when blanched are much less harsh in taste and require less sugar to be rendered palatable. It is largely grown also in many parts of the United States.



Rhubarb (*Rheum officinale*).

The well-known medicinal *R. officinale* differs considerably in appearance from the kinds preferred in kitchen-gardens; the petioles are nearly round, and the under side of the leaf is covered with small, erect hairs. The numerous varieties of commercial rhubarb may be thrown into two groups: (1) *Asiatic Rhubarbs*—Chinese, passing under the names of Russian, Muscovy or Turkey, Canton or East Indian, Batavian or Dutch trimmed, yielded probably by *R. officinale* and a variety of *R. palmatum;* Siberian, by *R. rhaponticum;* Himalayan large, by *R. emodi*, and small by *R. webbianum;* Bokharan or Bucharian, by *R. undulatum.* (2) *European Rhubarbs*—English, by *R. rhaponticum* and *R. officinale;* French, by *R. rhaponticum, compactum*, and *undulatum;* Austrian (Moravian), by *R. rhaponticum. R. palmatum* is believed to produce some of the best Russian rhubarb. Whether *R. officinale* occurs in Shan-hsi and Sze-chwan, from which provinces the true rhubarb is chiefly obtained and sent to Hankow, is not definitively known. The export of rhubarb from China (the so-called Turkey Rhubarb) has largely increased of late years. The average shipments of the four years ending with 1889 were 7500 cwt. per annum, against less than 4000 cwt. twenty years before. The Chinese rhubarb is of very variable quality, whole chests of 1½ to 3 cwt. sometimes affording but a few pounds of sound roots. The Shan-hsi rhubarb used to be the best in the market, the roots being large, smooth, and extremely fragrant. It is now, however, of inferior quality, and dried with less care, apparently in ovens, in which case it soon rots in the centre, or is attacked by insects. Sze-chwan furnishes a good and cheap rhubarb, esteemed in the London market, where it is known as 'high-dried Shanghai rhubarb.' The roots are small, rough on the exterior, deficient in flavour, and when cut give out little scent. The plant from which the Java rhubarb is derived is not known; it resembles the Chinese in smell and taste, but its activity is one-fourth less.

The rhubarb plant is distributed through an immense tract of country in the central provinces of China; probably several species yield the same drug. According to Professor Maximowecz, *R. palmatum* is probably the plant producing the drug whose reputation dates from the time of the Arabian and Greek physicians. It was introduced by Dr Mounsey from Russia to Great Britain, and cultivated at Edinburgh by Sir A. Dick prior to 1774. Garden rhubarb (*R. rhaponticum*) was in use in England in the time of Charles II. The medicinal root is now grown extensively in England, France, Germany, Austria, St Petersburg, and other parts of Europe. It is very difficult to distinguish between the true Chinese rhubarb and the root obtained in Europe by the culture of various species of Rheum. According to Cauvet, the European may be distinguished from the exotic by (1) the rectilinear disposition of its rays, from the centre to the circumference; (2) the presence upon its circumference of a brown zone, relatively large and especially very distinct; and (3) the absence of the radiated systems (stars) so numerous in the Russian rhubarb, less frequent, but always easy to recognise, in the Chinese. In the true rhubarb the rays are dispersed irregularly over the fractured surface. Some English rhubarb, probably obtained from *R. rhaponticum*, is readily distinguished from Chinese by being less marbled upon the fracture, and by the absence of the diamond-shaped meshes upon its surface. There were formerly three classifications of rhubarb—Russian, Turkish, and Chinese or East Indian, but these are now reduced to European and Chinese. Before the opening of the treaty ports in China most of the rhubarb consumed in Europe was obtained from the Chinese at Kiachta, carefully selected and brought overland through Russia, which has entirely lost this prized monopoly, the quantity now conveyed there overland from China being insignificant. Chinese rhubarb, received direct, is distinguished by the small size, dark colour, and irregular shape of the holes with which it is pierced; by the outer surface being frequently marked with whitish reticulations, which are more evident when the powder has been rubbed off; and by the transverse surface showing a number of star-like marks, but no cortical layer. The plant is hardly cultivated in China, but grows wild. The root-stocks are dug up when from six to seven years old, just before the flowering season. They are then peeled, cut in lengths measuring 4 to 5 inches, bored through the middle, placed on strings and hung up to dry. There is considerable diversity of form in the China rhubarb, arising from the various operations of paring, slicing, and trimming; but these forms are not found in the same package, the drug being usually sorted into what are commonly known as 'rounds' and 'flats.' The Indian rhubarb is frequent in parts of the Punjab Himalayas from 7000 to 14,000 feet. It is less active than the imported rhubarb, and has been often pronounced worthless; but, according to Dr Watt, this is owing to the fact that an inferior variety reaches the plains. The whole sour stems are eaten both stewed and raw, while the leaves of this and other species are dried and smoked in Tibet and in the Eastern Himalayas.

Rhubarb is not individually mentioned now in the official trade returns, but is included with 'unenumerated drugs.' Since 1870, when the imports were 343,000 lb., and the average prices ranged from 3s. 4d. to 5s. 6d. per lb., the supplies have increased and prices have fallen by one-half. The production of English grown rhubarb root now amounts to about 12,000 lb. annually, of which from three to four thousand pounds are exported.

Chemically, rhubarb consists of mucilage, oxalate of lime, an albuminoid containing nitrogen and sulphur, crystalline resins, tannin, gallic acid, sugar, chrysophane (decomposable into chrysophanic acid and glucose), rheotannic acid, and emodin.

Rhubarb may be briefly described as a cathartic, an astringent, and a tonic. As a cathartic it chiefly operates by increasing the muscular action of the intestines; and when the cathartic action is over there is generally more or less constipation. Rhubarb is one of the best aperients for general use in infancy, in consequence of the certainty of its action, and of its tonic and astringent properties, which are of much importance in the treatment of many infantile diseases attended with imperfect digestion and irritation of the intestinal canal. In adults it is serviceable in chronic diarrhœa and dysentery, when it is expedient to clean out the bowels. It is also a useful aperient in convalescence from exhausting disease, as being free from the risk of overacting; and, for the same reason, it is a useful medicine for persons who are constitutionally liable to over-purgation from trivial causes.

Rhuddlan, a decayed town of Flintshire, North Wales, on the Clwyd, 3 miles SSE. of Rhyl. Its ruined castle, dating from 1015, and dismantled after its capture by the Roundheads in 1646, was the scene of the betrayal of Richard II. by Percy (1399); at the marsh of Morfa Rhuddlan, across the river, Offa defeated Caradoc (795). With Flint, &c., Rhuddlan returns a member to parliament. Pop. 1242.

Rhus. See SUMACH.

Rhyl, a watering-place of Flintshire, North Wales, at the mouth of the Clwyd, 30 miles NW. of Chester. A mere fishing-village so late as 1830, it has fine sands, a promenade pier 705 yards long, built in 1867 at a cost of £17,000, an esplanade, an aquarium and winter garden, a dozen hotels, baths, &c.; and, though the country around is flat, it commands fine views of the Snowdonian mountains. Pop. (1851) 1563; (1881) 6029; (1891) 6491.

Rhyme, or, more properly, RIME (the former spelling being merely due to a confusion with the Greek *rhythm*), is itself a native Teutonic word; A.S. *rím*, Icel. *ríma*, Ger. *reim*, and O.H. Ger. *rím* (whence Fr. *rime*, Ital. *rima*); probably cognate with Gr. ἀριθμός, 'number.' In early English rime (and the same is true of Ger. *reim* and the other forms of the word in other northern tongues as well as in the Romanic) meant simply a poem, a numbered or versified piece (compare Lat. *numeri*, 'numbers' = verses, versification); but it has now come to signify what is the most prominent mark of versification in all these tongues—viz. the recurrence of similar sounds at certain intervals. As there may be various degrees and kinds of resemblance between two syllables, there are different kinds of rime. When words begin with the same consonant we have *Alliteration* (q.v.), which was the prevalent form of rime in the earlier Teutonic poetry, as in Anglo-Saxon. In Spanish and Portuguese we find employed a peculiar kind of rime called *Assonance*, consisting in the coincidence of the vowels of the corresponding syllables, without regard to the consonants; this accords well with the character of these languages, which abound in full-toned vowels, but is ineffective in English and other languages in which consonants predominate. In its more usual sense, however, rime denotes correspondence in the final syllables of words, and is chiefly used to mark the ends of the lines or verses in poetry. Complete identity in all the parts of the syllables beginning with the same consonants constitutes what the French call *rich* rime, as in mo*dèle*, fi*dèle*; beau*té*, san*té*. They designate as *poor* rimes most of such rimes as English verse allows—collocations of similar syllables beginning with different consonants, as *page* and *rage*, *nuit* and *instruit*. 'This difference of taste,' says Mr F. W. H. Myers, 'seems partly to depend on the more intimate *liaison* existing in French pronunciation between the consonant and the syllable which follows it—which syllable will often consist of a vowel sound very *rapidly* pronounced, like the terminations in the accented *é*, or very *indeterminately* pronounced, like the nasal terminations in *m* and *n*. If the consonant which gives the whole character to terminations like these differs in the two rhyming lines, there seems to be hardly enough substance left in the rhyme to satisfy the ear's desire for a recurring sound. This view is illustrated by such English rhymes as *alone* and *flown*, where an additional richness seems sometimes gained from the presence of the *l* in both the rhyming syllables.' Undoubtedly one of the delights of rime is expectance, but that of uniformity in variety, rather than of monotonous and absolute uniformity. Although such rimes are not only allowed but sought after in French, in English they are deservedly considered faulty, or rather as not true rimes at all. No one thinks of making *deplore* rime with *explore*. Riming syllables in English must agree in so far, and differ in so far: *the vowel and what follows it—if anything follow it—must be the same in both; the articulation before the vowel must be different.* Thus, m*ark* rimes with l*ark*, b*ark*, *ark*, but not with re*mark*. In the case of *mark* and *ark* the absence of any initial articulation in the latter of the two makes the necessary difference. As an example of rime where nothing follows the vowel we may take be-*low*, which rimes with fore-*go*, or with *O!* but not with *lo*. To make a perfect rime it is necessary, besides, that the syllables be both accented; *free* and merr*ily* can hardly be said to rime. It is almost needless to remark that rime depends on the sound, and not on the spelling. *Plough* and *enough* do not make a rime, nor *ease* and *decease*.

Such words as *roaring*, de-*ploring*, form *double* rimes; and un-*fortunate*, im-*portunate*, *triple* rimes. In double or triple rimes the first syllable must be accented, and the others ought to be unaccented, and to be completely identical. In the sacred Latin hymns of the middle ages the rimes are all double or triple. This was a necessity of the Latin language, in which the inflectional terminations are without accent, which throws the accent in most cases on the syllable next the last—do-*lorum*, vi-*rorum*; sup-*plicia*, con-*vicia*. Although rimes occur chiefly between the end-syllables of different lines, they are not unfrequently used within the same line, especially in popular poetry:

> And then to see how ye 're neglеckit,
> How *huff'd*, and *cuff'd*, and disrespeckit.
>
> And ice mast-*high* came floating *by*.

When two successive lines rime they form a *couplet*; three form a *triplet*. Often the lines rime alternately or at greater intervals, forming groups of four (*quatrains*) or more. A group of lines embracing all the varieties of metre and combinations of rime that occur in the piece forms a section called a *stave*, sometimes a *stanza*, often, but improperly, a *verse*. In the days of elaborate Acrostics (q.v.), verses constructed in shapes, and other conceits, it was the fashion to interlace rimes in highly artificial systems; almost the only complex arrangements now current in English are the various forms of the sonnet, and the Spenserian stanza. Tennyson has accustomed the English ear to a quatrain in which, instead of alternate rimes, the first line rimes with the fourth, and the second with the third.

It is a mistake to suppose that rime is a mere ornament to versification. Besides being in itself a pleasing musical accord, it serves to mark the endings of the lines and other sections of the metre, and thus renders the rhythm more distinct and appreciable than the accents alone can do. So much is this the case that in French, in which the accents are but feeble, metre without rime is so undistinguishable from prose that blank verse has never obtained a footing, notwithstanding the war once waged by French scholars against rimed versification. 'The advantages of rime,' says Guest, 'have been felt so strongly that no people have ever adopted an accentual rhythm without also adopting rime.' The Greek and Latin metres of the classic period, depending upon time or quantity, and not upon accent, were able to dispense with the accessory of rime; but, as has been well observed by Trench (*Introduction to Sacred Latin Poetry*), even 'the prosodic poetry of Greece and Rome was equally obliged to mark this (the division into sections or verses), though it did it in another way. Thus, had dactyls and spondees been allowed to be promiscuously used throughout the hexameter line, no satisfying token would have reached the ear to indicate the close of the verse; and if the hearer had once missed the termination of the line it would have been almost impossible for him to recover it. But the fixed dactyl and spondee at the end of the line answer the same purpose of strongly marking the close as does the rime in the accentuated verse; and in other metres, in like manner, licenses permitted in the beginning of the line are excluded at its close, the motives for this greater strictness being the same.' It is chiefly, perhaps, from failing to satisfy this necessary condition that modern unrimed verse is found unsatisfactory, at least for popular poetry; and it may be doubted whether it is not owing to the classical prejudices of scholars that our common English blank verse got or maintained the hold it has.

The objection that rime was 'the invention of a barbarous age, to set off wretched matter and lame metre,' rests mainly on ignorance of its real history. It cannot be considered as the exclusive invention of any particular people or age. It is something human, and universal as poetry or music—the result of the instinctive craving for well-marked recurrence and accord. The oldest poems of the Chinese, Indians, and Arabs are rimed; so are those of the Irish and Welsh. In the few fragments of the earliest Latin poetry that are extant, in which the metre was of an accentual, not quantitative kind, there is a manifest tendency to terminations of similar sound. This native tendency was overlaid for a time by the importation from Greece of the quantitative metres; yet even under the dominance of this exotic system riming verses were not altogether unknown; Ovid especially shows a liking for them:

> Quot cœlum stellas, tot habet tua Roma puellas;

and in the decline of classicality they become more common. At last, when learning began to decay under the irruptions of the northern nations, and a knowledge of the quantity of words—a thing in a great measure arbitrary, and requiring to be learned—to be lost, the native and more natural property of accent gradually reappeared as the ruling principle of Latin rhythm, and along with it the tendency to rime. It was in this new vehicle that the early Christian poets sought to convey their new ideas and aspirations. The rimes were at first often rude, and not sustained throughout, as if lighted upon by chance. Distinct traces of the adoption of rime are to be seen as early as the hymns of Hilary (died 368), and the system attained its greatest perfection in the 12th and 13th centuries. In refutation of the common opinion that the Latin hymnologists of the middle ages borrowed the art of rime from the Teutonic nations, Dr Guest brings the conclusive fact that no poem exists written in a Teutonic dialect with final rime before Otfried's *Evangely*, which was written in Frankish about 870. Alliteration had previously been the guiding principle of Teutonic rhythms; but after a struggle, longer protracted in England than on the Continent, it was superseded by end-rimes.

See the articles ALLITERATION, BLANK VERSE, HEXAMETER, METRE, ODE, POETRY, and SONNET; also Guest's *History of English Rhythms* (ed. by Professor Skeat, 1882), where the whole subject is learnedly and elaborately treated; Trench's *Sacred Latin Poetry* (1864); F. Wolf, *Ueber die Lais, Sequenzen, und Leiche* (Heid. 1841); and Schipper's *Englische Metrik* (Bonn, 1881-89).

Rhymer. See THOMAS THE RHYMER.

Rhymney, a town of Monmouthshire, on the river Rhymney (running to the Bristol Channel near Cardiff), 2¼ miles W. of Tredegar. It is the seat of ironworks. Pop. (1861) 7630; (1891) 7733.

Rhynchonella. See BRACHIOPODA.

Rhynchophora. See WEEVIL.

Rhynchops. See SKIMMER.

Rhyolite. See LIPARITE.

Rhys, JOHN, was born near Ponterwyd in Cardiganshire, June 21, 1840, served a pupil-teacher's apprenticeship, and after the course at Bangor Normal College kept a school in Anglesey down to the end of 1865, when he entered Jesus College, Oxford. He was elected to a fellowship at Merton in 1869, and next continued his studies at the Sorbonne, Heidelberg, Leipzig, and Göttingen, returning in 1871 to become inspector of schools for Flint and Denbigh. In 1877 he was appointed professor of Celtic in the University of Oxford, in 1881 was elected a fellow, and in 1895 principal, of Jesus College. His *Lectures on Welsh Philology* (1877) and *Celtic Britain* (1882) confirmed a reputation already gained by contributions to Kuhn's *Beiträge zur vergl. Sprachforschung*, the *Revue Celtique*, and the *Archæologia Cambrensis*. He gave the Hibbert Lectures on *Celtic Heathendom* in 1886, and at the close of 1889 the Rhind Lectures at Edinburgh. Professor Rhys is a contributor to the present work.

Rhythm may be defined as measured or timed movements, regulated succession. In order that a number of parts may constitute a pleasing whole, a certain relation or proportion must be felt to pervade them, and this exemplified in the arrangement of matter into visible objects, as in sculpture, architecture, and other plastic arts, produces a rhythm which is usually called *symmetry*. Rhythm applied to the movements of the body produces the *dance*. 'The rhythmical arrangement of sounds not articulated produces *music*, while from the like arrangement of articulate sounds we get the cadences of *prose*, and the measures of *verse*. Verse may be defined as a succession of articulate sounds, regulated by a rhythm so definite that we can readily foresee the results which follow from its application. Rhythm is also met with in prose; but in the latter its range is so wide that we never can anticipate its flow, while the pleasure we derive from verse is founded on this very anticipation.'

The rhythm of verse is marked in various ways. In Greek and Latin, during their classic periods, *quantity*, or the regulated succession of long and short syllables, was the distinguishing mark of verse. In the languages descended from these the rhythm depends upon *accent*. The recurrence of similar sounds, or rime, is also used, along with accent, to render certain points of the rhythm more distinct, as well as to embellish it. See METRE, RHYME.

Rhytina, a genus of Sirenia, akin to the dugong and manatee, of which only one species has been made known—the *Rhytina stelleri*, discovered by Behring and the naturalist Steller when they were wrecked on Behring Island in 1741, and described very fully by Steller. At that date they were extremely plentiful in this part of the northern Pacific, but were soon almost extirpated by the Russian hunters and traders. Nordenskiöld's inquiries led him to believe that individuals were seen till the middle of the 19th century. The species was distinguished by its large size, sluggishness, and its having horny plates in place of teeth. The skin was rough and hairless. The *Vega* expedition brought home many skeletons.

Riad. See WAHABIS.

Riazan, a town of Russia and capital of a government, stands near the right bank of the Oka, 115 miles by rail SE. of Moscow. A straggling, ill-built town of wooden houses, it sends wheat to Moscow. Pop. 30,327.

Ribalta, FRANCISCO (1550-1628), and JUAN (1597-1628), painters of the school of Valencia.

Ribble. See PRESTON.

Ribbon, Riband, or RIBBAND (a Celtic word). The principal ribbon manufacturing centre is Coventry in England, and St Étienne and Basel abroad, as also, more recently, the middle Rhine. Ribbons were also formerly made in Derby and Leek. In Coventry the ribbon industry was commenced by Bird at the beginning of the 18th century. Coventry was at that time a city of 12,817 inhabitants. The population increased with the progress of the ribbon industry, until in 1861 it was 41,638. In 1860 there were 8886 looms; but in 1885 not one-third of this number was employed, and the number is much less now. In 1861 there were 40,600 people dependent upon the ribbon trade, in 1881 not more than a fourth. The ruin and migration of the trade to the Continent arose from two causes—first, strikes, particularly the great one of 1860; second, the French treaty of 1860, before which this branch was protected by a duty of 15 to 30 per cent. The great competition of Basel and St Étienne then soon ruined the production of Coventry, for at these old centres labour was then much cheaper, the hours of work longer, and taste and style superior, particularly at St Étienne. Recently, however, much progress has been made in England both in style and economy. Amongst the various kinds of ribbons woven in Coventry are the following: Taffeta, gros-grain, twill, satin, satinette, ottoman-satin, and terry, plush, brocade, faille, plaids, watered satins, birthday-ribbons, and book-markers, sarsnets, orientals, waistbands, and other plain and figured narrow fabrics. Of the names which indicate the kind of groundwork, gros-grain is a ribbed silk; plush, a velvety or pile surface; satin, a smooth polished surface, &c.; and there are mixtures of these various fabrics, generally woven in stripes, faille with satin, satin with terry, velvet with satin, plain and figured in conjunction, making an infinite variety of decorative effects both in weaving and colour.

The construction of the fabric of a ribbon is like that of broad silks—viz. the threads or warp (Fr. *chaine*) lengthwise; those at right angles, or shot across the ribbon, the shute or weft (Fr. *trame*). The warp consists of many threads, the shute which interweaves the warp of one, or at most a few only, according to the number of colours or style of fabric required. There are two kinds of looms or methods of weaving, hand-looms and power-looms, the latter having gradually but surely superseded the former, except for very artistic work. These two looms are also of two kinds, those which weave plain goods and those which weave figured or patterned work. The latter are called Jacquard looms (see WEAVING); in these every warp-thread is so isolated as to be under mechanical control, and can be raised or not independently of every other thread. These warp-threads are raised by means of the 'harness' to allow of the shute to pass between the whole or parts of the warp-threads according to the pattern or style required. The harness is composed of 'leishes,' the purpose of which is to raise at will the warp-threads, each of which requires one leish. The term 'shed' is applied to the warp when separated horizontally by the harness for the shuttle to pass between; this is called the 'opening,' that in the upper surface being termed the top shed, and the lower part the bottom shed. The shuttle contains the quill in which has been wound the 'filling,' which is a portion of the shute or weft-thread, and is propelled in the shuttle between the warp-threads by hand or by other power, generally steam-power. In front of this complicated mechanism is the 'slay' or 'reed,' which is a comb-like apparatus through which the warp-threads pass before they receive the shute into its resting-place in the fabric. The Jacquard arrangement is placed on the top of the loom, and consists of perforated cards, with the requisite machinery to work them. See SILK.

Ribbon-fish, a name given to several genera of Acanthopterous fishes having the body much compressed and band-like, the dorsal fin extending the whole length of the back, the anterior rays being long and distinct, the skeleton soft, and the skin naked and silvery. They are true deep-sea fishes, and are widely distributed, though nowhere abundant. Some authorities divide them into two groups—the Trachypteridæ, having long ventral fins, and occasionally attaining to a length of 10 feet, with a thickness of scarcely an inch; and the Regalecidæ, with the ventral fins represented by single, oar-like filaments. The best-known species is *Regalecus banksii*, the Dealfish (q.v.).

Ribbonism, the name assumed by a group of secret associations among the lower classes in Ireland throughout the half century extending from 1820 to 1870, at its greatest height from about 1835 to 1855. Its origin and organisation are alike wrapped in obscurity, but it appears in the beginning at least to have been political in its aims, and O'Connell's opinion seems most probable, that it grew out of the northern Defenders who banded themselves to oppose the Orange organisation. Earlier associations with somewhat similar aims were the Whiteboys and the Threshers, and, in particular corners of the island, the Carders, Shanavests, and Caravats.

Ribbonism, according to O'Connell, was more political in the north, in presence of the organisation of the Orange lodges; in the south it flowed rather into what he characterised as 'driftless acts of outrage.' Although everywhere condemned by the Catholic clergy, it included none but Catholics within its numbers, and it maintained its influence by a system of oaths and secret signs and passwords. Of these many were made known to the authorities by informers, but they were found to contradict completely rather than merely differ from each other. One striking feature of Ribbonism, as distinguished from most Irish patriotic associations, was the fact that its adherents belonged exclusively to the very lowest and most ignorant classes, the humbler peasantry, farm-servants, labourers, and petty shopkeepers, hardly even the smallest farmers or their sons apparently belonging to it in any part of Ireland. So far as there was any unity in its aims, it aimed at making itself a public conscience on all agrarian questions; but, as A. M. Sullivan pointed out, the Ribbonism of one period and of one district was not the Ribbonism of another. 'In Ulster it professed to be a defensive or retaliatory league against Orangeism. In Munster it was at first a combination against tithe-proctors. In Connaught it was an organisation against rack-renting and evictions. In Leinster it often was mere trade-unionism, dictating by its mandates and enforcing by its vengeance the employment or dismissal of workmen, stewards, and even domestics. This latter phase generally preceded the disappearance of the system in a particular locality, and was evidently the lowest and basest form to which it sank or rotted in decay.'

The name, which of course originated in a green badge worn by the members, does not appear to have been attached to it till about 1826; and its influence seems to have grown gradually till about 1855, from which time it began rapidly to decline before a healthier public opinion and a growing political intelligence that recognised the greater advantage of more open and legitimate agitation. Here and there traces of a demoralised Ribbonism survived, capable of an occasional outbreak into malignant crime, but its declaration as illegal by the Westmeath Act of 1871 was hardly better than a mere flogging of the bodies of the slain.

See W. Stewart Trench, *Realities of Irish Life* (1868), and A. M. Sullivan, *New Ireland* (1877).

Ribeauville (Ger. *Rappoltsweiler*), a town of Upper Alsace, pleasantly situated amid vineyards at the west foot of the Vosges, 33 miles SSW. of

Strasburg. Excellent wines are made; cotton and calico goods are manufactured, and there are numerous flour, oil, and saw mills. Pop. 5902.

Ribera, JUSEPE, called SPAGNOLETTO ('Little Spaniard'), was born at Jativa, near Valencia, on 12th January 1588, and died at Naples in 1656. He studied a few years with Francisco Ribalta at Valencia, then crossed the sea and continued his studies in Rome, Parma, and Modena. He settled in Naples, where he adopted the boldness of Caravaggio's style, and became the ablest painter among the *naturalisti*, or artists whose treatment of subjects was based on a vigorous, but generally coarse, representation of nature, in opposition to that formed on the study of conventional or academic rules. He attracted the attention of the viceroy, became court-painter, and was elected member of the Academy of St Luke at Rome in 1630. His realism is forcible and generally gloomy: he delighted to represent horrible and gruesome subjects, such as the martyrdoms of SS. Bartholomew, Januarius, and Lawrence, 'Prometheus,' &c. Salvator Rosa and Giordano were his most distinguished pupils. He executed several etchings marked by force and freedom.

Ribes (from Arab. *ribaz*), a genus of shrubs belonging to the natural order Ribesiaceæ, familiar examples of which are the Gooseberry and the Currant of gardens. The species are chiefly natives of the temperate and colder regions of the northern hemisphere; some are found at high elevations in tropical America and on the Pacific coast, from California to Chili. They are found also on the mountains of Northern India, in the colder regions of Africa and Europe, but western America is the home of the largest number of the species. They are twiggy shrubs, often, as in the Gooseberry (*R. grossularia* and *R. speciosum*), armed with spines, clothed with deciduous alternate leaves, usually palmately lobed. The flowers are axillary in racemes, rarely solitary—small but often showy in the mass, as in *R. speciosum* and *R. sanguineum*, the former a native of California, often to be met with trained to walls in British gardens; the latter, enjoying a wide range in the northern United States, is also a very popular shrub in British gardens, well known under the name Scarlet or Flowering Currant. The calyx is the most conspicuous organ of the flower. It is persistent or adheres to the fruit after it is ripe, a feature very familiar in the gooseberry. The fruit is a berry, not in all species succulent, as in the gooseberry, currant, and others, but sometimes, as in *R. sanguineum*, almost entirely pulpless when ripe.

The most important product of the genus is the fruit, which consists of sweet mucilage mixed with malic and nitric acid along with an astringent substance. The gooseberry, the Red Currant (*R. rubrum*), and the Black Currant (*R. nigrum*) are natives of Britain—that is, they find a place in the British flora, though there are authorities who doubt whether they are truly indigenous, being rather disposed to think that where they are found wild they are merely escapes from cultivation. They have, however, been cultivated in British gardens for centuries, and the fact that they attain to higher perfection as fruits in Britain than in any other country in Europe—that in France, Italy, and Spain, although the plant is well known, the fruit is always inferior owing to the greater warmth of the climate—is strongly in favour of the presumption that the plants are indigenous to Britain (see CURRANT, GOOSEBERRY, GROSSULARIACEÆ). The fruit of *R. oxyacanthoides*, *R. lacustre*, and others, natives of North America, are pleasant to eat and have similar properties to those ascribed to the gooseberry and currants.

Rib-grass. See PLANTAIN.

Ribs are elastic arches of bone, which, with the vertebral column behind, and the sternum or breastbone in front, constitute the osseous part of the walls of the chest. In man there are twelve ribs on each side. The first seven are more directly connected through intervening cartilages with the sternum than the remainder, and hence they are termed *vertebro-sternal* or *true* ribs; while the other five are known as *false ribs*, and the last two of these, from being quite free at their anterior extremities, are termed *floating ribs*. A glance at a skeleton, or at a plate representing the articulated bones, will show that the ribs vary very considerably both in their direction and size. The upper ribs are nearly horizontal, but the others lie with the anterior extremity lower than the posterior; this obliquity increasing to the ninth rib, and then slightly decreasing. They increase in length from the first to the eighth, and then again diminish. The spaces between the ribs are termed the *intercostal spaces*. On examining a rib taken from about the middle of the series we find that it presents two extremities (a posterior or vertebral, and an anterior or sternal), and an intervening portion, termed the body or shaft. The posterior extremity presents a head, a neck, and a tuberosity. The head is marked by two concave articular surfaces divided by a ridge, the lower facet being the larger. These surfaces fit into the cavity formed by the junction of two contiguous dorsal vertebræ, and the ridge serves for the attachment of a ligament. The neck is a flattened portion proceeding from the head; it is about an inch long, and terminates at an eminence termed the tuberosity or tubercle, from whence the shaft commences. On the lower and inner part of this tubercle is a small oval surface, which articulates (as shown in fig. 2) with a corresponding surface on the upper part of the transverse process of the lower of the two vertebræ with which the head is connected. The shaft presents an external convex and an internal concave surface. A little external to the tubercle the rib is bent to form the angle, from

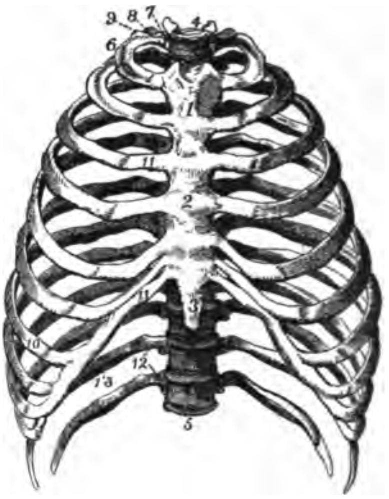


Fig. 1.—The Ribs, *in situ*:

1 and 2 are the upper and the middle parts of the sternum or breast-bone; 3, its ensiform cartilage; 4, the first dorsal, and 5 the last (or twelfth) dorsal vertebra; 6, the first rib; 7, its head; 8, its neck, resting against the transverse process of the first dorsal vertebra; 9, its tubercle; 10, the seventh or last true rib; 11, the costal cartilages of the true ribs; 12, the last two false ribs or floating ribs.

which point the rib passes forwards and outwards, ultimately curving inwards to join its costal cartilage. The upper border of the rib is thick and rounded, while the lower border is marked by a deep groove, which lodges the intercostal vessels and nerve.

The ribs of Mammals are mostly connected, as in man, with the bodies of two vertebræ, and with the transverse processes of the posterior one. In the Monotremata, however, they articulate with the vertebral bodies only; while in the Cetacea the posterior ribs hang down from the transverse processes alone. Their number on each side corresponds with that of the dorsal vertebræ. The greatest number, twenty-three, occurs in the two-toed sloth, while in the Cheiroptera eleven is the ordinary number. In Birds each rib articulates by means of a small head with the body of a single vertebra near its anterior border, and with the corresponding transverse process by means of the tubercle. Moreover, each rib possesses a 'diverging appendage,' which projects backwards over the next rib, so as to increase the consolidation of the thoracic framework, necessary for flying. The dorsal vertebræ here never exceed eleven, and are commonly seven or eight in number, and the ribs proceeding from them are connected with the sternum not by cartilage, as in mammals, but by true osseous sternal ribs, which are regularly articulated at one end with the sternum, and at the other with the termination of the spinal ribs. In the Chelonian Reptiles the ribs (as well as the vertebra and the sternum) deviate remarkably from the normal type, the lateral parts of the carapace consisting mainly of anchylosed ribs united by dermal plates. In the Crocodiles there are only twelve pair of true or dorsal ribs; while in the other Saurians, and in the Ophidians, the ribs are usually very numerous. In the Frogs there are no true ribs, the reason probably being that any bony element in their thoracic walls would interfere with the enormous thoracico-abdominal enlargement which these animals periodically undergo at the breeding period.

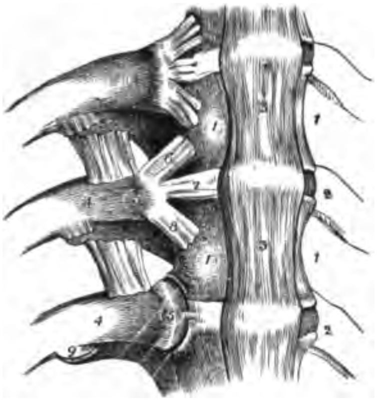


Fig. 2.—A Front View of the Articulations of the Ribs with the Spinal Column:

1, 1, dorsal vertebræ; 2, 2, intervertebral cartilages; 3, 3, anterior common ligament; 4, neck, and 5 head of rib; 6, 7, 8, flat bundles of ligamentous fibres (removed in the lowest rib, shown in the figure); 9, articulation between the tubercle of the ribs and the transverse vertebral process.

In the language of the comparative anatomist, a rib is to be regarded as a *Pleurapophysis*—one of the elements of a typical Vertebra.

Fracture of the Ribs is a very common surgical accident, resulting from blows or falls upon the chest. Ribs may, moreover, be broken by mere pressure, as when persons are severely crushed in a crowd; and instances are on record in which, in the case of aged persons, the ribs have been actually fractured in violent coughing. The treatment consists in the application of a broad flannel roller round the chest, so tightly as to prevent, as far as possible, all movement of the ribs, and to render the respiration abdominal rather than thoracic. The bandage must be prevented from falling by the addition of shoulder-straps; and in order to prevent the shoulder-blade from moving, and thus disturbing the broken ribs, some surgeons confine the arms to the side of the body. If one or both of the extremities of the fractured rib should perforate both layers of the pleura and wound the lung, or in rare cases when only the parietal layer of the pleura is injured, if the skin is also perforated, air may escape in the act of inspiration from the lung or from the exterior into the pleural cavity, and thence through the wound in the costal pleura into the cellular or areolar tissue of the trunk, giving rise to Emphysema (q.v.), in the form of a soft puffy swelling that crepitates and yields on pressure.

Ricardo, David, an eminent political economist, was born in London, 19th April 1772. His father was a Jew, a member of the Stock Exchange, and brought up his son to the same business. An alienation took place between them, when in 1793 young Ricardo married out of the Jewish persuasion and conformed to the Christian religion. He continued, however, to follow his father's profession with such success that at a very early age he realised a large fortune, while preserving an honourable reputation throughout his career in business.

In 1799 Ricardo had his interest in political economy awakened by the perusal of Smith's *Wealth of Nations.* His experience had well fitted him for the treatment of the special class of economic questions connected with banking and finance, and it was in the discussion of them that he first made his mark. In 1809 he brought out a pamphlet entitled *The High Price of Bullion a Proof of the Depreciation of Bank-notes.* As the title indicates, it was an argument in favour of a metallic basis. Other successful pamphlets followed. In 1817 appeared the work on which his reputation as an economist chiefly rests, *On the Principles of Political Economy and Taxation.* It is not a complete treatise on political economy, but may be described as a discussion of some of the principal factors of the science, such as value, wages, rent, &c. Ricardo is the conspicuous example of the abstract method of political economy. He was very deficient in the philosophic and historical training necessary for the wider investigation of economics. He approached the subject as a member of the Stock Exchange; and the economic conditions which he contemplated were those prevalent in his own day in England and in countries similarly situated, and particularly in the city of London. The main gist of his work is to embody economic principles in formulas, which for the most part have a general validity relative to the limited conditions which he thus recognised. His theories of Rent (q.v.) and of Wages (q.v.) have a general truth when regarded in this way; but when considered from a wider historical and philosophic standpoint they shrink greatly in significance. His theory of Value (q.v.) is still more defective.

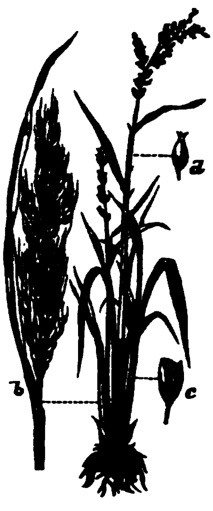
In 1819 Ricardo entered parliament as member for Portarlington, and retained his seat till his death at Gatcomb Park, Gloucestershire, on 11th September 1823. He was too diffident to be an effective speaker, but his speeches, especially on matters of trade and finance, which he had made particularly his own, always commanded respect, and had a very considerable influence. Personally he was highly esteemed. His method in political economy is now almost universally abandoned. Even the strongest supporters of the traditionary doctrines acknowledge that the value of his formulas have been greatly overrated, and must undergo continual limitation, modification, and correction in the light of experience and of historic conditions. Yet his theories are eminently worthy of study, both as a phase in the development of economic science, and as illustrating a stage in the development of economic facts. The collected works of Ricardo were edited by M'Culloch (1846), and his *Letters to Malthus* were published in 1887.

Ricasoli, BARON BETTINO, Italian statesman, was born at Florence, 9th March 1809, and studied at Pisa and Florence. He was one of the best agriculturists in Italy, wrote books on the cultivation of the vine, the olive, and the mulberry, and for ten years worked successfully at the drainage of the Tuscan Maremma (q.v.). In 1859 he took a prominent part in opposing the government of the grand-duke (see ITALY), and when the latter fled Ricasoli was made dictator of Tuscany. He laboured with great energy for the unity of Italy, and when that end was accomplished was by Victor Emmanuel appointed governor-general of Tuscany. On the death of Cavour (1861) he was called to the head of the ministry; but his government was undermined by Rattazzi, and he resigned in March 1862. Ricasoli returned to power in June 1866, but was again obliged to retire in April of the following year. At the same time he withdrew altogether from public life; he died in Rome, 23d October 1880. Five volumes of his *Letters and Papers* were published by Tabarrini and Gotti at Florence in 1886–89.

Ricci, MATTEO, founder of the Jesuit missions in China, was born at Macerata, 6th October 1552, studied at Rome, and in 1583 obtained leave to settle at Chow-king. He made his headquarters at Nanking, but was ultimately allowed to remove to Peking, where he built a church. He so mastered Chinese as to write dialogues and other treatises which received much commendation from the Chinese literati, and met with extraordinary success as a missionary. At his death, 11th May 1610, he was universally mourned. See JESUITS, Vol. VI. p. 314.

Riccio, or RIZZIO, DAVID. See MARY QUEEN OF SCOTS.

Rice (*Oryza*), a genus of grasses, having panicles of one-flowered spikelets, with two very small pointed glumes, the florets compressed, the paleæ strongly nerved, awned or awnless, six stamens, one germen, and two feathery stigmas. The Greek name *oryza* is, according to Skeat, from an old Persian word akin to the Sanskrit *vrîhi*, a word which passed into Arabic as *uruz* or *aruzz*, whence the Spanish form *arroz*. The only important species is the Common Rice (*O. sativa*), one of the most useful and extensively cultivated of all grains, supplying the principal food of nearly one-third of the human race. It seems to be originally a native of the East Indies, but is now cultivated in all quarters of the globe, and almost wherever the conditions of warmth and moisture are suitable. It is adapted to tropical and subtropical climates, rather to the latter than the former; and requires much moisture, rather, however, in the soil than in the air. Rice is an annual, varying from 1 to 6 feet in height. There are many other distinguishing characters of the varieties in cultivation, some having long awns and some being awnless, some having the chaff (*paleæ*), when ripe, yellow, white, red, black, &c. The seed or grain of rice grows on little separate stalks springing from the main stalk; and the whole appearance of the plant, when the grain is ripe, may be said to be intermediate between that of barley and of oats. Rice requires a moist soil, sometimes flooded; and the cultivation has in many places been attended with an increase of intermittent fevers and of general unhealthiness, the rice-fields being artificially flooded at certain seasons. In some parts of the East canals are carried along the sides of hills for the irrigation of land for the cultivation of rice. In South Carolina rice is sown in rows in the bottom of trenches, which are about 18 inches apart; the trenches are filled with water to the depth of several inches, till the seeds germinate; then the water is drawn off, and afterwards the fields are again flooded for rather more than a fortnight to kill weeds. They are flooded again when the grain is near ripening. In Europe the cultivation of rice is most extensively carried on in the plains of Lombardy and in Valencia in Spain. Marshy situations, where there is always the same abundance of water, are not so suitable for rice as those in which the supply of water is regulated according to the season and the growth of the plant. The best of all rice known in the market for size and quality is that of Carolina, yet the introduction of rice into the United States took place only about the middle or close of the 17th century; for the date has been disputed, 1694 being the earliest year in which it is known to have been grown. Rice in the husk is called *Paddy* in India.



Rice (*Oryza sativa*): *b*, a panicle in seed; *c*, a flower; *d*, a seed.

The wild rice, plentiful in the marshy tropical countries of southern Asia as well as in northern Australia, is without doubt the plant from which all our forms of cultivated rice have been derived. Most modern authorities regard India as the first home of rice, though some say it was originally derived from China. It has been cultivated in India from time immemorial. At the Calcutta Exhibition of 1884, 4000 apparently distinct forms of Bengal rice were shown, arising from differences of climate and varieties of soil. There are 1400 different specimens of rice in the Calcutta Museum. There are as many as 1300 names of rice, and though very many of these are merely local synonyms, a large number unquestionably correspond to intrinsic and seasonal distinctions. The obvious differences in the grain itself are indeed very remarkable. In colour the specimens range from a bright golden hue through almost every gradation of tint to black; and in regard to size also they vary greatly. But all these forms of rice are referable to a very few well-marked and constant varieties of *O. sativa*, the result of seminal variation commonly observed in plants that have been long brought under cultivation. The rice exported from India is divided broadly into three qualities—(1) table rice; (2) ballam, named after the boats in which it is carried; and (3) moonghy, common or inferior rice. Cargo rice is that in which only one part in five is husked. In British India there are more than 60 million acres under rice; in Ceylon, 605,000 acres; and in Cochin-China, 2 million acres. It is also extensively grown in Siam, China, Japan, Java, Egypt, and Brazil. In 1890 India exported 34,500,000 cwt.; China, 9,500,000 cwt.; Japan, 4,000,000 cwt. The produce in the United States has fluctuated much. In 1860 it was 187,140,173 lb.; in 1870, 73,635,071; in 1880, 110,131,173. In 1890, 388,912 lb. were exported, and 113,308,571 lb. were imported. After South Carolina the principal rice-growing states are Georgia and Louisiana. Great Britain imports about 6,000,000 tons annually, mainly from Burma; of this half is re-exported.

In China rice is generally sown pretty thickly on very wet land, and afterwards transplanted to the land which it is finally to occupy. The plants *tiller* or spread at the root very much, so that each sends up several or many stalks. The rice-grounds are carefully kept clear of weeds, although often so wet that a man cannot walk in them without sinking to the knees. In many parts of China and in other warm countries it is common to obtain two crops of rice in a year.

Rice is husked and quickly dried before being brought to market. Special milling machinery is required for removing the inner skin of the rice grain, and a large quantity of the grain is badly broken in the process, being saleable only as broken rice or rice flour. Good Indian rice has the following composition: Moisture, 13·50 per cent.; nitrogenous matter, 7·41; starch, 78·10; fatty or oily matter, 0·40; ash, 0·59. Rice contains a smaller amount of nitrogenous elements than any other grain (wheat having as much as 22 per cent.); it is also deficient in fatty matter, and if taken by itself is less nutritious than other grain-food (see FOOD, Vol. IV. p. 719); but combined with fatty nitrogenous substances it is a valuable food-stuff. It is believed to furnish more food for man than any other grain, especially in Chinese regions; but it is not, as is commonly supposed, the chief food-supply of India, where, save in certain favoured areas, millet is the principal food-stuff. Ground rice is in great demand for puddings; and preparations of rice flour under such names as rizine, &c., are familiar. Owing to the small quantity of gluten which it contains, it is capable by itself only of an imperfect fermentation, and is unfit for being baked into bread. It is, however, subjected to fermentation, by help of added ferments of various kinds, in many countries. The beer made from rice by the Japanese is called *Saki*, and is in general use among them. Several kinds of *Rice wine* are made by the Chinese and Japanese, some of them highly esteemed and very intoxicating; spirit is distilled from the lees. Some of the common Arrack (q.v.) of the East is made from rice; and rice is also largely employed by distillers in Britain.

Rice Starch is made in considerable quantity in Britain, and is used in laundries and muslin manufactories. It has one-fourth more starch in its composition than wheat, hence the preference given to it by starch makers, both from its cheapness and larger yield. The straw of rice is used to make straw-plait for bonnets and the straw shoes of Japan. The refuse of rice, which remains when it is cleaned for the market, and consists of the husk, broken grains, and dust, is valuable as food for cattle. It is known as *Rice-meal* and *Rice-dust*.

Canada Rice (*Zizania aquatica*), the Wild Rice or Indian Rice of North America, is a species of grass quite different from the true rice, and of a different genus. It is common in North America, and particularly abundant in the north-western parts, growing in miry places or shallow water, often on the margins of lakes. It has a culm 7 to 8 feet high, with broad diffuse leaves, and a large terminal panicle of male flowers, with a spike of female flowers at the summit. The flowers have six stamens. The seeds are about half an inch long, slender, farinaceous, affording very good meal, and are much used by the Indians where the plant abounds.

Rice, JAMES, novelist, for nine years *collaborateur* with Mr Walter Besant (q.v.), was born at Northampton in 1844, studied at Cambridge, drifted from law into literature, and became proprietor and editor of *Once a Week*. He died in London, 25th April 1882.

Rice-bird, a name given to the Bob-o-link (q.v.), as also to a popular cage-bird, the so-called Java Sparrow (*Padda oryzivora*), really a kind of finch.

Rice-paper, a paper made in China with layers of *Fatsia* (*Aralia*) *papyrifera*, a tree peculiar to the island of Formosa. The pith is sometimes 1 to 1½ inch in diameter. By carefully cutting this pith spirally with a very sharp knife it is opened out into a sheet of snowy whiteness. When the curl has been removed by weighting, or by flattening in a press, it is ready for use. The largest sheets cut are 10 by 15 inches. It is chiefly used for making coloured drawings on. When dyed it can be made into the most perfect artificial flowers, more natural than can be produced from any other paper or fabric.

Rich, EDMUND. See EDMUND (ST).

Richard I., king of England, surnamed CŒUR DE LION, was the third son of King Henry II. and his wife Eleanor of Aquitaine. He was born on 8th September 1157, either at Oxford or at Woodstock, but was brought up amongst the knights and troubadours of Poitou, in Aquitaine, with which duchy, his mother's patrimony, he was whilst still a child invested by his father. In England Richard did not spend in all his life a full twelvemonth; after he became king he spent only twenty-six weeks in his kingdom, seventeen weeks when he landed to take the crown and to go through the coronation ceremony at Westminster, and nine weeks when he came back from his imprisonment. It may indeed reasonably be doubted whether he could speak English. A favourite of his unprincipled mother, he was induced by her to join his brothers Henry and Geoffrey in their rebellion (1173) against their father (see HENRY II.). Henry II. had his eldest son, Prince Henry, crowned king as his successor during his own lifetime; and in 1183 he ordered that his younger brothers should do homage to him. Richard obeyed with the greatest reluctance; thereupon the ungrateful Prince Henry at once picked a quarrel with him, and marched an army into his duchy of Aquitaine. King Henry hastened to the assistance of the young duke, whilst the other brother Geoffrey sided with the prince. But the sudden sickness and death of the ingrate put an end to the quarrel. In the spring of 1189 Richard was in his turn in arms against his father. Philip of France, the pertinacious foeman of King Henry, mingled in the strife; and eventually Richard joined forces with his father's enemy, did homage to him, and took the field against the old king. A reconciliation was rendered more difficult because of Richard's jealousy of John, his father's favourite.

Richard became king of England, Duke of Normandy, and Count of Anjou on 5th July 1189, and was crowned king of England on 3d September following. But he had already taken the vows of the crusader; and, besides his coronation, he had another object in coming to England: he wanted to raise funds for his crusade. He effected this latter purpose in a brief space of time by selling whatever he could get a purchaser for. About midsummer 1190 he met Philip of France at the rendezvous, Vezelai in France; but from Lyons he made his way by a different route from Philip to Messina in Sicily. Both kings spent the winter at that city, and their mutual jealousy came within a hair's-breadth of a rupture. The throne of Sicily had just been seized by the Norman Tancred, an illegitimate son of King Roger, though the lawful heir was Henry of Hohenstaufen, son of Frederick Barbarossa, and afterwards the Emperor Henry VI. Moreover, Tancred detained in custody Johanna, widow of the late king (William the Good) and sister of Richard I., together with her very large dowry. But he made his peace with Richard by giving up to him his sister and her possessions, and by betrothing his little daughter to the boy Arthur (son of Richard's dead brother Geoffrey), whom Richard now declared to be his heir. On his way to Palestine in the spring of 1191, part of the fleet of the English king was driven on to the island of Cyprus, and the crews were most inhospitably treated by the reigning sovereign, Isaac Comnenus, a nephew of the emperor of Byzantium, who had revolted from his liege lord. Richard sailed back from Rhodes, routed Isaac in battle, deposed him, and gave his crown to Guy of Lusignan. In Cyprus, too, he married Berengaria of Navarre, whom his mother had brought to him at Messina. At last, on 8th June, the English king landed near Acre, and shortly afterwards that stronghold surrendered, the siege having lasted two years. Richard took his full share of the jealousies, animosities, and disagreements, though not of the treacheries, that made the Christian crusading host a hotbed of commotion. The glorious exploits of Richard the Lion-hearted—his march to Joppa along the seashore, his approach upon Jerusalem at Christmas, his capture of the fortresses in the south of Palestine, his second advance in the summer of 1192 on Jerusalem (the city he never beheld), and his relief of Joppa—made his name ring throughout the East and excited the wonder and admiration of Christendom, but brought no real advantage to the crusading cause. Richard in September concluded a peace with Saladin for three years, three months, and three days, and in his impulsive, impatient way started off home alone, without waiting for his army and fleet. A storm shipwrecked him near the north end of the Adriatic. In disguise he began to make his way through the dominions of his bitter enemy, the Archduke of Austria. He was recognised, seized, and handed over to the Emperor Henry VI. (March 1193). The emperor demanded a heavy ransom for his release, but promised to give him the kingdom of Arles in addition to his liberty. Richard's loyal subjects raised the money; and greatly to the chagrin of Philip of France and Richard's brother John, the captive king returned home (13th March 1194). In England in the meantime Longchamp (q.v.) had made himself so unpopular that Richard had been obliged to supersede him, appointing in his place Walter of Coutances, Archbishop of Rouen. It was John, however, who exercised the greatest power in the realm. And although he used his utmost endeavours to prevent Richard's return from his captivity, yet Richard generously forgave him. After distributing judicious rewards and punishments, raising what money he could, making arrangements for the governance of the kingdom, and being crowned again—the emperor is said to have forced his captive to resign his crown and take it back as a fief of the empire—Richard proceeded to France, and spent the rest of his life there, warring against Philip. England was governed in his absence by Hubert Walter, Archbishop of Canterbury, who by the measures he took to raise the vast sums demanded by his master trained the English people in habits of self-government. The most important constitutional advances made under Hubert's rule were the formulation of the methods for electing the county grand juries and an arrangement for keeping the pleas of the crown by officers who may be regarded as the forerunners of the modern coroner. Richard was shot, on 7th April 1199, by an archer of the Viscount of Limoges, whilst besieging that nobleman's castle of Chalus-Chabrol, and was buried in the abbey church of Fontevraud.

Richard cannot be called a good king; his only thought of his subjects was how to get money from them. He was not a faithful husband; he was an undutiful son. Yet, on the other hand, he treated his perfidious brother John in the most forgiving spirit, and was not incapable of noble and generous acts. His impulsive, hot-headed temperament made him at times cruel, but never vindictive. He was an adventurer, with a passionate love for contention and strife; he fought for warlike glory, not for victory or real advantage; he had all the personal courage and self-confidence of the born warrior; and a very large share of that careless indifference or magnanimity that is frequently associated with a bold and self-reliant character. In matters of dress and ceremony he loved magnificence, and was both ostentatious and extravagant. In person he was tall and ruddy, very skilful in the use of his weapons, and possessed of great personal strength. A fair scholar, he also had the knack of writing verses, and has been called a poet.

See BLONDEL; Stubbs' *Constitutional History* (vol. i.) and *The Early Plantagenets* (1876). Richard is the hero of Scott's *Talisman*, and figures also largely in *Ivanhoe*.

Richard II., king of England, the son of the Black Prince and Joanna of Kent, was born at Bordeaux on 13th April 1366, was acknowledged by parliament heir to the crown on the death of his father in 1376, and succeeded his grandfather, Edward III., on 21st June 1377. The government was entrusted to a council of twelve, from which the king's uncles, John of Gaunt, Duke of Lancaster, Edmund, Earl of Cambridge, and Thomas, Earl of Buckingham (afterwards Duke of Gloucester), were excluded. Nevertheless the central figure during the early years of this reign, as he had been during the last years of the preceding reign, was John of Gaunt, whose overreaching ambition and inability were a fruitful source of disquietude. He was on bad terms with the clergy and with the Londoners, and was viewed with great suspicion by the king and the commons; yet he was the most powerful man in the kingdom, having at his back the nobles and to some extent the Lollards. War was going on with France, but in a very weak and desultory fashion; the French ravaged the south coast at the time of Edward III.'s death, and truces were constantly being made for short durations. But this war cost money; so too did the extravagance of the court; and more was absorbed or wasted by the government, for which John of Gaunt was held by the nation at large to be mainly responsible. Consequently taxation was heavy. The imposition of a graduated poll-tax in 1380 provoked popular risings, directed principally against the gentry and landholders, in nearly all parts of the kingdom, at Whitsuntide in the following year. The insurgents destroyed the parks, attacked the manor houses, burned the court-rolls, and massacred the lawyers who had charge of them. The men of Essex and Kent, to the number of 100,000, marched upon London. The former body, whom the king met at Mile End on 14th June, consented to return home when the young monarch assured them he would grant their requests, and take measures to liberate the villeins from bondage and to commute their personal services into fixed money rents. The men of Kent, after destroying the Savoy (the Duke of Lancaster's palace), burning Temple Bar, opening the prisons, and breaking into the Tower and slaying the Archbishop of Canterbury, met the king at Smithfield (15th). During the negotiations, William Walworth, the mayor of London, struck down Wat Tyler (q.v.), the leader of the insurgents. The king immediately rode amongst them, exclaiming he would be their leader, and granted them the concessions they asked. The risings in the other counties speedily collapsed when the people learned what the king had done; but during the autumn severe punishment overtook them. Seven thousand in all are said to have perished in the fighting and on the scaffold. The causes of this wide-spread and simultaneous uprising on the part of the mass of the rural population may be summarised as follows: there had been long continuance of heavy taxation; the villeins resented the reimposition since the Black Death of personal services, and were anxious to become tenants of their little farms at a fixed rental; the free tillers of the soil had formed themselves into associations to defeat the Statute of Labourers (1349), which fixed the maximum and minimum of wages; the Lollard or Wyclifite preachers were denouncing the idleness and vices of the regular clergy, and they and others (as John Ball) were promulgating social doctrines calculated to make the common people discontented with their lot and hostile to the landholders; the country clergy complained of the tyranny of the church; the mismanagement of the war, and the incapacity and selfishness of the court party provoked much discontent; there were many discharged soldiers in the country; and moral and religious feeling were sunk to a low ebb. From the fact that the insurgents directed their enmity against himself and the advisers of the king, John of Gaunt saw that he could never hope to succeed in his ambitious schemes in England; and from this time he kept very much in the background, until in 1386 he carried himself and his restless plottings to Spain and Gascony. Richard in 1390 made him Duke of Aquitaine for life. In 1385 Richard invaded Scotland, and took Edinburgh and burned it; but, not encountering the Scots, returned home. About the same year another coalition of the baronial party, headed by Thomas of Woodstock, Duke of Gloucester, began to oppose the king and his chosen friends. They impeached several of them before the Merciless Parliament (1388), and secured convictions and executions. But on 3d May 1389 Richard suddenly declared himself of age, and proceeded to govern on his own responsibility. For eight years he ruled as a moderate constitutional monarch, and the country enjoyed peace—hostilities with France were not renewed after 1388—and was fairly prosperous. But in 1394 Richard's first wife, Anne of Bohemia, whom he had wedded in 1382, died, and two years later he married Isabella, daughter of Charles VI. of France, a girl of eight. From that time he seems to have adopted very largely French tastes, manners, and ideas. At all events, in the parliament of 1397 he began to assert the pretensions of an absolute monarch. On 8th July he had Gloucester, Arundel, and Warwick arrested on the charge of conspiring against the crown. Arundel was beheaded; Gloucester was sent a prisoner to Calais, and died there in prison, probably murdered, a fortnight after his arrest; and Warwick was banished to the Isle of Man. Thomas Arundel, Archbishop of Canterbury, was also banished. In the following year an obsequious parliament granted to the king the subsidy on wool for life, and delegated all its authority and power to a commission of eighteen members, all supporters of the king. Richard soon aroused the slumbering discontent of his subjects by his unjust methods of raising money, principally by means of forced loans, and by his arbitrary and despotic rule. In the beginning of 1398 the Duke of Norfolk and the Duke of Hereford (Henry, son of John of Gaunt) were accused to the king of having spoken treason against him. Richard banished them—Norfolk for life and Hereford for ten years. In January 1399 John of Gaunt died, and Hereford succeeded him as Duke of Lancaster; but the king refused to give up to the exile the lands of his dead father. Richard in May went over to Ireland, which he had previously visited at the head of a military expedition in 1394–95. Henry of Lancaster seized upon the opportunity afforded by the king's absence, and landed on 4th July (see Henry IV.). Richard at once hurried back, but had neither heart nor power to withstand his cousin. He submitted to Lancaster at Flint (19th August), was carried to London, and placed in the Tower. On 29th September he resigned the crown, and on the following day was likewise deposed by the parliament, which chose Henry of Lancaster as his successor. A month after his resignation Richard was condemned to perpetual imprisonment by parliament. His fate is wrapped in obscurity, beyond the almost certain fact that he met a violent death, for which it is not altogether clear that Henry IV. was responsible. A month after Henry's accession some noblemen of Richard's party formed a conspiracy to restore Richard to the throne, but their purpose was discovered. No doubt this decided the fate of Richard; at all events, authentic history knows nothing more about him from this time. According to different accounts, either he was murdered in Pontefract Castle, or he starved himself to death, or he escaped to Scotland and died there a lunatic. By nature he seems to have been passionate, impulsive, and excitable; but though capable of bold and energetic action on occasion, his habitual mood was one of indolence. He had a good insight into men's characters; but suffered himself to be influenced by those about him, and generally lacked the will and the steadfast resoluteness to act up to his own better judgment.

See *The Houses of Lancaster and York*, by J. Gairdner (1874), in 'Epochs of Modern History;' Stubbs' *Constitutional History* (vols. ii. and iii.); and read Shakespeare's historical drama *Richard II.*

Richard III., king of England, was the son of Richard, Duke of York, a descendant of Edmund, Duke of York, fifth son of Edward III., and was born, the eleventh out of twelve children, in Fotheringhay Castle on 2d October 1452. After the defeat and death of his father in 1460 he was sent, along with his brother George, to Utrecht for safety, but returned to England after his eldest brother Edward won the crown (1461). Two years later he was created Duke of Gloucester, his brother George being made Duke of Clarence. In the final struggle between the York and Lancaster factions he took an active share: he led the van at the battle of Barnet, rendered valuable aid in winning the fight of Tewkesbury, and is believed, on fairly good evidence, to have had a hand in the murder of Prince Edward, son of Henry VI., who was slain after that battle. All through the reign of Edward IV. he gave valuable and faithful support to his brother, and was rewarded by him with every confidence, and with numerous high offices. He was believed to have been concerned in the murder of Henry VI. in the Tower on 21st May 1471; but the evidence, although strongly pointing in that direction, is not conclusive. In the following year he married Anne, the younger daughter of Warwick the King-maker, who had been betrothed to the murdered Prince Edward. This alliance was greatly resented by Clarence, who had married the elder sister, and wished to keep all of Warwick's vast possessions in his own hands. Clarence quarrelled too with King Edward, who in 1478 procured his impeachment by parliament. The refractory duke was put to death privately in the Tower on 18th February. Of this judicial murder Gloucester is likewise accused; but the evidence for his complicity is very slight. In 1482 he was put in command of the army that invaded Scotland. Along with the Duke of Albany he entered Edinburgh; but his one warlike achievement was the capture of Berwick town and castle. In the following year, whilst still in Yorkshire, he heard of King Edward's death (9th April), and learned that he himself had been named guardian and protector of his son and heir, Edward V., then aged thirteen. On his way south the Protector arrested Earl Rivers and Lord Richard Grey, the uncle and step-brother of the young king, and confined them in his northern castles. All who were of the old nobility, and resented the rise of the Woodvilles, rallied round Richard. Whether this accession of strength first suggested to him the idea of making himself king, or whether he had conceived it before, cannot of course be known; but certain it is that from this time Richard of Gloucester schemed for the crown, and by craft, boldness, and utter unscrupulousness carried his project into execution.

The arrest of Rivers and Grey had put the king entirely into his hands, for the queen-mother had hastened to take sanctuary at Westminster. On 13th June Gloucester suddenly accused Lord Hastings, an influential member of the council, of treason, arrested him there and then, and had him instantly beheaded. The 'crime' for which Hastings died was changing sides from Richard to the Woodville party. On 16th June the queen-dowager was induced to give up, at the demand of Richard and the council, her other son, the little Duke of York. He was put into the Tower to keep his brother, the king, company. On the Sunday following (22d) a certain Dr Shaw preached at St Paul's cross that the children of Edward IV. were illegitimate, nay, that Edward IV. himself and his brother Clarence were both born out of lawful wedlock. Three days later the parliament desired Richard to assume the crown; on the next day (26th June 1483) he declared himself king, and on 6th July was crowned in state by Cardinal Bourchier. Rivers and Grey were executed at Pontefract on 25th June. In point of *form* Richard was a duly elected king, and Edward V. had not yet been crowned; all the same, his accession was *de facto* a usurpation. Richard's principal supporter all through, from the date of Edward IV.'s death, had been the Duke of Buckingham, a descendant of the Duke of Gloucester who was privily slain at Calais when Richard II. was king. Shortly after his coronation Richard set out on a tour through the kingdom, and during the course of it he was surprised by the intelligence that Buckingham was plotting with the friends of Henry Tudor, Earl of Richmond (afterwards Henry VII.), the chief representative of the House of Lancaster, to effect his overthrow and proclaim Henry king. But the attempted rising soon collapsed, and Buckingham was taken, and on 2d November executed. It seems to have been shortly before this that Richard contrived the foul crime that has branded his name with infamy, and that caused himself inextinguishable remorse to the day of his death—the murder of his nephews in the Tower. The deed was done so secretly, by Sir James Tyrrell, one of Richard's devoted followers, and a couple of hirelings, that the nation did not know of it until some time after (see EDWARD V.). Indeed, the very fact of their murder has been seriously called in question, though not until much later times. But from the days of Richard himself he was popularly believed to have effected his nephews' destruction, and evidence supports the popular opinion. During the remainder of his short reign Richard directed all his energies to baffling the plans of Richmond, and to making preparations to meet the invasion which he saw to be imminent. But he was rapidly losing his hold upon the nation, alarming and horrifying it by his crimes and tyrannous acts. Henry of Richmond at length landed at Milford Haven on 7th August 1485. Richard met him at Bosworth in Leicestershire on the 22d, and there lost his kingdom and his life, fighting bravely like a king, crown on head, in the midst of his foes (see HENRY VII.). The body of the slain king was subjected to great indignities, carried to Leicester, and there, after being exposed for two days, was buried in the Grey Friars churchyard.

Richard's was a strangely mixed character. Its ruling passion was an inordinate craving for power, to gratify which he stopped at no crime, however heinous. He possessed many of the typical qualities of the best of the Plantagenets—a skilful soldier, of great ability and energy, brave, bold, reckless of consequences, fond of display, yet not incapable of nobler impulses. Had he been born the lawful heir to the throne, and succeeded to it peacefully, he would probably have been a great king; for he was a very capable ruler, aiming at the real welfare of his subjects, promoting justice, and furthering religion and morality. Yet circumstances, conflicting with his insatiable ambition, helped the evil tendencies of his nature to get the upper hand; and these grew and hardened as time went on, till his audacity and unscrupulousness were matched with a cunning and hypocrisy such as are seldom found united in one man. On the other hand, he unquestionably had great charm of manner, and knew how to inspire confidence even in those who had the best reasons for distrusting him. He was liberal too, and, where his own personal ambition was not directly concerned, just and generous. He was also swayed by a lively sense of divine justice; and more than one religious institution owed its foundation to his bitter remorse for the murder of his nephews. Most of his subjects and contemporaries looked upon him as a monster of wickedness; others, however, cherished his memory as that of a wise and good ruler. The real man was probably not quite so black as the Lancastrian (Tudor) chroniclers have painted him, though their portrait is probably fairly accurate in its broad features. In person Richard was short of stature and slight of build, with one shoulder slightly higher than the other; but there is no evidence that he was a hunchback. His face was thin and intelligent, and in portraits wears a look of sadness.

The best biography is James Gairdner's *Life and Reign of Richard III.* (2d ed. 1879). Attempts to defend his memory from some of the foul crimes laid to his charge have been made by Horace Walpole, *Historic Doubts on the Life and Reign of Richard III.* (1768); J. H. Jesse, *Memoirs of King Richard III.* (1862); A. O. Legge, *The Unpopular King* (2 vols. 1885); and C. R. Markham, in *English Historical Review* (1891). None of them can be said to have been successful in making Richard out a good man or a good king. Sir T. More's *History of King Richard III.* (1513), though highly coloured and antagonistic, is full of interest and vivid pictures of the king. *The Paston Letters*, ed. by J. Gairdner (1872-75), convey a good impression of the life and manners of the period. Shakespeare's drama gives the popular idea of Richard.

Richard de Bury. See AUNGERVILLE.

Richard of Cirencester, an early English chronicler, whose life falls between 1335 and 1401. His name is found in 1355 in the list of monks of the Benedictine monastery of St Peter, Westminster. In 1391 he obtained a license from his abbot to visit Rome, and he died in 1401. The only known work of his extant is a poor compilation in four books, the *Speculum Historiale de Gestis Regum Angliæ 447–1066*, edited for the Rolls series by Professor J. E. B. Mayor (2 vols. 1863–69). It is of some independent value for the history of Westminster Abbey and Edward the Confessor. But Richard's name is best known in connection with the notorious forgery, *De Situ Britanniæ*, long accepted, to the serious detriment of history, as an authoritative work on the antiquities of Roman Britain. This work was first printed in 1758 by its ingenious author, Charles Julius Bertram (1723–65), teacher of English in the naval cadets' school at Copenhagen, who professed to have discovered it in the Royal Library there. In the same volume were included the works of Gildas and Nennius, the title of the whole being *Britannicarum Gentium Historiæ Antiquæ Scriptores tres, Ricardus Corinensis, Gildas Badonicus, Nennius Banchorensis.* A new edition of the treatise, with an English translation, appeared at London in 1849; a reprint forms one of the 'Six Old English Chronicles' in Bohn's 'Antiquarian Library' (1848). Dr William Stukeley, with whom Bertram had corresponded since 1747, received the book warmly on its appearance; Gibbon commends 'a genuine knowledge of antiquity very extraordinary for a monk of the 14th century;' all the historians, even Lingard and Lappenberg, trusted it; and even so late as 1886 we find it gravely treated as an authority in a work by James Grant on the *Tartans of the Clans of Scotland.* Some later scholars, such as Guest, had doubted, if not condemned it, but its authenticity received its death-blow in the series of papers contributed to the *Gentleman's Magazine* (1866–67) by Mr Woodward, librarian of Windsor Castle. Again in Professor Mayor's preface the various sources of the forgery are elaborately set forth, and everything satisfactorily accounted for but the credulity of its dupes.

Richard of Cornwall, second son of John, king of England, was born on 5th January 1209. In 1225-26 he and his uncle, William of Salisbury, commanded an expedition which recovered Gascony, and the next year he received Cornwall, as the result of a rising of the earls to compel the king (Henry III.) to make provision for him. He managed his money matters well, and his wealth, as well as his prudence, saved Henry in many an impending crisis. For some years he acted with the English barons, to many of whom he was closely related by his marriage with Isabel, Countess of Gloucester, daughter of the Earl of Pembroke. In 1232 he was one of the leaders in the opposition to Hubert de Burgh; and in 1238 he headed an armed rising provoked by the king's secret marriage of his sister to Simon de Montfort. But Richard was still heir to the throne, and the articles which Henry was prepared to sign, and which dismissed his foreign advisers, appeared to the earl to bind the king's hands too closely, and he drew back. In 1240–41 Richard was away on a crusade, and the next year he was with his brother in Gascony; and in 1244 he married Sanchia of Provence, sister of Queen Eleanor, and this second marriage drew him away from the baronage. In 1252 he refused the pope's offer to sell him the crown of Sicily; but in 1257 he was elected by a majority titular king of the Romans, and was soon afterwards crowned at Aix-la-Chapelle; and he was skilful enough to maintain a certain hold on Germany, lavishing his wealth to maintain his own position and the dignity of the empire. In the great struggle which took place between Henry III. and his nobles Richard at first acted as a peacemaker. Subsequently, however, he sided with his brother against Simon de Montfort; and he was taken prisoner at Lewes, and imprisoned for a year, until the battle of Evesham (1265) set him free. In 1267 he was a third time married, to Beatrice, niece of the Elector of Cologne. Richard died at Kirkham, 12th December 1271, broken-hearted at the loss of his eldest son, Henry, who was murdered at Viterbo by the Montforts, and immortalised by Dante. Two other sons died also without issue.

Richards, BRINLEY, pianist and composer, was born at Carmarthen in Wales in 1819, the son of a church organist. He began to study music at the Royal Academy in London about 1835, and on the completion of his studies soon won a good position in London as a pianist and teacher of music. He was for many years a professor of the Royal Academy. His compositions for sacred and part songs and for the pianoforte won great popularity, especially his 'God Bless the Prince of Wales.' Richards bestowed much attention upon the study and encouragement of Welsh music. He died on 1st May 1885.

Richardson, SIR BENJAMIN WARD, M.D., LL.D., F.R.S., physician, author, and inventor, was born at Somerby, Leicestershire, 31st October 1828. He studied at Anderson's College, Glasgow, took the diploma in 1850 of the faculty of Physicians and Surgeons, and graduated in medicine at St Andrews in 1854. He was a frequent contributor to the *Medical Times and Gazette*, and gained the Fothergillian gold medal for an essay on 'Diseases of the Fœtus in Utero,' and the Astley-Cooper prize of 300 guineas in 1856 for an essay on the 'Coagulation of the Blood.' Dr Richardson's medical inventions include a double-valve inhaler for chloroform, an ether spray tube, apparatus for embalming, a mask for workers in dust, a lethal chamber for painless extinction of the life of lower animals, &c. He has tried various new anæsthetics, and discovered the controlling influence of nitrite of amyl over tetanus. He has written and lectured on total abstinence, public health, and many medical and scientific subjects, and popularised many facts in sanitary science. He founded the *Journal of Public Health* in 1855 and the *Social Science Review* in 1862, and a quarterly journal, entirely written by himself, *The Asclepiad*, in 1861 and 1884 onwards. In 1868 he was presented with 1000 guineas and a microscope by 600 of his medical brethren and friends 'in recognition of his various contributions to science and medicine.' He was knighted in 1893.

His published works and essays are numerous, including *Cause of the Coagulation of the Blood* (1856); *Alcohol, its Action and its Use* (1869); *Cantor Lectures on Alcohol* (1875); *Hygeia, A Model City of Health* (1876); *Diseases of Modern Life* (1876); *Moderate Drinking* (1879); *A Review of the Life and Work of Edwin Chadwick* (2 vols. 1887); *Common Health* (1887); *National Health* (1890); *Life of Sopwith* (1891).

Richardson, CHARLES, lexicographer, was born in July 1775, studied law, kept school at Clapham, received in 1852 a pension of £75, and died October 6, 1865. His first work, *Illustrations of English Philology* (1815), led to his undertaking an English dictionary for the *Encyclopædia Metropolitana*, the first part of which appeared in January 1818. The project fell through, but Richardson's *New Dictionary of the English Language* at length appeared complete in two quarto volumes in 1837. The work was warmly received—Trench styled it 'the best dictionary in the language'—and at that time it deserved the praise. A later work was entitled *On the Study of Language: an Exposition of Tooke's Diversions of Purley* (1854).

Richardson, SIR JOHN, naturalist, was born at Dumfries, November 5, 1787, studied at Edinburgh University, became a navy-surgeon, served in the Arctic expeditions of Parry and Franklin (1819-22 and 1825-27), as well as in the Franklin search expedition of 1848-49, was knighted in 1846, married thrice, and died near Grasmere, June 5, 1865. The most valuable of his books were *Fauna Boreali-Americana* (4 vols. 1829-37) and *Ichthyology of the Voyage of H.M.S. Erebus and Terror* (1844-48). There is a Life by the Rev. John M'Ilraith (1868).

Richardson, SAMUEL, novelist, was born in 1689 in Derbyshire. Like Matthew Prior, he was the son of a joiner; but unlike him, he made no effort to obscure his origin. 'My father,' he said, 'was a very honest man, descended from a family of middling note. My mother was also a good woman, of a family not ungenteel.' His career is a curious exemplification of the truth of that Horatian precept which Thackeray chose for the motto of *Esmond*. It preserved to the end the characteristics of its outsetting. The man who was afterwards the moralist of Salisbury Court was as a boy the 'Gravity' and 'Serious' of his schoolfellows; the novelist who penned the interminable epistles of Clarissa and Harriet Byron was as a youth the favoured and indefatigable amanuensis of half the girls in the neighbourhood, acquiring in this artless office something of that strange knowledge of the minuter mechanism of the feminine mind which is so conspicuous a feature of his genius. He says of himself that he had only 'common school-learning;' but he appears to have been at Christ's Hospital. In 1706, at the age of sixteen, he was bound by his own wish to John Wilde of Stationers' Hall, a printer, with whom he served the usual period, ultimately completing the orthodox programme of exemplary apprenticeship by marrying his master's daughter. From 1713 to 1719 he worked as a journeyman printer. In the latter year he opened an establishment of his own in the centre, and later in the north-west corner (No. 11) of Salisbury Square, then Salisbury Court. His printing-office and warehouses were in Blue Ball Court, on the east side of the Square. In a sober, methodical way he continued to prosper, perfecting his faculty for letter-writing in various ways, and serving the humbler needs of literature by diligent compilation of prefaces, indexes, advertisements, and the like. He printed more than one newspaper, and by the favour of Mr Speaker Onslow obtained the printing of the journals of the House of Commons, twenty-six volumes of which passed through his establishment. Then, in 1740, came the opportunity which transformed him into a literary celebrity. To use his own words, 'he accidentally slid into the writing of *Pamela*.' He was over fifty when two bookselling friends invited him to prepare a volume of familiar letters 'in a common style, on such subjects as might be of use to those country readers who were unable to indite for themselves.' He caught at the idea, superadding another. 'Will it be any harm,' he said, 'in a piece you want to be written so low, if we should instruct them how they should think and act in common cases?' 'Hence sprung *Pamela*,' published in November 1740. Its title was as leisurely as its method: 'Pamela; or Virtue Rewarded. In a series of familiar letters from a beautiful young damsel to her parents. Published in order to cultivate the principles of virtue and religion in the mind of the youth of both sexes. A narrative which has its foundation in truth; and at the same time that it agreeably entertains by a variety of curious and affecting incidents, is entirely divested of all those images which, in too many pieces calculated for amusement only, tend to inflame the minds they should instruct.' The moral note is explicit enough on the good printer's title-page; but for all that *Pamela* is by no means *ad usum Delphini*. Its vogue, in a coarser and robuster age than ours, was nevertheless extraordinary. Not to have read of Richardson's exemplary heroine was 'as great a sign of want of curiosity, as not to have seen the French and Italian dancers.' Divines extolled her from their pulpits; Pope declared she would do more good than their discourses; fine ladies triumphantly exhibited her popular chronicles at places of amusement; and in remote country villages, when at last she was happily married, her rustic admirers set the bells a-ringing. In February followed a second edition; a third succeeded in March, and a fourth in May. Grub Street, fastening promptly upon this unexampled popularity, hastily put together for sequel a *Pamela in High Life*, which had the unfortunate effect of seducing Richardson into two supplementary volumes, now deservedly forgotten; and then Henry Fielding fluttered the Salisbury Court dovecote by producing what Richardson and his coterie regarded as the 'lewd and ungenerous engraftment' of *Joseph Andrews*. Happily, however, both for Richardson and posterity, he speedily discarded burlesque for the immortal character of Parson Abraham Adams.

Eight years elapsed before Richardson published another novel. But during this time, consoling himself for the coarse sallies of the irreverent by the 'soft adulation' of a little circle, chiefly of the gentler sex, who gathered round him in his suburban home at Hammersmith, he continued, either in his snug writing-closet or his summer-house, to work placidly at his masterpiece—*Clarissa; or the Adventures of a Young Lady*, known generally as *Clarissa Harlowe*. Virtue, in this performance, was not 'rewarded,' but ruined. The heroine is nevertheless drawn with a tenacity of insight to which *Pamela* could scarcely pretend; and the chief male character, that of Lovelace, though more of an abstraction, is scarcely inferior. Johnson declared the book to be the first in the world for its knowledge of the human heart; and even Fielding did not refuse his tribute: 'Such simplicity, such manners, such deep penetration into nature, such power to raise and alarm the passions, few writers, either ancient or modern, have been possessed of' (*Jacobite Journal*, No. 5). Lesser voices swelled the chorus with greater energy, and it was repeated across the Channel with Gallic enthusiasm. The high-priest of sentiment, Diderot, did not scruple to name its author with Homer and Euripides; and as if to prove that this was no momentary Anglomania, in our own day the poet Alfred de Musset proclaimed it to be 'le premier roman du monde.' But from France also came its compactest condemnation. 'La nature,' said D'Alembert, 'est bonne à imiter, mais non pas jusqu'à l'ennui.'

Having drawn the ideal woman in *Clarissa*, Richardson proceeded, some five years later, to portray, in *Sir Charles Grandison*, the perfect man—'the man of true honour.' This is a work of much greater ability than *Pamela*, but still far below *Clarissa*. It has, moreover, no central story strong enough to reconcile the reader to the prolix impeccability of its superfine hero, whom M. Taine, with an unwonted burst of critical levity, suggests should be stuffed and canonised for his wearisome good qualities. Besides a solitary essay in Johnson's

Rambler (No. 97), and the voluminous but not very interesting correspondence published (with an excellent memoir) by Mrs Barbauld in 1804, Richardson left no other literary remains of any importance. In later life a nervous habit grew upon him, which terminated in 1761 by a fit of apoplexy, of which he died. He has left his own protrait in his letters to Lady Bradshaigh (*Corr.* ii. 206, and iv. 290); but it might almost have been deduced from his letters. He was a sentimental, purring, methodical, well-meaning little man, domesticated and affectionate, whose fitting environment was feminine society of the sympathetic sort; and he has repaid the gentle caresses with which his worshippers tempered the wind of adverse criticism to his sensitive soul by depicting their sex in return with a patience, a discrimination, a sustained analysis of secret spring and motive which it has been given to no other male author, living or dead, to achieve. It is the most unequivocal testimony to his native genius that his impracticable method of telling his story by correspondence, and his intolerable circumstantiality and diffuseness (he thinks nothing of an epistle of fifteen pages, and Clarissa takes nineteen for her will) have only served to tighten his hold upon his reader, and to emphasise and intensify the reality of his creations.

A reprint of Richardson's novels, with an admirable preface by Mr Leslie Stephen, was issued in 1883. The essays of Mrs Oliphant (*Blackwood*, March 1869), of Mr Buxton Forman (*Fortnightly*, xii.), of Mr H. D. Traill (*Contemporary*, xliv.), and of Mrs Andrew Lang (*National Review*, xiv.) all deserve the attention of the student.

Richborough. See SANDWICH.

Richelieu, ARMAND JEAN DUPLESSIS, CARDINAL, DUC DE, one of the greatest statesmen of France, was born of a noble but impoverished family at Richelieu, 12 miles SSE. of Chinon, September 5, 1585. He abandoned a military career for the church, in order to keep in the family the bishopric of Luçon, to which he was consecrated at twenty-two. Representative of the Poitou clergy at the States-general in 1614, he attracted the notice of the queen-mother, and rose in 1616 to be secretary at war and foreign affairs; but the downfall of Marshal d'Ancre, the queen-regent's favourite, in April 1617, sent him back to his diocese. At length in August 1620 the queen-mother and the young king were reconciled, mainly through the agency of the celebrated Capuchin Father Joseph—'l'éminence grise' of later days, till his death in 1638 the intimate friend of Richelieu. The latter showed much tact and patient forbearance in his measures; he formed an alliance with the powerful Duc de Luynes, and in 1622 was named cardinal, in 1624 minister of state. This position he retained to the end of his life, in spite of countless court intrigues, and ere long the most powerful open and secret opposition from the queen, Gaston, Duke of Orleans, and a host of minor intriguers, first among whom was the too famous Duchess de Chevreuse. His first important measure was the blow to Spain of an alliance with England, cemented by the betrothal (1625) of the king's sister Henrietta with Charles, then Prince of Wales. In the Valtelline war he cleared the country of the Spanish and papal troops, but was unable to pursue his advantage, and had to submit to the terms of the peace of Monzon (1626). His next task was to destroy the political power of the Huguenot party. After a fifteen months' siege, which he conducted in person, concentrating all his energy upon the task, the great stronghold of La Rochelle was starved into submission, 30th October 1628. He next turned to crush Rohan and the Languedoc rebels, and destroyed the proud walls of Montauban, last refuge of Huguenot independence. Early in 1630 he entered Italy with a splendid army, himself in command, and soon reduced Savoy to submission. Meanwhile he plunged into dark and tortuous intrigues with the Italian princes, the pope, and with the Protestants in the north against the House of Austria. He promised a large subsidy to Gustavus Adolphus, and, through the masterly diplomacy of Father Joseph at the Ratisbon Diet in June 1630, succeeded in persuading Ferdinand to dismiss Wallenstein. The first treaty of Cherasco (April 1631) ended the Italian war, the second gave France the important strategic position of Pinerolo. Just before this final triumph Richelieu had successfully surmounted the greatest danger of his life—a great combination formed for his downfall by the queen-mother, Gaston of Orleans, the House of Guise, Bassompierre, Créqui, and the Marillacs. She tried to bully the king by her violence, but Richelieu followed his master to Versailles, and again had the whole power of the realm placed entirely in his hands. So ended 'the Day of Dupes' (11th November 1630). The queen-mother fled to Brussels, Bassompierre went to the Bastille, Gaston fled to Lorraine. The cardinal was now made duke and peer, and governor of Brittany. Further intrigues and attempted rebellions by the emigrant nobles and governors of provinces were crushed with merciless severity—Marillac and Montmorency and other nobles were sent to the block. Meantime Gustavus Adolphus had run his brief and brilliant course; and his death at Lützen removed an ally with whom it might have become difficult to reckon. In July 1632 Richelieu had seized the duchy of Lorraine. He continued his intrigues with the Protestants against Ferdinand, subsidising them with his gold, but till 1635 he took no open part in the war. In May of that year, after completing his preparations and concluding a close alliance with Victor Amadeus of Savoy, Bernhard of Saxe-Weimar, and the Dutch, he declared war on Spain, and at once placed in the field an army of 132,000 men. But his first efforts were singularly unsuccessful, and in 1636 Piccolomini and the Cardinal-Infante, governor of the Netherlands, entered Picardy, crossed the Somme, and threatened Paris itself. But in this hour of peril Richelieu rose to the height of his genius, and awoke a new and irresistible force as he threw himself upon the patriotism of France. With 30,000 foot and 12,000 horse he swept the enemy out of Picardy, while his ally Bernhard drove them across the Rhine, and in 1638 destroyed the imperial army in the decisive battle of Rheinfelden, a victory which opened to him the gates of the key-fortress of Breisach. The unexpected death of Bernhard threw the fruit of his victories into the hands of Richelieu, whose policy soon bore further fruit in the disorganisation of the power of Spain—revolts in Catalonia, and the loss of Portugal; the victories of Wolfenbüttel (1642) and Kempten (1642) over the Imperialists in Germany; and at length in 1641 in Savoy also in the ascendency of the French party. Another triumph that same year was the speedy collapse of the Imperialist invasion in the north by the Count of Soissons, who perished in the first battle. The failure to capture Tarragona was the one exception to the complete triumph of the cardinal's latest years.

But the hatred of the great French nobles to his rule had never slumbered, and Richelieu found safety alone in the king's sense of his own helplessness without him. He was firmly convinced that the only safe government for France was a strong absolutism uncontrolled either by the selfish ambition of the nobles or the constitutional legalism represented by the Parlement of Paris. The last conspiracy against him was that of the Grand-equerry, the young Cinq-Mars, whose intrigues with Gaston, the Duke of Bouillon, and the

Spanish court were soon revealed to the cardinal, the centre of a network of espionage which covered the whole of France. When the hour was ripe he placed in the king's hands at Tarascon proofs of the traitorous plot with Spain, and was given full powers as Lieutenant-general of the realm. Cinq-Mars and De Thou were at once arrested, and the wretched coward Gaston of Orleans hastened after his kind to buy his own security by betraying his accomplices. Cinq-Mars and De Thou were executed at Lyons in the autumn of 1642. But the great minister was himself dying in the hour of his greatest triumphs. Death had often drawn near him, but the strong will and fiery soul within his frail and feeble frame had thrust him aside and retained the fleeting life. He faced the inevitable at last with calm tranquillity—when the priest bade him forgive his enemies, he made answer, 'I have never had any other enemies than the state's.' We see the same unhuman impersonality in the identification of himself with the state in his *Mémoires*—'I have been severe to some in order to be good to all. . . . It is justice that I have loved and not vengeance. . . . I wished to give to Gaul the limits that nature had marked out for her . . . to identify Gaul with France, and wherever the ancient Gaul had been, there to restore the new.' He died 4th December 1642, bequeathing Mazarin to the king as his successor.

Richelieu built up the power of the French crown, he achieved for France a preponderance in Europe, and throughout life he moved onwards to his goal with the strongest tenacity of purpose, unmoved either by fear or pity. He destroyed the local liberties of France, and crushed every element of constitutional government, and his policy overwhelmed the citizens with taxation and made waste places some of her fairest provinces and most thriving towns. Our judgment of him will always differ according as we examine his end or his means —the public or the private man. He never sacrificed to personal ambition the interests of his country as these seemed to himself, but he often forgot in his methods the laws of morality and humanity. There is no need here to discuss the more fundamental question of whether his end was actually identical with the highest good of France—the best defence that even so redoubtable a Chauvinist as Henri Martin can offer is that he merely developed out to the full tendencies long rooted in French soil, and that no other ideal of a policy was then possible for France but a systematised absolutism under a beneficent despot. Nor have we sympathy to spare for the corrupt and selfish nobles whom he crushed with a severity so merciless that he drove twenty-one persons into exile, all of them the greatest names in France, banished sixty-five, several of these ladies, while seventy-three nobles were flung into prison, and forty-three were either beheaded or died in prison.

We know the face of Richelieu best from Philippe de Champagne's picture in the Louvre, in which the energy of the model had passed into the hand of the artist. A pale apparition, the mere ghost of a great man in Michelet's phrase, neither flesh nor blood, but all intellect, as Quinet said of Voltaire, he looks down upon us still with that steady and penetrating eye and that imperious gesture that overawed the king and the proudest peers of France. The weakest point in Richelieu's character was his literary ambition and the extraordinary pains he took to construct a literary reputation. His own plays, for the fate of which he trembled with anxiety, sleep in safe oblivion, but his *Mémoires* are still read with interest, forming a subtle and elaborate panegyric upon himself, so that Michelet says in his paradoxical manner, yet not without truth, 'If one would not know Richelieu, one should read his Memoirs.' He founded the French Academy. His Correspondence and State Papers, edited by d'Avenel, fill 8 vols. of the *Collection de Documents inédits sur l'Histoire de France* (1853–77).

See the article FRANCE; Capefigue, *Richelieu, Mazarin, et La Fronde* (2d ed. 1844), and *Le Card. de Richelieu* (1865); Dussieux, *Le Card. Richelieu* (1885); D'Avenel, *Richelieu et la Monarchie absolue* (3 vols. 1884–89); Hanotaux, *Histoire du Card. de Richelieu* (1893).

Richmond, an ancient municipal borough in the North Riding of Yorkshire, on the left bank of the deep-channelled Swale, 49 miles by a branch-line NW. of York. Its Norman castle (1072–1146), now utilised for barracks, stores, &c., has a very fine banqueting-hall and a keep 100 feet high. Other buildings are the parish church (restored by Scott, 1860), with good wood-carvings; Queen Elizabeth's grammar-school (1567; rebuilt, 1849–68); the market-house (1854); and the Perpendicular tower of a Franciscan friary, founded in 1258. The racecourse (847 feet above sea-level) commands a magnificent view. Till 1867 Richmond returned two members, and then till 1885 one. Pop. (1851) 4106; (1881) 4502; (1891) 4216. The earldom of Richmond was conferred by the Conqueror on his kinsman, Alan Rufus, son of the Count of Brittany, and, coming into the possession of the crown through John of Gaunt, was granted by Henry VI. to the father of Henry VII. Henry VIII. created his natural son, Henry Fitzroy (1517–36), Duke of Richmond, as Charles II. did his natural son, Charles Lennox (1672–1723), the ancestor of the present Duke of Richmond and Gordon.

See works by R. Gale (Latin, 1722), Clarkson (1821), Whitaker (2 vols. 1823), Robinson (1833), and Longstaffe (1852).

Richmond, a town of Surrey, 8½ miles WSW. of London (by rail 9½, by river 16), stands partly on the summit and declivity of Richmond Hill, and partly on the level right bank of the Thames. The Terrace, stretching along the brow of the hill, commands an unrivalled prospect of hill and dale, woodland and winding stream; and one of the fairest river-views in England may be gained from Richmond Bridge, which, 100 yards long, was built in 1774–77 at a cost of £26,000. Only a gateway remains of the ancient royal palace of Sheen, where died Edward III., Richard II.'s queen, Anne of Bohemia, Henry VII., and Elizabeth, and which was rebuilt by Henry V. and Henry VII. (1499), who renamed the place Richmond after his own former earldom. That palace, which has memories also of Wolsey, Charles V., and many others, was dismantled in 1648; but the splendid deer-park, formed by Charles I. in 1634, remains. It covers 2253 acres; and its brick wall is nearly 8 miles in circumference. Scott here makes Jeanie Deans have her audience with Queen Caroline. The well-known 'Star and Garter,' which dates from 1738, was largely destroyed by fire in 1870, but rebuilt in 1872–74 at a cost of £24,000; its banqueting-house escaped, built by Barry in 1865. At the parish church are buried the poet Thomson, Kean, Lady Di Beauclerk, and Dr John Moore; and here, too, Swift's Stella was baptised. St Mathias' (1858) is a striking building by Scott, with a spire 195 feet high; and there are also a Wesleyan theological college (1834), a free library (1881), &c.; whilst Richmond worthies other than those above mentioned have been Reynolds, Gainsborough, Collins, and Earl Russell. Market and nursery gardening is a chief industry. Richmond was incorporated as a municipal borough in 1890. Pop. (1861) 7423; (1881) 19,066; (1891) 22,684. See R. Crisp's *Richmond* (1866); *Round Richmond* (1881); and E. B. Chancellor's *Historical Richmond* (1885).

Richmond, (1) capital of Wayne county, Indiana, on the East Fork of Whitewater River, 69 miles by rail NNW. of Cincinnati, and 68 E. of Indianapolis. It was founded by the Society of Friends, who in 1859 established Earlham College here, for both sexes. There are manufactures of agricultural implements, machinery, boilers, flour, &c. Pop. (1880) 12,743; (1890) 16,608.—(2) Capital of Madison county, Kentucky, 120 miles by rail S. of Cincinnati. It is the seat of the Central University (Presbyterian; 1874) and the Madison Female Institute. Pop. (1890) 4753.

(3) The capital of Virginia, on the left bank of the James River (here crossed by a number of bridges), at the head of tide water, about 150 miles from its mouth, and 116 miles by rail S. of Washington. It is a port of entry, and vessels drawing 14 feet of water can come up to the lower end of the city, where there are large docks. Richmond is picturesquely situated on a group of hills, the summit of one—Shockoe Hill—being occupied by the capitol (1796), which contains valuable colonial archives and portraits; it possesses also a marble statue of Washington by Houdon, and in its grounds are statues of Henry Clay and 'Stonewall' Jackson, and the Washington monument, a noble bronze group by Thomas Crawford. Patrick Henry is buried in St John's churchyard, and President Monroe in Hollywood Cemetery, where also is a Confederate monument 90 feet high. Among other notable public buildings are the governor's mansion, the new city hall, custom-house and post-office, penitentiary, almshouse, and markets. In the city are Richmond College (Baptist; 1832) and the Virginia Medical College. The James River Falls here supply immense water-power, and in 1890 the city contained 783 manufacturing establishments, employing 21,618 hands, with a capital of $16,596,500. The chief of these are numerous tobacco-factories (employing 8792 people), great rolling-mills, iron-foundries, nail-works, machine- and locomotive-works, flour, meal-flour, and paper mills, and fertiliser-works. Five railways meet at Richmond, which is a terminus also of the James River and Kanawha Canal; and there are regular steamers to New York, Philadelphia, and Baltimore. The chief exports are cotton, flour, and tobacco. Richmond was founded in 1737, and became the capital in 1779. On 26th December 1811 the burning of a theatre destroyed the lives of sixty persons, including the governor of the state. In 1861 Richmond was selected as the Confederate capital, and from that period was the objective point of the Union armies in the east, and defended by General Lee with a large army and formidable lines of earthworks (which eventually extended for nearly 40 miles), until the seizure of the lines of supply by Generals Grant and Sheridan compelled its evacuation, after almost a year's siege and a series of sanguinary battles, on the night of April 2, 1865. A considerable portion of the city was burned by the retreating Confederates. But in the quarter of a century that followed Richmond recovered her old beauty, and more than her old prosperity and importance. In 1888 an 'agricultural, mechanical, and tobacco exposition' was held here. Pop. (1860) 37,910; (1870) 51,038; (1880) 63,600; (1890) 81,388. See the articles MCCLELLAN, GRANT, LEE, UNITED STATES.

Richmond, LEGH, author of the *Dairyman's Daughter*, was born at Liverpool, 29th January 1772, and while a child was lamed for life by leaping from a wall. He studied at Trinity College, Cambridge, and was appointed in 1798 to the joint curacies of Brading and Yaverland in the Isle of Wight, in 1805 to the rectory of Turvey in Bedfordshire, where he died, 8th May 1827. He wrote *Fathers of the English Church* and *Domestic Portraiture*—memoirs of his three deceased children—and in a happier hour his *Dairyman's Daughter*, *Negro Servant*, and *Young Cottager*, three evangelical tracts which have carried his name over the world. Collected they form *Annals of the Poor* (1814). See the *Memoirs* by the Rev. T. S. Grimshawe (1828; ed. by Bishop G. T. Bedell, Phila. 1846).

Richter, JOHANN PAUL FRIEDRICH, usually known by his pen-name of JEAN PAUL (with the French pronunciation), Germany's greatest humorist, was born on the first day of spring (21st March) 1763, at Wunsiedel, a little town of the sequestered pine-clad Fichtelgebirge in North Bavaria. The imaginative boy was brought up in the idyllic sabbath-life of the mountain villages in which his father was pastor, went to school at the town of Hof, and in 1781 was sent to Leipzig University to study theology. But, like Lessing, he did not study theology; Rousseau and Voltaire, Swift and Sterne, Pope and Young, had much stronger attractions for him, and he too resolved to write books. He asserted his independence of custom by discarding the periwig and stiff necktie, wore his hair long, his shirt and vest open at the throat, and dressed him as he pleased. But he found it harder work to get bread than to write and assert his position as an 'emancipated' youth. Being poor, he got into debt all round, and in November 1784 fled secretly from Leipzig, to go and hide his head in the poverty-stricken home of his mother (a penniless widow since 1779) at Hof. His first literary 'children' were satires; but he could get no publisher to introduce them to the world, until in 1783 Voss of Berlin gave him forty louis d'or for *The Greenland Law-suits*. The book was a failure. For three years Jean Paul struggled on at home, his mother spinning hard for bread, he helping with the few florins he earned by his pen. He read enormously, omnivorously, and sat hours making excerpts from the books he devoured—a practice he kept up from early boyhood to old age. These many folios of closely-written pages were the storehouses upon which he drew for materials when he came to write his romances. He took long rambles amongst the hills and forests, his hair flying in the wind, a book in his hand or a song on his lips, and a favourite dog at his heels. In the beginning of 1787 he began to teach the children of different families in the district, and of course taught by original methods. All this time he still went on writing, and during his nine years of tutorship produced, amongst other things, the satirical *Extracts from the Devil's Papers* (1789), *Fälbel's Journey* (1796), and *Freudel's Complaint* (1796), the last two amongst the best examples of his satirico-humorous writings; the beautiful idylls *Dominie Wuz* (1793), *Quintus Fixlein* (1796; Eng. trans. by Carlyle, 1827), the *Parson's Jubilee* (1797), the first two perhaps the most finished things Jean Paul ever wrote; the grand romances *The Invisible Lodge* (1793), *Hesperus* (1795; Eng. trans. 1865), and *Flower, Fruit, and Thorn Pieces*, or *Siebenkäs* (1796–97; Eng. trans. by Noel 1844 and 1871, by Ewing 1877); *Campanerthal* (1797; Eng. trans. 1857), a series of reflections on the immortality of the soul, an undigestible book; and the prose lyrical idyll, *My Prospective Autobiography* (1799). *The Invisible Lodge* was his first literary success; *Hesperus* made him famous. In 1796 Charlotte von Kalb, perhaps the most remarkable, certainly the most advanced, woman of her age in Germany, wrote to express her admiration of the book; and a few months later, at her invitation, Jean Paul visited Weimar. There Goethe received him politely, but with cool reserve; that, too, was Schiller's attitude, when Jean Paul went on to Jena to see him. The antagonism between them was deep and fundamental, and lasted till death, being at times but ill concealed by all three. Herder and his wife, on the other hand, greeted the young romance-writer with overflowing admiration, and gave him their friendship, which also endured till death. As for Charlotte von Kalb, she did not stop at friendship: in spite of having a husband already, she exercised her sex's fabled privilege of leap-year—her first letter to him was dated 29th February—and gave him unasked the love of her vehement heart.

From this time for a few years Jean Paul's life was rich in incident and full of excitement—an Odyssey of love adventures, in which he was the object of extravagant idolatry on the part of the women of Germany, especially of aristocratic dames who dabbled in literature. They gave him their love whether or no, and would have deserted husband and children for his sake; for, though not personally handsome, Jean Paul had a wonderful fascination of manner, particularly towards women. He found all women charming, he was a delightful talker and a good listener, and had a sweet and sympathetic smile —qualities that explain a good deal. In 1801 he married a Berlin lady, and three years later settled down at Bayreuth, attracted by its beauties of hill and valley, and by its beer. There he spent the rest of his days, leading a simple, busy life, writing his books, playing with his children, tending his pet animals, and taking short summer journeys to different towns of Germany; the present of a flower filled him with perfect joy. His last years were clouded by the death of his only son, a promising student, in 1821, and by his own blindness. From 1799 he enjoyed a pension from the Prince-primate Dalberg, and then from the king of Bavaria. He died on 14th November 1825. The principal works of his married life were the two grand romances, *Titan* (1800–3; Eng. trans. 1862) and *Wild Oats* (1804–5; Eng. trans. as *Walt and Vult*, 1849), the former accounted by himself and by most German critics his masterpiece, though Englishmen would generally prefer the latter, as they would certainly prefer *Siebenkäs* to *Hesperus*; *Schmeltzle's Journey to Flätz* (1809; Eng. trans. by Carlyle, 1827) and *Dr Katzenberger's Trip to the Spa* (1809), the best two of his satirico-humorous writings; the idyll *Fibel's Life* (1812); the fragment of another grand romance, *Nicholas Markgraf*, or *The Comet* (1820–22); a series of reflections on *Literature* (*Vorschule der Æsthetik*; improved ed. 1812), containing many excellent things about poetry, humour, wit, style; another series on *Education* (*Levana*, 1807; Eng. trans. 1848, 1876, and 1887), a book that ranks with Rousseau's *Émile* as a standard work on training the young, and is full of evergreen wisdom; various patriotic writings (1808-12); and an unfinished *Autobiography* (1826), the finest of all his idylls.

Jean Paul stands apart entirely by himself in German literature, a humorist of the first water, a Titan, 'a colossal spirit, a lofty and original thinker, a genuine poet [in prose], a high-minded, true, and most amiable man. . . . He advances not with one faculty, but with a whole mind, with intellect, and pathos, and wit, and humour, and imagination, moving onward like a mighty host, motley, ponderous, irregular, irresistible. He is not airy, sparkling, and precise, but deep, billowy, and vast' (Carlyle). Two irreconcilable tendencies strive for mastery in him and his works—a dreamy, lachrymose sentimentality, that shrank from the rough buffetings of life, and sought refuge in emotional dissipation, luxuriating in tears, caressing sorrow, coquetting with love, melting in melancholy longings for the world beyond the grave; and a sharp-eyed, wide-awake common sense, that saw workaday realities with the utmost clearness and discrimination. All his great qualities of imagination and intellect were, however, made ministers to his humour, which had the widest range, moving from the petty follies of individual men and the absurdities of social custom up to the paradoxes that are rooted in the permanent ordinances of the universe. He turns his irony—a tender, reverent, playful irony—upon all the relations of human life, even upon the holiest beliefs of his own heart. And, in spite of the egotism of genius that often shows itself so strongly in him, Jean Paul had the heart of a truly great and good man. Börne calls him the author *par excellence* of the lowly born, the poverty-stricken, the neglected, and the despised; to this class belong some of his finest characters, as Wuz, Fixlein, Siebenkäs, Vult. As a master of pathos he is put by De Quincey above Sterne. Few, if any, have written with such tender love and such delicate feeling of the idyllic joys of the country and the happiness of simple domestic life, particularly in the schoolhouse and parsonage. He had a wonderfully deep and sympathetic insight into the nature of woman, but has not created more than one lifelike woman (Lenette). Yet the male characters of his books, in so far as they are humorous, are generally living beings, or else, if secondary characters, well-drawn pencil sketches in outline. Jean Paul is the classic author of friendships (Siebenkäs and Leibgeber, Walt and Vult); he matched them with his own friendship for Hermann and Oertel, and for Otto and the Jew Emmanuel Osmund. Nature was to him a living and divine presence: he loved her reverently, from the solemn stars to the tiniest flower, and his descriptions of nature embrace some of the loftiest hymns the spirit of man has chanted to the beauty and sublimity of created things—e.g. several passages in *Hesperus* and *Wild Oats*, the Dream of the Universe in *Siebenkäs*. God and the immortality of the soul were the great facts ever present to his mind, influencing all his thoughts. An enduring sense of the ethic worth of human action, 'a noble reverence for the spirit of all goodness forms the crown and glory of his culture' (Carlyle). The reason why he is so little known, except by name, is that of all great writers he is one of the most difficult to read, and it may be added to understand. No reader who has not the strongest constitution can struggle through the tangled thickets of encyclopædic learning, the tortuous wit, the dreary wastes of digression and dullness, the hothouses of tropical sentimentality, amid which the gem-like gardens of his creative art are hidden. His prose is harder to translate than Heine's verse. For literary form, for order, harmony, or restraint he has not the slightest respect. The principal idea in his (often) long sentences is too frequently lost amid a labyrinth of subordinate clauses. The story is chiefly a peg for Jean Paul to hang Jean Paul's self-communings and reflections upon, a *point d'appui* for the play of his wit and humour. The wildest improbabilities, the wildest extravagances of fancy, are indulged in without check. Sentence follows sentence teeming with allusions, analogies, images, metaphors, similes, tumbling one over another in inextricable confusion. A Crœsus of idioms, he is the greatest and most prolific word-coiner in the language: he compels words to adapt themselves to his ideas. Often enough his diction is inflated and bombastic, and his literary taste execrable; yet when he is at his best his language marches with a majesty, a dignity, a natural beauty that are seldom matched in German literature. Carlyle's

Sartor Resartus and *French Revolution* are steeped in the spirit of Jean Paul, and show how greatly he fascinated the imagination of the rugged Scotsman.

The best editions of Jean Paul's *Werke* are the editions of 1860–62 (34 vols.), 1879 (60 parts), and 1882 *et seq.* (Kürschner's Deutsche National-Literatur series). The best complete Life, that by Nerrlich (Berlin, 1889), is marred to some extent by the Hegelian speculations of the writer. The more important biographical sources are *Wahrheit aus Jean Paul's Leben*, his Autobiography (1826), continued by Otto and Förster (1827–33); Spazier's *Biographischer Kommentar zu Jean Paul's Werken* (5 vols. 1833); Förster's *Denkwürdigkeiten* (4 vols. 1863); Correspondence between Jean Paul and Otto (4 vols. 1829–33), Charlotte von Kalb (1882), Jacobi (1828), and Voss (1833); and Fr. Vischer's *Kritische Gänge* (new series, vol. vi. 1875). In English the best accounts are contained in Carlyle's *Miscellaneous Essays* (vols. i. and iii.); De Quincey's *Analecta* of specimen passages translated (vol. xi. of *Collected Works*); and *Life of Jean Paul F. Richter* (1845). Lady Chatterton published a collection of translated extracts in 1859.

Richthofen, FERDINAND, BARON VON, traveller and geographer, was born at Karlsruhe in Silesia, on 5th May 1833, was educated at Breslau and Berlin universities, and at the Geological Institute of Vienna (1856), and in 1860 accompanied a Prussian expedition to eastern Asia. The next twelve years he spent in travelling through Java, Siam, Burma, California, Sierra Nevada, and China and Japan (1868–72). After his return to Europe (1872) he was appointed president of the Berlin Geographical Society (1873–78), professor of Geology at Bonn (1875), and of Geography at Leipzig (1883) and at Berlin (1886). His reputation as a geographer is built principally upon his great work on *China* (Berlin, 4 vols. 1877–81), and upon *Die Metallproduktion Kaliforniens* (1865), *The Natural System of Volcanic Rocks* (San Francisco, 1867), *Aufgaben und Methoden der heutigen Geographie* (1883), and numerous articles in geographical journals. Died in 1888.

Ric'inus. See CASTOR-OIL.

Rickets (according to Skeat, akin to A.S. *wringan*, 'to wring'), or RACHITIS (Dr Glisson's pseudo-Greek coinage in 1650 from Gr. *rhachis*, 'the spine,' because a peculiar form of spinal curvature results therefrom), is a disease of children, chiefly characterised by the imperfect development, softness, and consequent distortion of some or many of the bones. The bones thus affected consist of a sort of gelatinous tissue, which will bend without breaking; and they are so soft that they may be cut with the knife. Though so soft, they are thickened, especially at the parts where growth normally takes place most rapidly; the enlargement of the wrists, ankles, &c. which results has led to the term 'double-jointed,' often applied to those suffering from the disease. The weight of the body and the traction of the muscles acting on bones thus constructed cause them to bend, and the thighs or shins are abnormally arched, or the spine is curved, or, in slighter cases, only the normal form of the ankle is modified. In aggravated cases the chest is so affected as to give rise to the condition known as 'pigeon-breasted;' the lower jaw is imperfectly developed, and the teeth project; and the pelvis becomes so altered in form as, in the case of girls, to render future childbearing in the highest degree perilous. Rickets is exclusively a disease of childhood, and rarely begins later than the second year. It appears to be caused by unhealthy surroundings, particularly defective or improper food, and insufficient light and air. It is therefore much more common among the poorer classes, and in towns. It is not due in most cases to the want of lime-salts in the food, but to the want of power in the child's system to assimilate them. In some of the large cities of Europe one-third or even a larger proportion of the children brought to the out-patient departments of hospitals are more or less affected. It is a very chronic disease, and if at all severe leaves its mark on the bones for life. It is very rarely fatal of itself; but affected children are much less able than others to resist attacks of other diseases (bronchitis, diarrhœa, hooping-cough, measles, &c.). In Germany this malady is, under an old misapprehension, called the 'English disease.'

The treatment must be mainly directed to the improvement of the general health. Free exposure to pure bracing air, sponging with sea-water, or sea-bathing if the little patient can bear it, an abundance of suitable and nourishing food, cod-liver oil, iron, and quinia include all that need be said about general treatment. The administration of lime-salts seems to do little good, though it might naturally be thought the one thing needful. While the bones are still soft great care must be taken to keep the child in such attitudes as will cause the least possible strain upon the affected parts. When the bones have become ossified in faulty positions surgical interference may often be useful in producing amelioration of the condition.

Rickman, THOMAS, an English architect, was born at Maidenhead in Berkshire in 1776. He was undecided as to a calling, being in succession chemist, grocer, corn-factor, and insurance agent. But he seems to have always had a love for architecture, and to have studied it carefully. Having sent in a design for a church that proved successful in a government competition, he settled at Birmingham as an architect. He designed a great number of Gothic churches and chapels—e.g. in Birmingham, Hampton Lucy, Bristol, Preston, Carlisle, &c., many country-houses, and the New Buildings of St John's College, Cambridge. He died in March 1841. His *Attempt to discriminate the Styles of Architecture in England from the Conquest to the Reformation* (1817; 6th ed. by J. H. Parker, 1862) is still a standard authority.

Rickmansworth, a town of Hertfordshire, at the confluence of the Colne, Gade, and Chess, 4 miles W. by S. of Watford. It has a church (rebuilt in 1890) with interesting monuments; and near it is Moor Park, the seat of the ill-fated Duke of Monmouth. Pop. of parish (1881) 6211; (1891) 7672. See R. Bayne's *Historical Sketch* (1870).

Ricochet, in Artillery, is the bounding of a shot along the ground which takes place when a gun is fired low. Intentional ricochet firing was first introduced by Vauban at Philipsburg in 1688, believing it to have great actual and moral effect in clearing the face of a ravelin, bastion, or other rather long line of fortification.

Ricord, PHILIPPE, a French physician, was born on 10th December 1800, at Baltimore, U.S. He came to Paris in 1820, and after 1828 delivered there two annual courses of lectures at the Pitié on surgical operations, and was appointed surgeon-in-chief to the hospital for venereal diseases. This post he held till his retirement in October 1860. He died on 22d October 1889. Ricord won a world-wide reputation in the specialty which he had chosen, a reputation which he owed to his combination of accurate physiological and pathological knowledge, manual dexterity as a surgeon, and felicitous inventiveness and resource as a physician.

The more important of his numerous works are *On the Employment of the Speculum* (1833); *Treatise on Venereal Maladies* (1838); *On Blennorrhagic Ophthalmia* (1842); *Iconographical Clinic of the Venereal Hospital* (1841–66); *Letters on Syphilis* (3d ed. 1863); and *Lectures on Cancer* (2d ed. 1860).

Riddles (A.S. *rǽdelse*, from *rǽdan*, 'to interpret'), or Sense-riddles, to adopt Dr Tylor's phrase, have been defined as 'roundabout definitions of the hearer has to guess what.' They were widely popular in dim antiquity, as to-day they are popular among many half-civilised races—not absolute savages, for to perceive an analogy demands some measure of culture. They may be broadly divided into two classes—riddles admitting of more or less easy solution, and riddles whose solution is beyond any wit of man, unless indeed, as is very often the case, the answer is known already. To the former class belong the enigma propounded by the Sphinx to Œdipus (q.v.), and that which, according to Plutarch, Homer died of chagrin at not being able to answer. It seems to us easy now, for it was the one about the two boys who went hunting: all they caught they flung away, and all they could not catch they carried home. Of insoluble riddles Samson's is a good instance, and this which, in a Russian folk-tale, is put by 'Boots' to the princess: 'As I came to you I saw on the way what was bad, and I struck the bad with a bad thing, and of what was bad the bad died.' Naturally the princess could not guess that he had killed a snake with his lance; she gave it up, and had to marry him. Such propounding of riddles for wagers (her hand to his head in this instance) meets us frequently. Josephus relates how Solomon and Hiram, king of Tyre, once had a contest, in which Solomon first won a large sum of money from Hiram, but presently lost it all back to Hiram's subject Abdemon. The Queen of Sheba, again, came to pose the wise king with enigmas ('venit tentare eum ænigmatibus,' so it runs in the Vulgate); the trials of skill between Virgil's shepherds are a standard classical instance; and, to come down to later times, the Russian folk-tale has many analogues in other folklores and in our own ballad minstrelsy—e.g. in 'Proud Lady Margaret,' 'Captain Wedderburn,' and 'The Elfin Knight.'

The riddle is found in the Koran, and several collections of riddles exist in Arabic and Persian. They were, it seems, also known to the ancient Egyptians, while among the Greeks they were allied in the earliest times with the oracular responses, and, like Samson's riddle, were generally in poetical form. But in Greece they first came into vogue about the time of the 'Seven Sages,' one of whom, Cleobulus, was celebrated for the composition of metrical *griphoi*. Even the greater poets did not disdain to introduce them into their writings, or to devote whole poems to the subject—e.g. the *Syrinx*, commonly ascribed to Theocritus. Appuleius wrote a *Liber Ludicrorum et Griphorum*, but it is lost; and almost the only name we can fix upon is a certain Cælius Firmianus Symposius, whose riddles, comprising a hundred hexameter triplets, are termed by St Aldhelm 'rubbish' ('carmina inepta').

The riddle, but more perhaps as an amusement for the baronial hall on winter nights, or for the monkish refectory, than as a serious intellectual effort, was much cultivated during the middle ages. Many French, English, and German riddle-books exist in MS., and some were printed at an early period. Wynkyn de Worde's *Demaundes Joyous* (1511) contains several riddles that are simply coarse jests; but others, again, well illustrate the simple faith of mediæval Christendom—e.g. '*Demand:* What bare the best burden that ever was borne? *Response:* The ass that carried our Lady when she fled with our Lord into Egypt.' The Reformation checked, if it did not wholly stop, the merry pastime of riddle-making; but in France, in the 17th century, it began to creep back into favour, until at last riddles rivalled in popularity the madrigals and sonnets of the period. Le Père Menestrier, in 1694, wrote a grave treatise on the subject; and before that, in 1646, the Abbé Cotin had published a *recueil*, in the preface to which he modestly dubbed himself 'le Père de l'Enigme.' 'Posterity,' adds a French critic, 'has not recognised his paternity.' The taste for riddle-making grew and grew, and many brilliant French writers, such as Boileau, Voltaire, Madame du Deffand, and Rousseau, did a little in this line, until finally the *Mercure de France* became a fortnightly repository of riddles, the solution of which secured a reputation in society. In Germany we have Schiller's delightful extravaganza, *Turandot*; and in England Cowper, Fox, Canning, and Praed are a few of the makers of poetical riddles or Charades (q.v.). To-day with us the riddle is a mere *jeu d'esprit*, a conundrum or pun couched question-wise; but among the Irish, German, and Russian peasantry, the Gypsies, the Zulus, the Samoans, and many more races, the old-fashioned sense-riddles, often enshrining a mythological germ, still hold their own. Thus, 'in the government of Pskov, on the occasion of a marriage, the bridegroom and his friends are not allowed to enter the bride's cottage until they have answered all the riddles her friends put to them; and in one of the villages in the Jaroslav government a bargain of which the bride is the subject is concluded between the groomsman and the "seller of the bride"—riddles, answered by gestures, instead of words, taking the place of coin.'

See chap. iii. of Tylor's *Primitive Culture* (1871); Ralston's *Songs of the Russian People* (1872); two articles in *Once a Week* (1868); one by D. Fitzgerald in the *Gentleman's Magazine* (1881); Friedreich's *Geschichte des Räthsels* (1860); Rolland's *Devinettes ou Énigmes Populaires*, with a preface by Gaston Paris (1877), and a bibliography of fifty other works; and Bladé's *Proverbes et Devinettes de la Gascogne* (1886).

Riding (Scand. *thriding* or *triding*, 'third part'), a term applied to the three parts into which the county of York is divided, termed respectively East, West, and North Riding. A similar division existed in several other counties in the Anglo-Saxon period, as the *laths* of Kent, the *rapes* of Sussex, the *parts* of Lincoln. In *Domesday Book* Yorkshire was divided, as at present, into three ridings, and subdivided into wapentakes.

Riding and Driving. The art of riding may be divided into (1) ordinary riding, (2) school riding, (3) circus riding, and (4) side-saddle riding. The two objects aimed at in *ordinary riding* (which includes riding on the road, hunting, pig-sticking, stock-driving, breaking in young and freshly handled horses, playing polo, race and steeplechase riding) are to remain in the saddle and to make the animal carry its rider with the greatest possible ease to itself. The former of these objects is the one almost entirely aimed at by the breaker when giving his first lessons; the latter, by the flat-race jockey. Hence we find that the saddle and seat adopted by the Colonial buckjumping rider are those that are best suited for 'sticking on.' The large pads on the flaps of his saddle are about six inches deep, and are curved backward, so as to fit against his thighs, a little above the knees, in a manner similar to that in which the third crutch (or leaping head) acts on the lady's left leg in a side-saddle. The seat of the jockey, instead of being that in which most security can be obtained, is the one by which the rider can best conform to the movements of his mount. Hence we find that, even in Australia, many of the best jockeys on the flat are but very poor performers on a buckjumper. In all kinds of riding balance rather than grip should be the chief means for retaining one's seat in the saddle, for if muscular action be constantly employed to 'stick on' the muscles then brought into play will soon become tired, and will be unable to act at the very moment their aid is most required. One valuable rule in riding is that, except when applying the leg to the animal's side, the leg from the knee down should remain unaltered in its position, so that neither knee nor foot will work backwards or forwards. The movements of the upper part of the body should be regulated by the play of the hips. There should be no hollowing out of the small of the back or pushing out of the chest, or any other action which would give rigidity to the muscles. The great reason why any approach to stiffness, when riding, should be avoided is that it has to be maintained by muscular effort and is consequently followed by fatigue. As soon as the muscles become tired they are weak and slow to act. Consequently, if they be kept stiff (or, more correctly speaking, in a contracted condition) they will be unable to do any work they may be called upon to perform in as effective a manner as they would do were they kept lissom. Hence a person should ride, as a rule, by balance and not by grip, until the moment comes to put forth the required muscular effort. The rider should endeavour to avoid the two very common faults of holding on by the reins and of putting too much weight on the stirrups, and he should try to ride with his seat well under him and not stuck out behind. If he find that he is insecure in his saddle he should allow no false shame to prevent him from getting one in which he will have a firmer hold. To give this additional grip the saddle may be covered with buckskin, or with leather the rough side of which is put on the outside. The saddle should be roomy. The back part, upon which the seat rests, should be fairly flat; the seat ought to have a good 'dip' in it; and there should be tolerably large 'rolls' on the flaps. To become a good rider one will require plenty of practice, and a frequent change of horse and saddle. The English style of riding, which has been adopted with marked success in the hunting-field, racecourse, steeplechase-course, and polo-ground, is treated clearly and systematically in Captain Hayes's *Riding* (Thacker & Co., 3d ed. Lond. 1891). There is also much valuable advice given in that excellent work, Colonel Greenwood's *Hints on Horsemanship* (Moxon & Co., London). In the Badminton Library book on *Riding* (Longmans, Green, & Co.) this subject is treated from the old-fashioned riding-school point of view, at which we shall presently glance.

In *school riding* the object of getting the horse to carry his rider with the greatest possible ease to himself, which is the chief aim of the ordinary rider, is sacrificed to a large extent for increased control, so as to get the horse to perform the various *airs de manège* with precision. The English military riding system is a kind of compromise between that of the continental *haute école* and the English hunting style. Although great improvements have been made in high school riding in France and Germany, the riding instruction contained in *The Cavalry Regulations* has remained practically unaltered for the past thirty years. M. Baucher, we may remark, was the great master of school equitation of the previous generation. His system has been much modified for the better by Captain Raabe and M. Fillis, although these masters differ in some details from each other. M. Barroil's *Art Équestre* (Rothschild, Paris) is moulded on the teaching of Raabe. *Principes de Dressage and d'Équitation* (Marpon and Flammarion, Paris), by M. Fillis, contains all his views. Both are most valuable works on *l'équitation savante*, and should be carefully studied by the student. Previous to their appearance Mr E. L. Anderson wrote *Modern Horsemanship* on the same subject; but it is neither so elaborate nor so instructive as either of the other two, which ought to be read conjointly. Of the two we prefer that of M. Fillis, especially as he teaches that the horse should carry his head in a freer and less fatiguing style than that advised by M. Barroil, who in this respect follows the instruction of Baucher. In M. Fillis's book there are some valuable *commentaires sur Baucher*.

Although exhibitions of school riding are often given in a circus, we must separate it from *circus riding*, which, properly speaking, is limited to performances (standing, leaping, dancing, and tumbling) in an upright position, either on a pad or on the bare back of a horse. The only part which we could term riding, in the usual sense of the term, is the 'bounding jockey act,' in which the 'artist,' while riding round the ring, takes off his saddle, stands on it, gets off his horse, and jumps astride on him and on top of his back while the animal is galloping round.

In *side-saddle riding* the lady depends for security of seat on balance and on the grip she has on the upper and lower crutches. Her right leg is placed over the former, and she presses her left leg, a little above the knee, against the latter when she seeks their aid. Her left foot should not be placed 'home' in the stirrup, but only as far as the ball of the foot; and the heel should be slightly depressed. If, when her left leg is held in this manner, she can just feel the pressure of the lower crutch, the length of her stirrup will be about right. The only pace at which she should put weight on the stirrup is the trot. The great requisite for obtaining a 'square' seat, which is the one correct position for a lady on horseback, is for the rider to put her weight on her right leg, and not equally on both, as is often wrongly advised, and to bring the left shoulder up as much as the right. The body should be free from all stiffness, and should be kept erect by the play of the hip-joints, and not by hollowing out the small of the back and pushing out the chest. She should try to get her seat well under her. We would strongly advise the use of the 'Scott stirrup,' which will always release the foot in the event of a fall. The best book on ladies' riding is *The Horsewoman* (Thacker & Co., London), by Captain and Mrs Hayes. French ideas on ladies' riding are expounded in *L'Amazone* (Rothschild, Paris), by M. Musany.

The art of *driving* is studied in Great Britain chiefly with the view of having the horses in perfect control, which is necessitated by the hilly nature of the country and by the crowded condition of the thoroughfares in the cities and towns. In America and Australia there are better opportunities for fast driving. Hence in England a showy style of trotting is sought for, while speed is more thought of in the United States and in the Antipodes. Although strenuous efforts are being made to establish trotting as a sport in Britain, and trotting meetings are often held at the Alexandra Park, Liverpool, and elsewhere, we greatly doubt whether it will obtain any permanent footing.

The best books on driving are *Driving* (Badminton Library); *Riding and Driving*, by J. H. Walsh; *Coaching*, by Lord W. P. Lennox; *Down the Road*, by C. T. Birch-Reynardson; *American Trotters*, by Hiram Woodruff; and *Among the Trotters*, by John Splan. See also the articles BRIDLE, COACHING, FOXHUNTING, HORSE-RACING, and TROTTING.

Ridley, NICHOLAS, Protestant martyr, was born about 1500, of good Northumbrian stock. From the grammar-school of Newcastle-upon-Tyne he passed to Pembroke Hall, Cambridge, became fellow in 1524, and master in 1540. The spirit of the Reformation had already begun to penetrate both universities; Tyndale and Bilney had taught the new doctrines at Cambridge, and Ridley, no less than Cranmer and Latimer, Cambridge students about the same period, had early caught something of their spirit. Ridley went next to Paris and to Louvain, and, having encountered some of the most active Reformers abroad, after a three years' absence returned firmly grounded in the new doctrines. He was made proctor to the university of Cambridge in 1533, became domestic chaplain to Cranmer, afterwards to the king, and had already been made vicar of Herne, canon, first of Canterbury, then of Westminster, and rector of Soham, when in 1547 he was raised to be Bishop of Rochester. An ardent and outspoken Reformer, yet without either bigotry or intolerance, he brought great learning and admirable preaching power to the cause, and quickly made himself one of the foremost leaders of the church. On the deprivation of Bonner, Bishop of London, in 1550, Ridley became his successor. In this high position he distinguished himself by his moderation, his learning, and his munificence, prompted Edward VI. to the foundation of Christ's, St Bartholomew's, and St Thomas' hospitals, and assisted Cranmer in the preparation of the Forty-one Articles, afterwards reduced to thirty-nine. In 1552 he visited the Princess Mary at Hunsdon, but failed to shake her adherence to her mother's faith. Thereupon, after the death of Edward VI., he warmly espoused the cause of Lady Jane Grey, and at St Paul's Cross declared both Mary and Elizabeth to be illegitimate, July 16, 1553. As soon, however, as Mary was proclaimed he repaired to Framlingham to make his peace, but was coldly received, and soon stripped of his dignities and sent to the Tower. Once at least he attended mass, but his spirit soon returned to him. In March 1554 he was sent to Oxford, together with Latimer and Cranmer, to be tried by a committee of convocation, and after a profitless disputation all three were adjudged defeated and obstinate heretics, and condemned to suffer at the stake. As England was not yet formally reconciled to Rome, the sentence could not be carried out, and accordingly Ridley lay in Bocardo gaol at Oxford for eighteen months, writing the while a noble and touching farewell letter to his friends. After the formality of a second trial he was led forth to execution, along with Latimer, 16th October 1555. The stake was placed in front of Balliol College, and here Ridley played the man in the midst of awful torments of a smouldering fire that burned him slowly to death. His writings were collected in a volume of the Parker Society series (1841), with a life by Rev. H. Christmas. See his Life by Dr Gloucester Ridley (1763).

Riehm, EDUARD (KARL AUGUST), a learned Protestant theologian, born at Diersburg in Baden, December 20, 1830. He studied at Heidelberg and Halle, became vicar at Durlach in 1853, garrison-preacher at Mannheim in 1854, and qualified as *privat-docent* in the theological faculty at Heidelberg in 1858. He was appointed an extra-ordinary professor here in 1861, at Halle in 1862, and ordinary professor at the latter in 1866. He died April 5, 1888. Of his numerous books most important are *Der Lehrbegriff des Hebräerbriefs* (1858–59; 2d ed. 1867); *Die Messianischen Weissagungen* (1875; 2d ed. 1886; Eng. trans. 1890); *Der Begriff der Sühne im Alten Testament* (1877); and the posthumous *Alttestamente-Theologie* (ed. by Pahncke, 1890) and *Einleitung in d. Alte Testament* (ed. by A. Brandt, 2 vols. 1889–90). He edited the second edition of Hupfeld's *Commentary on the Psalms* (4 vols. 1867–71) and the invaluable *Handwörterbuch des biblischen Alterthums* (1884), and was from 1863 joint-editor of the quarterly *Theologische Studien und Kritiken*.

Riel, LOUIS, a Canadian insurgent, born in Manitoba in 1844, became a leader of the Metis, or French half-breeds, and headed the Red River rebellion in 1869–70, afterwards escaping from the country. In 1885 he again established a rebel government in Manitoba, and in November, the rising having been quelled, he was executed at Regina.

Rienzi, COLA DI, the famous Roman tribune, was born at Rome in 1313. His parentage was humble, his father being a tavern-keeper named Lorenzo, by abbreviation, Rienzo; the family name of Gabrini is sometimes added. The son Nicolas (shortened into Cola) studied grammar and rhetoric, read and re-read the Latin historians, philosophers, and poets (Greek was scarcely yet known in Italy), and excited his imagination, while at the same time he coloured his speech, with the prophetic enthusiasm of the inspired writers. The assassination of his brother by a Roman noble, whom he found it impossible to bring to punishment, finally determined him to deliver the city from the barbarous thraldom of the barons. In 1343 he was appointed by the heads of the Guelph party spokesman of a deputation sent to the papal court at Avignon to beseech Clement VI. to return to Rome in order to protect the citizens from the tyranny of their noble oppressors. Here he obtained a favourable hearing from the pope, who appointed him notary to the civic chamber. In April 1344 Rienzi returned home, and sought to obtain the countenance of the magistrates in his ideas of reform; but reform he found was impossible without revolution; and for three years he loudly and openly menaced the nobles. At last, when Rienzi thought he could rely on the support of the citizens, he summoned them together on the 28th of May 1347, and, surrounded by 100 horsemen and the papal legate, he delivered a magnificent discourse, and proposed a series of laws for the better government of the community, which were unanimously approved of. The aristocratic senators were driven out of the city, and Rienzi, as tribune of the holy Roman republic, was invested with practically dictatorial power. The pope confirmed the eloquent dictator in his authority; all Italy rejoiced in his success, and foreign lands, even warlike France (according to his enthusiastic friend and admirer, Petrarch), began to dread the reviving majesty of the Eternal City. A bright dream flashed across Rienzi's imagination, the dream of every great Italian from Dante to Mazzini—the unity of Italy and the supremacy of Rome! Rienzi despatched messengers to the various Italian states, requesting them to send deputies to Rome to consult for the general interests of the peninsula, and to devise measures for its unification. These messengers were everywhere received with enthusiasm, and, on the 1st of August 1347, 200 deputies assembled in the Lateran Church. Rienzi was crowned tribune with great ceremony on the 15th April. But the nobles were still bitterly hostile; Rienzi, who defeated them in a bloody battle on the 20th November, became suddenly infected with the insolence of victory and power, and proceeded to levy taxes and enforce obedience. The papal authority was turned against him; after a short reign of seven months he lost heart at the combination of forces against him, and fled to Naples.

After two years of religious meditation among the mountains of the Abruzzi, Rienzi resumed his life as political reformer, and went to Prague to secure the support of the emperor, Charles IV. Charles, however, sent him as a prisoner to Pope Clement VI. to Avignon, but by the mediation of Petrarch he was released from imprisonment. A new pope, Innocent VI., resolved to take advantage of Rienzi's old popularity in order to crush the power of the Roman nobles, now becoming troublesome, and sent him to Rome in the train of Cardinal Albornoz. Their mission was swiftly accomplished, and the power of the nobles overthrown again. Rienzi aimed, however, at re-establishing himself in supreme authority. In August 1354, having borrowed money and raised a small body of soldiers, he made a sort of triumphal entry into Rome, and was received with universal acclamations. But misfortune had impaired and debased his character; he abandoned himself to luxurious living, and his once generous sentiments had given place to a hard, mistrustful, and cruel disposition. The barons refused to recognise his government, and fortified themselves in their castles. The war against them necessitated the contraction of heavy expenses; the people grumbled; Rienzi only grew more severe and capricious in his exactions and punishments. He even murdered the free captain, Fra Monreale, for his wealth. In two months his rule had become intolerable, and on the 8th of October an infuriated crowd surrounded him in the Capitol, and put him to death with ferocious indignities.

The fortunes and fate of Rienzi have been made the subject of a romance by Lord Lytton, and of an opera by Wagner. See monographs on Rienzi by Papencordt (Hamburg, 1841), Auriac (Amiens, 1885), and Rodocanachi (Paris, 1888); and the histories of Mediæval Rome by Gregorovius and Reumont.

Riesengebirge (i.e. 'Giant Mountains'), a mountain-range about 23 miles long by 16 broad, separating Bohemia from Prussian Silesia. Seen from Silesia on the north they look like a gigantic wall of rock, pierced at places by deep ravines. On the south they fall away more gradually. The highest peak is the Schneekoppe (5260 feet), the loftiest mountain in this part of Europe. Granite and crystalline schists, especially mica-slate, are the principal geologic constituents of the range. There are only three passes: one in the east, with a railway, from Landeshut in Silesia to Trautenau in Bohemia; one in the west, from Hirschberg to Reichenberg; and one in the middle, from Hirschberg to St Peter in the upper Elbe valley in Bohemia. These mountains are a favourite tourist resort of the Germans. They figure in popular legend as the home of the mountain-spirit Rübezahl, called also 'Herr Johannes,' who rules the weather. See Meyer's *Reisehandbuch* by Letzner (6th ed. 1888); and *Rübezahl, seine Begründung in der deutschen Mythe* (Prague, 1885).

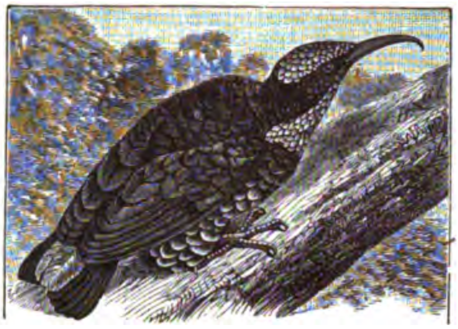
Riesi, a town of south Sicily, 10 miles NW. of Terranova, has sulphur-mines and makes wine and olive-oil. Pop. 11,914.

Rieti (ancient *Reate*), a city of Central Italy, 40 miles NE. of Rome, is walled, and presents a mediæval appearance; it has a fine cathedral with a monument by Thorwaldsen. Pop. 9618.

Rievaulx Abbey, situated 26 miles N. of York and 10 E. by N. of Thirsk, is a ruined edifice, Norman and Early English in style, originally built for the Cistercian order by Walter l'Espec in 1131. The ruins consist of the choir and transepts of the church, with a choir-arch 75 feet high, the refectory, and the gate-house. They occupy a beautiful site in the valley of the river Rye; 'Rievaulx' is said to be a corruption of 'Rye vale.' At the dissolution this was one of the richest foundations in Yorkshire.

Riff, a name given to the coast districts of northern Morocco extending from Ceuta to the western frontier of Algiers, and forming a line of steep cliffs with few harbours. Its Berber inhabitants were formerly much addicted to savage piracy.

Rifle-bird (*Ptilorhis paradiseus*), often spoken of as one of the 'Birds of Paradise,' is perhaps the best-known species of a genus which, according to Elliot, comprises four species confined to Australia and to New Guinea. *Ptilorhis paradiseus* inhabits the south-eastern districts of Australia, and is found only in very thick 'bush.' The male is regarded as more splendid in plumage than any other Australian bird. The upper parts are velvety black, tinged with purple; the under parts velvety black, diversified with olive-green. The crown of the head and the throat are covered with innumerable little specks of emerald green of most brilliant lustre. The tail is black, the two central feathers rich metallic green. The female, as is often the case, is much duller coloured than her mate. See HONEY-EATER.



Rifle-bird (*Ptilorhis paradiseus*).

Rifles. The object of rifling any weapon, whether cannon or small-arm, is for the purpose of causing the projectile, when fired from such weapon, to rotate round its axis, and thus to impart steadiness to it in its passage or flight through the air. The subject of rifled cannon has already been dealt with under the head of Cannon (q.v.); in this article, therefore, it is intended to deal only with the question of rifles as applied to small-arms, whether military or sporting. The idea of imparting steadiness to the projectile and thereby increasing the accuracy of fire is one which has exercised the minds of scientific artillerists and gunmakers from a very early period in the history of firearms. The cause of inaccuracy when firing a spherical ball from a smooth-bore firearm may be briefly explained as follows: in all muzzle-loading arms the projectile must be smaller in diameter than the bore of the gun, otherwise it could not enter and be rammed home from the muzzle; the projectile therefore rests on the bottom of the barrel, and its centre is below the axis of the bore. When the gun is fired part of the gas generated by the explosion of the powder escapes over the top of the ball, causing a downward pressure on it; as this pressure is removed during its passage down the barrel the ball impinges on the top side of the barrel, and so on, up and down and from side to side, until it leaves the muzzle of the gun; the direction of its flight is therefore not in line with the axis of the bore, but is determined by its last impact against the side of the barrel. To overcome this inaccuracy the idea suggested itself to cut grooves in the bore of the barrel which by gripping the ball would cause it to rotate round its axis and to leave the barrel more nearly in line with the axis of the bore.

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The first authenticated instance we have of a rifled small-arm being actually used was in the year 1563, when the Swiss government issued an edict to the following effect: 'For the last few years the art of cutting grooves in the chamber of the guns has been introduced with the object of increasing the accuracy of fire; the disadvantage resulting therefrom to the common marksman has sown discord amongst them. In ordinary shooting matches marksmen are therefore forbidden under a penalty of £10 to provide themselves with rifled arms. Every one is nevertheless permitted to rifle his military weapon and to compete with marksmen armed with similar weapons for special prizes.' In the later half of the 16th century Augustus Kutter of Nuremberg brought out a rifle the grooves of which were in a spiral form, and to him is due the idea of this form of rifling. In 1662 a cleric, the Bishop of Munster, invented elongated projectiles for use in such arms, but whether in conjunction with a rifled arm or simply with the idea of improving the accuracy of a smooth bore is not known. In 1729 Lautmann, a Russian, brought out a pamphlet advocating the advantage of firing with balls of an elliptical form with a cavity at the base so as to augment considerably the impetus imparted to the projectile when fired from a rifled arm. Lautmann undoubtedly hit upon the true theory, and had his idea been worked out to a practical result the armies of Europe would in all probability have been armed with rifles a hundred years sooner than they actually were. But Lautmann, like so many other inventors, was in advance of his age and did not live to see the correctness of his theory vindicated.

In 1750 Wild brought out a rifle with six grooves having one turn in the length of the barrel, from which he fired balls weighing eighteen to the pound, wrapped in an envelope of greased linen, the object of the linen being to fill up the bore and to impart the necessary rotatory motion to the bullet; but nothing came of his invention. And again in 1770 experiments, which were not successful, were made at Metz with elongated bullets.

The adoption of rifles into the British service dates from about the year 1800, when the old 95th Regiment, which later became the Rifle Brigade, were armed with 'Baker's rifles,' so called from the name of the inventor. There were two patterns of this arm, one with eleven and the other with seven grooves, the twist of rifling being one turn in 136 inches. The weight of the rifle was 8 lb. 9 oz. and its length 3 feet 9¾ inches; the length of the barrel was 2 feet 6 inches, and bore ·705″. The bullet was spherical; before being rammed home it was wrapped in a greased patch, there being a cavity in the butt for carrying these patches. After firing a few rounds the barrel became so foul that it was difficult to ram the bullets home; a wooden mallet was therefore served out with each rifle to drive the ball down the barrel. This rifle remained in the British service till about the year 1835, when it was superseded by 'the Brunswick rifle,' the invention of Major Berner in the Brunswick army. The barrel of this arm was rifled with only two grooves having one turn in the length of the barrel; the bullet, which was spherical, was 'belted'—the belt fitting into the grooves in the barrel—this method being adopted to give the bullet a spin. A grease patch was also used with this rifle; it added greatly to the difficulty of loading, as it made it extremely difficult to see whether the belt on the bullet was properly placed in the grooves or not. This rifle was the first arm in the British service which had a percussion-lock, and it was not till the year 1842 that a percussion musket was generally adopted for the service. A rifle of a similar design was about the same time adopted in Russia and in some of the German principalities.

In 1837 a rifled arm was adopted in France for the use of the 'Chasseurs' or rifle regiments. This arm was rifled in the chamber on a system invented by Captain Delvigne of the French army. The diameter of the chamber was slightly smaller than the calibre of the bore; the ball was driven into the rifling, but not sufficiently far to crush the powder. In 1841 the Prussians discarded their old muzzle-loading smooth-bore musket, and introduced in its stead an arm which, besides having a rifled barrel, was also made to load at the breech, and in a few years the whole Prussian army was armed with the celebrated 'Zündnadelgewehr' or needle-gun. This arm, the invention of Dreyse (q.v.), is a bolt-gun, the needle being contained in the bolt; to load, give a smart blow to the handle of the bolt to release it from its fastening, then draw back the bolt and insert the cartridge, close the bolt and lock it by turning the handle down to the right. The act of closing the bolt compresses the mainspring and holds back the needle, which is released in the usual way on pulling the trigger. The cartridge is a peculiar one. There is a papier-maché plug called 'Zündspiegel,' in which is imbedded the bullet in the form of an egg. The percussion-cap is fixed in the rear of the plug; behind the plug is the powder charge. The powder, the plug, and the bullet are all enclosed in a paper cartridge-case, which is tied in front of the bullet. On firing the gun the needle presses through the powder charge and strikes the cap in the plug so that the charge is ignited from the front, the idea being that by this means the bullet is less likely to be detached from its bed in the papier-maché plug, which latter takes the rifling and imparts rotation to the projectile, the diameter of which is ·54 of an inch, whereas the calibre of the barrel is ·61 of an inch.

During some experiments at Spandau in 1846 so many needles were broken that the continuance of the arm in the service was in great jeopardy; but its efficacy in quelling disturbances in the troublous times in 1848 and 1849 was so great that in the year 1850 a further large number of arms was made, and the system was further extended by the introduction of carbines on the same model. In 1842 the Austrians armed their rifle regiments with a rifle. Thus we see that by the year 1842 all the great powers of Europe had armed a part of their troops with rifles, and that by 1846 the whole of the Prussian army was not only so armed, but that their arms also possessed the great superiority over all others of being breech-loaders. Another point in which the Prussians had a superiority over other nations was that they had a complete cartridge combining in one case the projectile, the powder charge, and the percussion-cap—the introduction of a breech-loader enabling them to have a capped cartridge instead of having to place a cap on the nipple for each discharge. Those who are old enough to remember the old percussion-lock with the capping and uncapping of the nipple will appreciate the immense advantage that was gained by the introduction of a capped cartridge.

The vast superiority of the Prussian needle-gun over the rifles in use in other countries gave a great impetus to the spirit of invention, and in 1849 Captain Minié (q.v.), of the French army, brought out a rifle called the Minié rifle; this arm was first introduced into the French, and subsequently, about 1851, into the English army. Up to this date rifles were only issued to rifle regiments, but with the introduction of the Minié rifle it was intended to discard the smooth-bore altogether and to arm the whole army with rifles. The adoption of the Minié rifle was a great step in advance; it was the first time the spherical bullet was discarded in favour of one of a cylindro-conoidal form. The bullet had a hollow base in which was placed an iron cup; on the explosion of the powder this cup forced the bullet into the grooves of the rifling. The separate grease patch was discontinued, lubrication being obtained by greasing the paper in which the bullet was wrapped with a mixture of tallow and beeswax. The rifle weighed 9 lb. 13 oz.; its length was 4 feet 7 inches. The barrel weighed 4 lb. 13¼ oz. and was 39 inches long; the diameter of the bore was ·702″, the number of grooves three, having a twist of one turn in 36 inches. The charge of powder was 2½ drams, or nearly 70 grains, and the weight of the bullet was 680 grains. The rifle was sighted to 1000 yards. A description of it has been given in some detail for the sake of comparison with the rifles of the present day. All the English infantry regiments which proceeded to the Crimea were armed in the first instance with this rifle, and a large proportion of the French army also had a rifle constructed on the same principle, though varying in detail from the English pattern. This gave the allies an immense advantage over their Russian adversaries, who were still, with few exceptions, armed with the old smooth-bore.

But the Minié rifle was cumbersome and heavy, and as early as 1852 experiments were made with a view of obtaining a better weapon. The result of these experiments led to the introduction of the Enfield Rifle, Pattern 1853, so called from the Royal Small-arms Factory at Enfield Lock, from which factory the rifle was first introduced. The principal point of difference between this arm and the Minié was the great reduction in the diameter of the bore from ·702″ to ·577″. This reduction of the bore enabled the barrel to be made very much lighter without in any way impairing the arm as a shooting weapon; in fact it shot very much better, as the bullet was better proportioned. And, while the powder charge remained the same, the bullet was reduced in weight from 680 to 535 grains; by this means the initial velocity was greatly increased and the height of trajectory diminished at all ranges. The lubrication of the bullet was the same as in the Minié. There were two descriptions of this rifle, the long and the short; the long was issued to the regiments of the line, and the short to rifle and light infantry regiments. A carbine was also constructed on the same principle for issue to the cavalry and Royal Artillery. The issue of this rifle and ammunition to the native troops in India was the occasion of the Indian Mutiny of 1857, it being believed that the grease round the bullets was cows' and pigs' fat purposely supplied to defile Hindus and Mohammedans alike.

But while the armies of Europe, with the exception of the Prussian, were all armed with a muzzle-loading rifle more or less on the principle of the Minié, experiments were being continually carried on with the view of obtaining a good breech-loader. It was not, however, till the Danish war of 1864 that the very vast superiority of the breech- over the muzzle-loader was brought prominently home to the authorities. The need was urgent, but in order to give time to discover a really satisfactory breech-loading rifle it was determined in the first instance to convert the Enfield into a breech-loader by attaching the Snider breech-action to the Enfield barrel. The old arms were readily converted, and a large number of new arms were made on this principle, so that by the time of the Franco-Prussian war the whole English army was armed with the Snider breech-loader, and during the winter of 1871–72 the militia and volunteers also received these arms; but it was perfectly well understood that the introduction of the Snider breech-loader was only intended to fill the gap until a more perfect and more efficient weapon could be devised; and after a most exhaustive series of trials, which had been conducted for some time by a special committee appointed for the purpose, the Martini-Henry rifle was in the year 1871 recommended for adoption in the English army.

The manufacture commenced shortly afterwards, and the first issue of rifles of this pattern to the troops was made in 1874. The Martini breech-action has already been described under the head of Breech-loading (q.v.). The barrel was the invention of Mr Alexander Henry, a gunmaker of Edinburgh. The calibre is ·45″, and the form of the rifling is peculiar. Fig. 1 represents an end section of a barrel rifled on this system. There are seven grooves, having a complete turn in 22 inches, cut in the barrel, forming seven plain surfaces at AA. These are tangential to the periphery of the projectile which is represented by the dotted circle C. In addition to the bearing surfaces thus obtained there are seven angular projections, BB, extending inwards from the ends of the grooves on plain A. Thus in its passage down the bore the bullet has fourteen bearing surfaces at AA...BB, and it expands into the spaces left between A and B, and thus obtains its rotatory motion. Whilst these transformations were going on in England the French had adopted the Chassepôt rifle in 1869, superseded in 1874 by the Gras; the Germans in 1871 discarded the needle-gun and adopted the Mauser (see BREECH-LOADING); the Austrians after their war with Prussia in 1866 adopted in 1868 the Werndl rifle; the Italians adopted the Vetterli in 1871; the Russians adopted the Berdan rifle, Mark I., in 1867, superseded in 1871 by Mark II. of the same rifle; the Americans adopted the Springfield, whilst the minor states adopted breech-loaders of various designs and patterns. It is unnecessary in this article to give a full description of all these rifles, most of them having the bolt breech-action, a drawing of which may be seen under the head of Breech-loading (q.v.), and the tables at the end of the article give all essential particulars in connection with the more important arms.

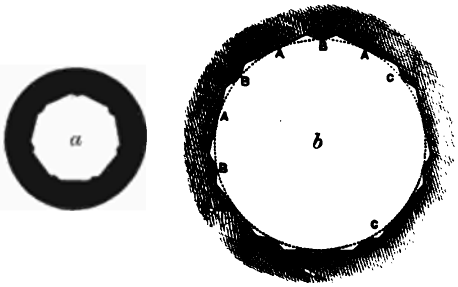


Fig. 1.—Section of Henry Barrel, actual size (*a*) and enlarged (*b*).

At the time of its introduction the Martini-Henry rifle was probably the finest military rifle in Europe; it is extremely accurate either at long or short ranges; its bullet has great penetrative power. The rifle is simple and does not easily get out of order. But, while the Martini-Henry rifle was more accurate at all ranges and had a higher terminal velocity and lower trajectories at long ranges than the rifles of the continental armies, these rifles had a higher muzzle velocity and lower trajectory up to ranges of 500 yards. This was due to two causes: first, because the proportion of powder to bullet was greater in the foreign than in the English cartridge; and secondly, because the value of $\frac{D^2}{W}$ was also greater—this being the mathematical expression used in England to denote the power of the air to retard bullets in their flight, where D is the diameter of the bullet in inches and W its weight in pounds; therefore the smaller the value of the fraction the less power has the air to retard the flight of the bullet, and *vice versâ*. The heavier the bullet can be made in proportion to its diameter, the better able it will be to maintain its velocity at long ranges. It was determined to endeavour to remedy the defect referred to above, so that the English rifle should be superior to all others in all particulars at all ranges. To do this it was necessary to maintain the low value of $\frac{D^2}{W}$ and to increase the proportion of powder to bullet; this led to the introduction of the Enfield-Martini rifle, in which the Martini action was maintained, but the calibre of the barrel was reduced to ·40″. Owing to the high muzzle velocity obtained—viz. 1570 feet—the trajectory was very flat and the shooting exceedingly accurate. Several thousands of these arms were made, but before they were issued to the troops a far more important change was determined on—viz. the introduction of a *magazine* rifle. A magazine rifle may be described as one which has attached to it a magazine or case or hopper containing four or more cartridges which are fed one by one into the barrel by mechanism in connection with and actuated by the breech-action; and the primary object of a magazine arm is to enable the soldier at a critical moment to fire a certain number of consecutive shots without having to reload from the pouch.

The great importance of a magazine arm was first practically demonstrated in the American war between the North and South in 1861, when one regiment of the northern army, armed with a magazine rifle, successfully resisted the attack of a force at least three times as numerous armed with the ordinary single loader, simply on account of the great rapidity of fire. And again in the war between Turkey and Russia in 1877 the constant repulse of the Russian assaults on the Turkish lines before Plevna was in a great measure, if not mainly, due to the fact that the Turks were armed with the Winchester repeating rifle, which enabled them to mow down the Russians by hundreds as they crossed the open to the assault. In the United States there were at that time several systems already in practical use, and after the experience of the Turkish war the question was seriously taken up by most of the European governments. By the end of the year 1879 the French government had adopted the Kropatschek magazine rifle for the navy; the Germans were experimenting with a Mauser rifle converted to take the Lee magazine; the Austrians were experimenting with the Kropatschek and the Spitalski; in Italy the Bertoldo rifle had been issued to some few regiments for trial; in Switzerland the troops were armed with the Vetterli repeater; and in Norway and Sweden a repeater on the German principle was on trial. The matter was then taken up by the English government, and a committee was appointed by the War Office to consider the whole question. Although the number of magazine rifles is legion, the magazines themselves are all modifications of one or other of a few principal systems or types, which may for convenience be divided under the following heads:

(1) Those with the magazine in the fore end of the stock under the barrel; (2) those with the magazine under the breech-action; (3) those with the magazine above and at the side of the breech-action; (4) those with the magazine in the butt of the stock; (5) those with the magazine in a circular form round the breech-action.

Type No. 1 may be described briefly as follows: The magazine consists of a metal tube fixed in the fore end of the stock, and capable of containing eight or more cartridges. The tube or magazine is loaded by drawing back the bolt of the breech-action and inserting the cartridges one by one into the tube at the breech end, there being a catch to retain them when once inserted; the insertion of the cartridges gradually compresses a long spiral spring contained in the tube, so that when the tube is full the spring is completely compressed, and is exerting its force on the whole column of cartridges in the direction of the breech end of the barrel, the base of one cartridge being always pressed against the bullet of the one next behind it. The action of unlocking and drawing back the bolt withdraws one cartridge at a time from the magazine, and places it in front of the bolt; and the action of closing the bolt forces the cartridge into the barrel. As each cartridge is thus withdrawn for loading, the column of cartridges within the tube is pressed back as already described, leaving another cartridge in position to be withdrawn for loading. There is generally a stop or 'cut-off' which, when applied, prevents the bolt from acting on the magazine, so that the arm may be used as a single loader on occasions when it may not be considered either necessary or desirable to bring the magazine into play.

In type No. 2 the magazine can either be detachable and carried in the soldier's pouch, to be attached to the rifle when required for use, or it can be a fixture on the arm itself. In either case the magazine consists of a metal box containing from six to ten cartridges, according to the size of the cartridge. The cartridges, which are inserted at the top of the box or magazine, compress a spring in the magazine which is generally either in a zigzag form or in the form of a C. In this type of magazine the cartridges lie on the top of one another, and not bullet to base as described in No. 1 type. They are held in the magazine by a catch or 'cut-off,' and when this is applied the rifle can be used as a single loader. On withdrawing the cut-off and drawing back the bolt, the spring in the magazine forces one cartridge up in front of the bolt, which, on being pushed home, forces the cartridge into the barrel. By a mechanical contrivance, only one cartridge at a time can be forced up out of the magazine.

In type No. 3 the magazine can also be either detachable or a fixture on the rifle. In magazines of this type no spring is necessary to force the cartridge out of the magazine, which is loaded by dropping the cartridge in at the top. At the bottom of the magazine, on the side next the body of the rifle, there is a slot, with a corresponding slot in the body or shoe of the breech-action. On drawing back the bolt one cartridge passes out of the magazine through these slots into the shoe, and just in front of the bolt, by the force of gravitation alone. The cartridge is then forced into the barrel by the action of closing the bolt. There is also a cut-off with magazines of this type to prevent cartridges passing through the slots when it is not required to use the magazine.

In No. 4 type various attempts have been made from time to time to utilise the butt of the stock by hollowing it out and converting it into a magazine. In this system the cartridges are brought up one by one into the loading position by a ratchet actuated by the bolt. As the bolt is drawn back the ratchet is also forced back, and hooking on to a cartridge brings it forward as the bolt is pushed home again.

In type No. 5 the cartridges are contained in a cylinder placed around the breech-action of the rifle. A spring acts on these cartridges and brings them up one by one in front of the bolt, the act of closing forcing the cartridge into the barrel. There are objections to the two types Nos. 4 and 5 which have prevented the adoption by any government of a magazine arm constructed on these systems; it is unnecessary therefore to describe them further. Of the arms previously referred to as being under trial by various European governments at the close of the year 1879 the Kropatschek is an example of type No. 1, the Lee magazine of type No. 2, the Jarmann of type No. 3. There is no example of type No. 4, but the Spitalski is an example of type No. 5.

The Germans were the first to re-arm the whole of their infantry with a magazine rifle; but, pending the result of trials which were being carried on with small-bore rifles and smokeless powder, they determined in the first instance to convert the then existing Mauser rifle into a magazine arm, as this would require no change of ammunition, the magazine being placed in the fore end of the stock as described under the head of No. 1 type. But it was generally understood that in order to derive the full benefit from a magazine arm the soldier would have to carry more ammunition, and, as it was not desirable to add to the weight of his equipment, this could only be done by reducing the weight of the cartridge. A reduction of bore, therefore, became almost a *sine quâ non*, as by that means only could a sensible reduction be made in the weight of the bullet, and with it of the cartridge. But this led to fresh difficulties. It is quite impossible in the space available for this article to discuss fully all the difficulties which had to be overcome either as regards cartridge-case, bullet, powder, rifling, &c., but it may be stated that it was generally conceded that the ordinary charge of loose black powder could not be used in a rifle with a bore less than ·40″ on account of the difficulty of overcoming the fouling which would take place in a small bore, and also on account of the difficulty of making a suitable cartridge-case. Therefore the question of the explosive to be used had to be considered in connection with the question of the reduction of bore. The Swiss were the first to arrive at a practical solution of the difficulty. Two rifles were brought out in Switzerland very similar to one another, and merely differing in points of minor details. One was the Rubin rifle, having a calibre of ·295 inch. The powder charge consisted of 70 grains of black powder compressed into a solid pellet, and the weight of the bullet, which was nickel coated, was 217 grains. The force of the powder was very greatly increased by compression, and, the proportion of powder to bullet being very high, a muzzle velocity was obtained of no less than about 1850 feet; and the value of $\frac{D^2}{W}$ being 2·8 the velocity was well kept up at all ranges. The other Swiss rifle was the Hebler. The calibre of this rifle was the same as the Rubin—viz. ·295 inch; the charge was 74 grains of compressed black powder, the weight of nickel-plated bullet 225 grains; both these rifles had magazines on the Lee principle.

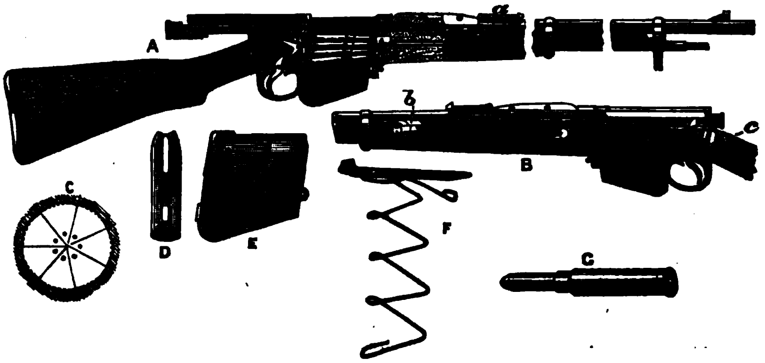


Fig. 2.—The Lee-Metford Magazine Rifle, Mark I.:
A, rifle showing section of breech after four cartridges have been fired; B, part of rifle showing sights, &c.; C, section of barrel; D, E, magazine; F, magazine spring; G, cartridge.

Experiments were carried on in England with both these rifles, and the results were such as to warrant the committee, which had been investigating the subject, to recommend in the year 1887 the adoption of a magazine rifle for the English army, of which the following is a brief description. The barrel is rifled on the Metford principle (fig. 2, C), in which there are no corners nor angles to hold the fouling. The twist of the rifling is one turn in 10 inches, the bore of the barrel is ·303 inch, and its length 30·20 inches.

The bolt breech-action which has been adopted for the rifle is a modified form of the Lee bolt. The Lee magazine (fig. 2, D, E), which has also been adopted, holds eight cartridges, and is detachable—i.e. it can be carried on the arm itself or in the soldier's pouch; its position on the arm is immediately in front of the trigger-guard underneath the body of the breech-action, in which a slot or opening is cut through which the cartridges are fed up by a spring ready to be pushed into the barrel by the closing of the bolt. There are two turned-in lips (fig. 2, D) at the mouth of the magazine under which the heads of the cartridges are inserted when filling it; the rim of the cartridge projecting sufficiently to be caught by the bolt. These lips prevent the cartridges from being shot out by the spring, and hold the head down till the bullet has entered the chamber of the barrel. A cut-off is provided to enable the arm to be used as a single loader; this is a plate pivoted at one end, and it is pulled out by means of a thumb-piece projecting on the right side. When it is thus pulled out the magazine is in action, but when pushed in the plate partly covers up the aperture through which the cartridges pass out of the magazine, and forms a bed on which to place the cartridges by hand. The magazine, which fits into a slot cut in the stock under the opening in the body, is held in position by a catch. This can be withdrawn by a small trigger in front of the main trigger, when the magazine is released. The magazine can only be filled by one cartridge at a time; these can be passed into it through the slot in the body of the breech if it is desired to fill the magazine when attached to the rifle. The spring (fig. 2, F) which forces the cartridge up is in the form of a coil flattened at the side. The rifle has two sets of sights, the ordinary back sight (fig. 2, A*a*) being graduated to 1900 yards; but for longer ranges there is a pair of sights consisting of a dial sight (fig. 2, B*b*) on the left side of the fore end of the stock, and a short arm (fig. 2, Bc) near the trigger, at the end of which is a small hole. The weight of the rifle is 9-lb. 6 oz., and length 49·5 inches The bayonet, weighing 15 oz., is in the form of a short knife having a blade 12 inches long. The cartridge (fig. 2, G) for this rifle consists of a solid drawn brass cartridge-case, in which is inserted a pellet of 70 grains of compressed black fine-grain powder; the length of the pellet is 1·6225 inch. The black powder is to be ultimately superseded by a smokeless powder (see GUN-COTTON)—probably Abel's 'cordite' powder.

After insertion of the powder pellet the case is necked so as to reduce the diameter at the mouth of the case to ·312 inch.

The smallness of the bore necessitated a long bullet, in order to get the necessary weight, and a quick twist in the rifling; it was found that an ordinary hardened lead bullet could not stand the strain, and therefore the bullet, which weighs 215 grains, is composed of a hardened lead core inserted into an envelope of cupro-nickel turned over at the end to prevent the gas on the explosion of the pellet getting up between the envelope and lead core. The length of the bullet is 3·05 inches, and diameter ·312 inch. It is pressed into the mouth of the cartridge-case, which holds it firmly. A packet of ten of these cartridges weighs 10 ounces. The muzzle velocity obtained with the powder pellets is 1830 ft.-seconds; but with the cordite powder about 2000 ft.-seconds. When firing at 500 yards' range the highest point of the trajectory above the line of sight is 5 feet, whereas that of the Enfield-Martini ·40-bore rifle is 6 feet, and of the Martini-Henry ·45-bore rifle 8 feet 7 inches.

But the English government was not the first to adopt a small-bore magazine rifle for the general armament of the whole army, the French having adopted the Lebel rifle as early as the year 1887. It has been already stated that the French navy had for some time previously been armed with the Kropatschek repeating rifle, having the magazine in the fore end of the stock; and, like the Germans, the French had converted their single loading Gras rifle into a repeater on the Kropatschek model. The Lebel is an improved Gras repeating rifle; the bore of the barrel is ·315 inch. The magazine (fig. 3) is in the fore end of the stock, and holds eight cartridges. The points of the bullets are flattened to lessen the chance of accidental explosions in the tube, which might be caused by the cap of one cartridge resting on the point of the bullet of the cartridge in rear of it. The cartridge-case is charged with about 35 grains of smokeless powder, and the bullet weighs about 215 grains. The muzzle velocity is about 2000 ft.-seconds. Great results were expected from this rifle when first introduced; but experience has shown that the smokeless powder adopted for the Lebel cartridge is not reliable, and that after being kept a year or so it greatly deteriorated.

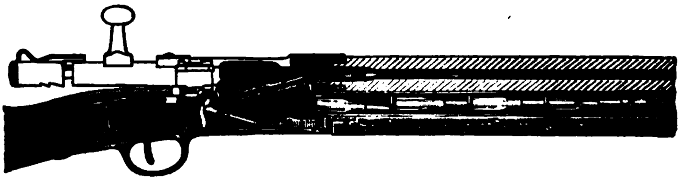


Fig. 3.—French Lebel Magazine Rifle, in section.

The Lebel rifle itself has proved inferior to one of a simpler construction, called the Berthier rifle after the name of the inventor. The breech mechanism is on the same principle as that of all other magazine arms—viz. the bolt containing the striking apparatus; but the magazine in the fore end of the stock is discarded, and the Mannlicher magazine adopted in its place. This consists of a light metal frame or clip holding five cartridges; the clip is dropped into a receptacle to hold it, but cannot drop through, as the bottom cartridge rests on a spring which forces the cartridges up, as in the case of the Lee magazine, and the clip is held up by the top cartridge, which presses against the turned-in sides of the clip. As soon as the last cartridge is fed into the barrel by the bolt there is nothing to hold up the clip, which then drops out, and on the withdrawal of the bolt another clip full of cartridges is inserted. There is a cut-off which enables the rifle to be used as a single loader. The bullet weighs 205 grains, and consists of a hardened lead core coated with a white metal envelope. The charge is 33 grains of smokeless powder. Ten cartridges weigh about 8¾ oz. The bore of the barrel is ·301", and weight of arm 8½ lb. The muzzle velocity is 2070 ft.-seconds. The extreme simplicity in the mechanism of the bolt of this rifle is one of its chief recommendations. In Germany the original Mauser rifle, which had been converted into a magazine arm as a temporary measure, as already described, was, in 1889, superseded by one, also the invention of Mauser, having a barrel with a bore of ·315 inch, and in which the magazine is filled from a metal clip containing five cartridges, somewhat like the Mannlicher; but the clip or cartridge-holder does not itself pass into the receptacle made for the cartridges, as in the Mannlicher; but, being held over the receptacle or magazine, the cartridges are pushed out of it by the thumb, and the clip itself falls off. The magazine rifles of other nations are all modifications of one or other of those already described; but there is a peculiarity in the construction of the Mauser and Mannlicher rifles which must be mentioned. This peculiarity consists in the barrel-proper being encased in a barrel jacket or light steel cylinder, both being screwed into the body of the breech, and the nose end of the barrel passing loosely through a thimble at the end of the barrel jacket. The sights are fixed to the barrel jacket. There is a very slight air-space between the barrel and the jacket, and the advantages claimed for the compound barrel are chiefly that the barrel proper is protected and is less liable to injury from a blow, and that the outer coating does not heat so rapidly as a barrel constructed in the ordinary way, and that therefore a handguard, such as is used with the English rifle, is not necessary. The Mannlicher and the Mauser both have a calibre of ·315", and fire a bullet weighing 216 grains, the charge of smokeless powder being about 35 grains, and the muzzle velocity about 2000 ft.-seconds. In the hands of the Chilian Congressionalists the Mannlicher rifle contributed very largely to the defeat of Balmaceda in 1891.

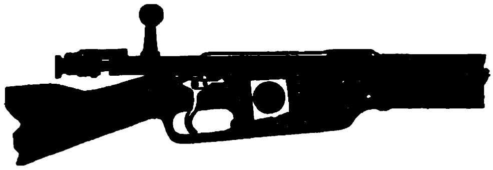


Fig. 4.—German Mauser Magazine Rifle, in section.

Sporting Rifles have already been dealt with under the head of Breech-loading and Firearms (q.v.). But it may be as well to observe that the same principle or law governs the ammunition for the sporting as for the military rifle, only it is differently applied. In the military rifle a high

LIST OF RIFLES IN THE BRITISH SERVICE FROM THE YEAR 1800 TO PRESENT DATE.

Description of Arm.	Without Bayonet.		Barrel.						Bayonet.		Ammunition.			Value of $\frac{D^2}{W}$.
	Weight.	Length.	Weight.	Length.	Diameter of Bore.	Number of Grooves	Twist of Rifling.	Sighted up to yards.	Weight.	Length beyond Muzzle.	Charge of Powder.	Weight of Bullet.	Lubricator.	
	lb oz.	ft. in.	lb. oz.	ft. in.	in.				lb. oz.	ft. in.	dr.	gr.		
Baker	8 9	3 9¾	3 14½	2 6	·705	7	1 in 180″	..	0 15	1 6⅜	..	..	Grease patch.	
Brunswick Pattern 1836	9 6½	3 10	3 13¾	2 6½	·620	2	1 ,, 28″	..	2 0½	1 9½	2½	557	,, ,,	
Minié ,, 1851	9 13	4 7	4 13½	3 3	·706	3	1 ,, 64″	1000	1 0¾	1 5⅝	2½	680	Tallow and bees-wax on paper.	5·886
Enfield, Long ,, 1853	8 14½	4 6½	4 4½	3 3	·577	3	1 ,, 78″	900	0 13½	1 5½	2½	535	,, ,,	4·356
,, Short ,, 1860	8 11¾	4 0¾	4 1½	2 9	·577	5	1 ,, 48″	1200	1 11¾	1 10¾	2½	535	,, ,,	4·356
Snider ,, 1864	9 5	4 7⅝	4 12½	3 3	·577	3	1 ,, 78″	950	0 13¼	1 5½	70 gr.	480	Three cannolures with wax.	4·855
Martini-Henry, Mark III ,, 1871	9 0	4 1⅜	3 5¾	2 9½	·450	7	1 ,, 22″	1800	1 1	1 10½	85 gr.	480	Wax-paper round bullet and bees-wax-wad.	2·958
Enfield-Martini ,, 1886	9 5	4 1½	3 13	2 9½	·402	7	1 ,, 15″	2000	1 8	1 6½	85 gr.	384	Cardboard bees-wax-wad.	2·917
Lee-Metford, Mark I ,, 1887	9 6	4 1½	..	2 6	·303	7	1 ,, 10″	3500	0 15	1 0	70 gr. compressed pellet.	216	Nil.	2·975

MILITARY RIFLES IN USE IN THE PRINCIPAL ARMIES OF EUROPE AND IN THE UNITED STATES IMMEDIATELY PRECEDING THE ADOPTION OF MAGAZINE RIFLES.

Country.	System.	Breech-closing Mechanism.	Without Bayonet.		Barrel.		Charge.		Approximate Proportion of Powder to Bullet.	Value of $\frac{D^2}{W}$.	Velocities.				Heights of Trajectories.			Country.
			Weight.	Length.	Calibre.	Length.	Powder.	Bullet.			Muzzle.	500 yards.	1000 yards.	1500 yards.	500 yards.	1000 yards.	1500 yards.	
			lb. oz.	ft. in.	in.	in.	gr.	gr.			F.-s.	F.-s.	F.-s.	F.-s.	feet.	feet.	feet.	
Austria	Werndl.		9 13½	4 2	·433	33	77	370	1 to 4⅘	3·547	1439	854	620	449	8·252	49·41	162·6	Austria.
England	Martini-Henry.	Falling hinged block.	9 0	4 1½	·45	33$\frac{3}{16}$	85	480	1 to 5$\frac{9}{16}$	2·958	1315	869	664	508	8·594	47·90	147·1	England.
,,	Enfield-Martini.		9 5	4 1½	·40	33$\frac{3}{16}$	85	384	1 to 4½	2·917	1570	947	719	558	6·704	39·00	122·0	,,
France	Gras.	Bolt.	9 4	4 3½	·433	32⅜	80	386	1 to 4⅘	3·416	1439	873	643	471	7·769	46·6	151·8	France.
Germany	Mauser.	Bolt.	10 4	4 4⅝	·433	33⅝	75	380	1 to 5	3·453	1430	859	629	459	8·249	48·68	159·2	Germany.
Italy	Vetterli.	Bolt.	9 9	4 5⅜	·408	33⅜	62	310	1 to 5	3·759	1430	885	595	422	8·527	52·17	176·3	Italy.
Norway and Sweden.	Jarmann.	Bolt.	10 1½	4 4⅛	·397	32	77	337	1 to 4$\frac{7}{16}$	3·222	1536	908	675	504	7·235	42·97	187·6	Norw. and Swed.
Russia	Berdan.	Bolt.	9 12¼	4 5½	·42	32½	77	370	1 to 4⅘	3·336	1444	873	645	476	7·995	47·01	151·7	Russia.
United States	Springfield.	Turnover block.	9 5½	4 3¾	·45	32½	70	500	1 to 7	2·884	1301	875	676	523	8·574	46·88	142·3	United States.

velocity and great accuracy are required at moderately long ranges; it is therefore necessary to have a heavy bullet in proportion to its diameter. But in sporting rifles long range shooting is not required; the bullet can therefore be made very much lighter in proportion to its diameter. And as the shock of recoil from a light bullet is comparatively slight, the powder charge may be very large; by this means a very high muzzle velocity is obtained and great accuracy at short ranges. As an example of the above we may take the ·450" bore Express rifle and compare it with the Martini rifle having the same bore. The charge of powder for the Martini-Henry cartridge is 85 grains, and weight of bullet 480 grains—proportion of powder to bullet, 1 to 5⅝; muzzle velocity, 1320 ft.-seconds; highest point of trajectory at 100 yards, 2⅝ inches; at 150 yards, nearly 7 inches. In the ·450" Express the powder charge is 120 grains; weight of bullet, 260 grains; proportion of powder to bullet, 1 to 2⅛; muzzle velocity, over 2000 ft.-seconds; highest point of trajectory at 100 yards, 1⅛ inch; at 150 yards, under 3¼ inches. In the year 1891 the troops of the countries enumerated below were either armed or were in process of being armed with magazine rifles; but at that time in Norway and Sweden and in Russia the pattern to be adopted had not been finally decided on. In the United States of America the original Lee rifle is still in use, but the Winchester and other small-bore repeaters are also in the hands of a part of the United States army.

MAGAZINE RIFLES IN USE.

Country.	Rifle.	Weight.		Calibre.	Magazine.	No. of Rounds in Magazine.
		lb.	oz.	inches.		
Austria......	Mannlicher.	10	2	·315	Fixed box.	5
England.....	Lee-Metford.	9	6	·303	Detachable.	8
France......	Lebel.	9	4	·315	Tube.	8
Germany....	Mauser.	9	8	·310	Fixed box.	5
Italy........	Vetterli.	10	10	·409	Fixed box.	5

For a more detailed account of the arms referred to in above article the reader is referred to 'Armes à feu portatives,' by Schmidt, in *Engineering*, Nos. of February 6, March 6, April 3, and May 15, 1891, and *Treatise on Military Small-arms and Ammunition*, by Lieut.-colonel Bond, R.A. See also the articles in this work on FIRE-ARMS, GUN, GUNNERY, PROJECTILE, VOLUNTEERS, &c.

Riflemen. All British infantry are now riflemen; but till 1854 riflemen were the exception, the army generally having the smooth-bore 'Brown Bess.' During the Peninsular war the 60th and 95th Regiments were armed as riflemen, taught light infantry drill, and clothed in dark green. The 95th became the 'Rifle Brigade.' The 60th are called 'The King's Royal Rifle Corps.' In 1881 the 26th and 90th were linked to form the 'Scottish Rifles,' and dressed in green; while the 83d and 86th Foot were formed into the 'Royal Irish Rifles.' See also VOLUNTEERS.

Riga, capital of Livonia, and next after St Petersburg and Odessa the third seaport of Russia, lies on the Dwina (crossed here by a bridge of boats and a railway bridge) 7 miles from the mouth of the river, and 350 by rail SW. of St Petersburg *viâ* Pskoff. The old town has narrow streets and mediæval houses and stores; but the suburbs are laid out in broad streets with handsome buildings. The chief edifices are the cathedral built in 1204, burned down in 1547, but rebuilt; St Peter's Church (1406), with a steeple 460 feet high; the castle of the old Knights of the Sword, built 1494–1515, the former residence of the grand-master of the order; and several old guild houses and Hanseatic halls. It is the seat of an archbishop of the Greek Church. Its industries are rapidly growing; they turn out cottons, machines, tobacco, corks, spirits, oil, metal wares, glass, paper, flax, jute, and oilcloth, and employ nearly 12,000 work-people. The exports reach an annual average of £5,560,000 (£2,396,000 in 1866), and embrace grain (average £1,433,000), timber (£1,175,000), flax (£1,077,000), linseed (£581,500), hemp and hemp-seed (£443,000), wool, hides, eggs, oilcake, hair (horse and camel), and mineral oil. The imports (iron and steel, coal, machinery, cotton, dye-woods, corkwood, herrings, manure, woollens, and wine) average £2,233,000 (£675,000 in 1866). Britain's share in this trade is represented by an average of £2,604,000 for exports and £978,350 for imports. The port, which is closed by ice for three to four months in the winter, is entered by an average of 2396 vessels of 1,047,915 tons every year, of which 625 of 464,500 tons are British. Riga has grown from 102,590 inhabitants in 1867 to 169,329 in 1881, and 181,935 in 1891. Nearly one-half are Germans (with German-speaking Jews), one-fourth Russians, and one-fourth Letts. Riga was founded in 1201 by Albert, Bishop of Livonia, and soon became a first-rate commercial town, and member of the Hanseatic League. It belonged to Poland from 1561, and in 1621 was taken by Gustavus Adolphus, and in 1710 was finally annexed to Russia.

The GULF OF RIGA is an inlet on the east side of the Baltic Sea, which washes the shores of Courland, Livonia, and Esthonia. It is 105 miles in length from north to south, and about 60 in breadth. The islands of Oesel, Dagö, Mohn, and Worms lie athwart the entrance. The chief river which falls into the gulf is the Dwina. Sandbanks render navigation in some parts dangerous.

Righi. See RIGI.

Right Ascension. See ASCENSION (RIGHT).

Right-handedness is no doubt due to the lack of perfect symmetry in the human body. If the latter could be folded over from a medial line so that each organ of the one side fell exactly upon a corresponding organ of the other, we should have a structure highly favourable, mechanically, to the equal use of each limb, and ambidextral individuals would be the rule, not the exception. If a vertical line be drawn dividing the body it will be found that the centre of gravity is a little to the right of this medial line. This makes the right side heavier. From a series of experiments the greater weight has been estimated at about 15 ounces. Upon this fact is founded the mechanical theory of right-handedness, or the predominance of the right hand over the left; or, more generally, of the limbs of the right side over those of the left, as expounded by Professor Buchanan of Glasgow in a pamphlet published in 1862. The three-lobed right lung is more capacious and receives more air during an inspiration than the two-lobed left. The liver during inspiration swings toward the right side, shifting the centre of gravity farther to that side. In violent muscular exertion there is more air proportionally inhaled by the lung of the side which sustains the exertion. Normally about 230 cubic inches of air are contained by the lungs, of which the right holds 20 inches more than the left. Under exertion of the right side the larger lung is better filled than the smaller, and the centre of gravity is removed until it is found in a line passing through the right foot; so that the right leg and foot afford a steadier basis of support than the left would do under similar circumstances. Whichever leg we stand on we use the arm of that side to greater advantage, and thus, through the greater use of the right lower limb, the right upper limb comes to be preferred.

Professor Buchanan's theory also explains the almost universal habit of carrying burdens on the left shoulder. In the case of a light weight, slung on the arm, the equilibrium of the body is better maintained by carrying it on the left side. If the weight be a heavy one, borne on the left shoulder, the burden is really being supported very much by the right limb, owing to the natural curve of the body towards the right side, while sustaining the pressure.

But, it may be argued, if this theory covers the case, then left-handedness, which is certainly inherited, cannot be accounted for except on the extraordinary supposition of transference of the viscera. In a very few cases left-handedness has been found to accompany such transposition. Strange to say the liver has been found on the left side, and the heart, stomach, and spleen on the right without any derangement to the health of the subject, even from the point of view of a life-insurance company. Nevertheless, the number of cases of genuine left-handedness far exceeds such instances of transposition. An explanation of left-handedness in normal structures has been sought by falling back on the fact that the cerebral hemispheres of the brain work the muscles cross-wise. Ferrier's researches have proved that when we see with the right eye we see with the left side of the brain. Another curious and instructive fact is that, although an animal be rendered blind of an eye by the destruction of a convolution on one side of the brain, the blindness is temporary. Soon the other hemisphere can take up the function, and then vision is possible with *both* eyes as before.

Viewed in this light, hereditary left-handedness may be due to the greater development of the right side of the brain. Suppose accident, or the cruelty of the conqueror, had deprived a comparatively young archer of his right hand or right eye (and the latter cruel custom is referred to in the Bible), then the left hand, governed by the right hemisphere, being called into work would react on that hemisphere, whose blood-vessels would be oftener replenished and whose strength and sensitiveness would grow. It is not too much to assume that in some cases this improved power of the right hemisphere might be transmitted to a descendant. 'It is practically certain,' says Dr Bastian, 'that the great preponderance of right-handed movements in ordinary individuals must tend to produce a more complex organisation of the left than the right hemisphere.' M. Broca states that in forty brains he examined he found the left frontal lobe heavier than the right. These investigations have not yet been thoroughly carried out; but possibly the explanation of obstinate left-handedness lies in that direction.

In connection with the evolution of the species right-handedness, in all probability, has been a late acquisition. The body is more symmetrical in early youth, and is more symmetrical in the female than in the male. A very young child betrays no disposition to use the right hand more than the left. The habit of using the right hand gradually increases with boyhood, and boys have to the last a wider range with the right hand than girls, who are proverbially bad stone-throwers. Hitherto, however, the oldest records of the human race, even when man sketched with a flint point on the bones of extinct animals, prove him to have been a right-handed being. His profiles are then sketched with faces toward the left, just as a street arab chalks them on a door at the present day. Nevertheless, the primeval left-handed artist often betrays himself. Bronze weapons are the weapons of right-handed individuals; witness the curious yew-tree handle of a bronze sickle fished up from the lake of Brienne, Switzerland, quite intact and ingeniously carved, 'as incapable,' says Sir Daniel Wilson, 'of being used by a left-handed shearer as our present mower's scythe.'

A few observers of the habits of savages have remarked that left-handed individuals were proportionally more numerous among them. This is what we should expect from the enormous additional demands made by civilisation, its manners, and its tools upon the activity of the right hand. It only requires to spend an hour at a carpenter's bench to see how planes, screws, &c. are fashioned to suit that member. In drawing a pattern of small repeating character we begin, as we begin to write a page, at the top left-hand side, so as to avoid placing fingers on the still undried pigments. Military drill, associated labour, and, as much as any, the tyrant fashion, all urge on the right hand in the path of greater dexterity, leaving the left as the inept drudge whose duty it is merely to assist. No wonder the right has acquired strength, size, greater tactile sensibility, and greater patience of the extremes of heat and cold. Naturalists, who observe that adult monkeys catch nuts more with the right hand, that the African elephant digs more with the right tusk, or that the Carolina parrot has a preferential claw for grasping, tell us that these habits are subject to more numerous exceptions than the exception of left-handedness with human beings. Egyptian and Assyrian painting and sculpture and Etruscan bronzes also elucidate the general law that burdens have been assigned to the left shoulder; so that the position of the shepherd's plaid is nowise a whim, but has its roots in the far past. The primitive blanket-like toga of the Etruscans covers the left shoulder, and is wrapped under the right armpit to allow of the freer motion of that arm.

Use and disuse, by strengthening or weakening organs, would warrant us in believing that where there is inequality of vision between one's eyes the balance would be thrown in favour of the right. As Sir John Herschell has remarked, cases can be adduced of persons who were unaware of one of their eyes being weak almost to blindness until far advanced in life. The writer has a near-sighted left eye, inherited from a grandfather short-sighted in both, the defect of which he did not discover until far advanced in manhood. It is well to know that such disparity in power of vision can be greatly mitigated by the lenses of the oculist. A good deal of folklore is to be found connected with the right and left hands. The rule of the road and the interpretation of omens tell, by the contrary rule obtaining in nations of different race, no small part of their story as to whether they belong to the conquerors or the conquered. See Sir Daniel Wilson's *The Right Hand: Left-handedness* (1891); Professor Dwight in *Scribner's Magazine* (April 1891); also the article BRAIN, Vol. II. pp. 391, 392.

Right, CLAIM OF. See FREE CHURCH.

Right of Way, the right which the public has to the free passage over roads or tracks. The expression is more generally applied to those public routes which are *not* statutory roads, such as hill or field paths, drove roads, bridle and other paths, and cart or driving roads in the common use of the public, which are not kept up by the county authorities. In many instances these roads are the only means of communication between important districts; and generally they are the shorter, and often the more picturesque, ways from one point to another. Right of way also exists along the seashore and on the banks of tidal rivers. The law of rights of way is judicial and not statutory. In Scotland, where of late the chief *causes célèbres* have originated, forty years' continuous use by the public of such roads or paths is the prescriptive period for constituting a right of way; while in England the public acquire a right of way under dedication to them by the owner of the soil, and user signifying their acceptance of the same, or when dedication can fairly be assumed from notorious user, which needs generally to be proved for a lengthened period, but which may yet, according to circumstances, be presumed from a period of user of only a few years. The following points fall under the legal aspect of a public right of way, according to the law of Scotland: (1) The path or road must go from one public place to another public place. By this is not meant that it must go from one town or village to another; it may be between any two points at which the public have a right to be, and to which they resort for some definite and intelligible purpose. Thus it may run from one highway to another; but it cannot run between a public road and a private house. (2) It must be along some tolerably well-defined route between the *termini*. (3) If there is a definite road between two public places it does not matter for what purpose it is used. It is not necessary that the public should use the road for any business purpose; it is quite sufficient if the purpose is merely for recreation, the exercise of walking, or the contemplation of the beauties of nature. (4) Its use must be maintained by the public themselves in order to keep up the right to the way. Continuous use is necessary, though the public need not use the road every day or every month; yet the right is in danger if use is discontinued for any length of time. But if the public allow themselves to be excluded from the road for seven years the proprietor becomes entitled to continue the exclusion by interdict without raising the question of public right—that is to say, possession for seven years throws the *onus probandi* on the public. According to the law of England such points are not construed in a narrow sense, and they distinctly differ in the following respects: (1) It is not necessary that the right of way be between two public places, and (2) continuous use is not necessary, for no lapse of time as regards user or the claiming of their rights can bar the right of the public to a footpath or a highway once dedicated to them, or where dedication can be assumed. There are, however, statutory provisions for shutting up a road when it becomes unnecessary. The whole breadth of the originally dedicated road, including what is known as 'road wastes,' must always remain as the right of way to the public, and cannot be encroached upon.

In Scotland there is no public authority for the protection of the interests of the public in rights of way, or for their maintenance. They are in the position of being left to chance; and 'what is everybody's business is nobody's business' has resulted in many valuable rights being lost. The public, or individual members of the public, have to incur the costs and risks of litigation in the courts under an action of declarator to recover a road which a proprietor has closed, and it is difficult for them to do this. In England, though there is also no direct public authority for the guardianship of rights of way, yet their *maintenance* is so far provided for under section 10 of the Local Government (England) Act, 1888, which enacts that county councils 'may, if they think fit, contribute towards the costs of the maintenance, repair, enlargement, and improvement of any highway or public footpath in the county, although the same is not a main road.'

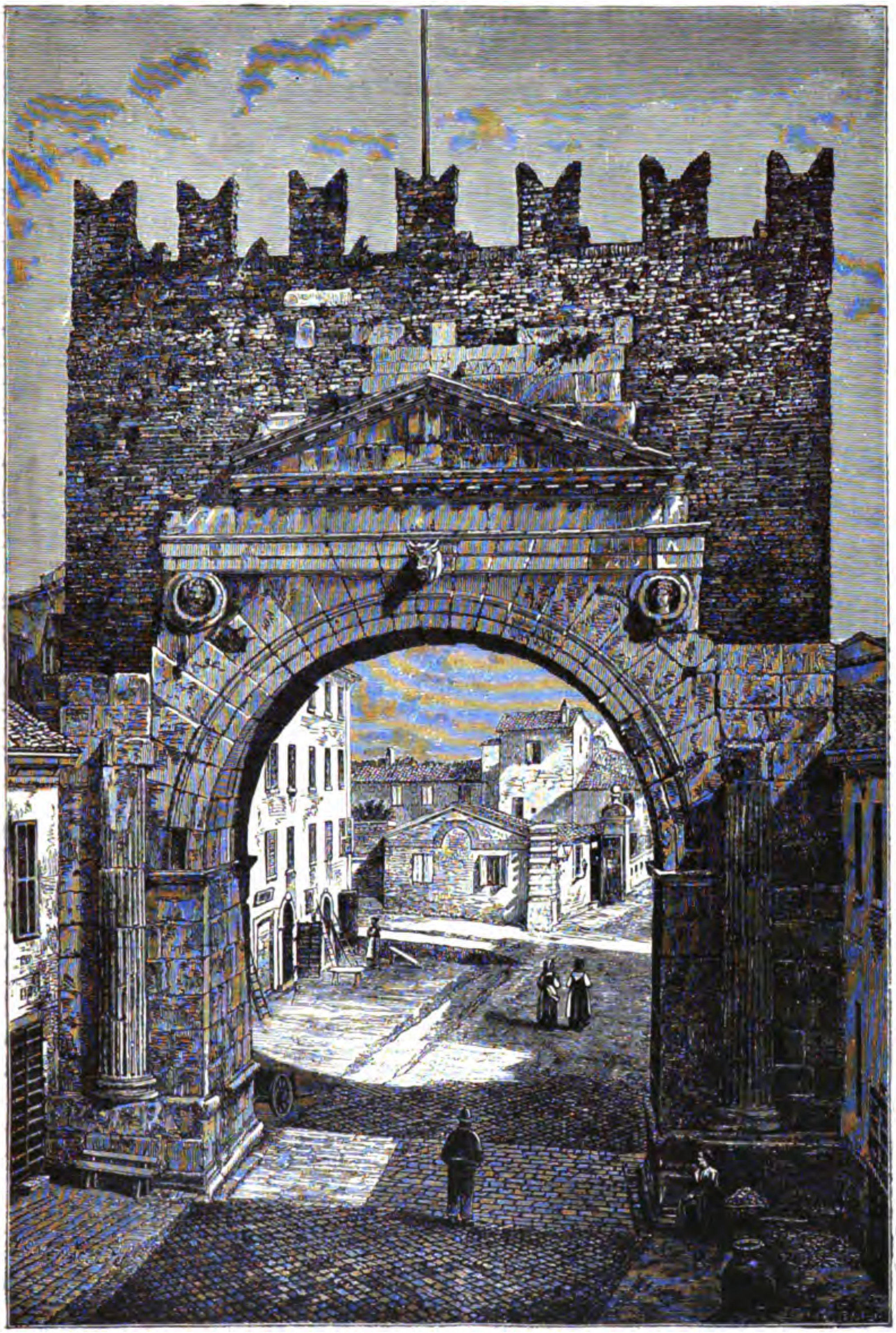
Both in Scotland and England influential societies exist for the purpose of assisting in the protection of public rights of way—viz. the Scottish Rights of Way and Recreation Society, Edinburgh, founded in 1844 and reconstituted in 1884, and the National Footpath Preservation Society, London, founded in 1884. There are also several societies for special districts. Bills have since 1888 been introduced into the House of Commons by private members with the object of charging a public authority with the duty of protecting and maintaining rights of way, but no legislative measure has yet been passed. See also the section on the law of highways at Roads. For right of way on the Norfolk Broads, see Walter Rye, *Fishing, Shooting, and Sailing on the Norfolk Broads* (Norwich, 1891).

Rights, Declaration and Bill of. The Convention Parliament which called the Prince and Princess of Orange to the throne of England set forth, in a solemn instrument known by the name of the Declaration of Rights, the fundamental principles of the constitution which were to be imposed on William and Mary on their acceptance of the crown. This declaration (February 1689), drawn up by a committee of the Commons, and assented to by the Lords, began by declaring that King James II. had committed certain acts contrary to the laws of the realm, and, having abdicated, had left the throne vacant. The main provisions of the Declaration, and of the Bill of Rights (October 1689) based upon it, were to the effect that the power of suspending and of dispensing with laws by regal authority is illegal; that the commission for creating the late Court of Commissioners for Ecclesiastical Causes, and all commissions and courts of the like nature, are illegal; that the levying of money for the use of the crown by prerogative, without grant of parliament, is illegal; that it is the right of the subjects to petition the king, and all prosecutions for such petitioning are illegal; that the raising or keeping of a standing army in time of peace, except with consent of parliament, is illegal; that Protestant subjects may have arms for their defence; that the election of members of parliament should be free; that freedom of speech in parliament should not be questioned in any place out of parliament; that excessive bail ought not to be required, or excessive fines imposed, or cruel or unusual punishments inflicted; that jurors should be duly impanneled, and that jurors in trials for high-treason should be freeholders; that grants and promises of fines and forfeitures before conviction are illegal; and that for redress of all grievances, and the amendment, strengthening, and preserving of the laws, parliaments ought to be held frequently. The remaining clauses treat of the succession to the crown. See also Petition of Right.

Rights of Man, Declaration of the, a famous statement of the constitution and principles of civil society and government adopted by the French National Assembly in August 1789. In historical importance it may fairly be ranked with the English Bill of Rights and the American Declaration of Independence. It suggested the title for Paine's defence of the French Revolution against Burke (1791-92); which was followed by Mary Wollstonecraft Godwin's *Vindication of the Rights of Women.*

Rigi, or Righi, an isolated mountain standing between the Lakes of Lucerne, Zug, and Lowerz, in Switzerland, is greatly frequented by visitors on account of the extensive views it commands of some of the finest Swiss scenery. Verdant pastures clothe the summit, and the slopes are belted with forests. About 100,000 tourists ascend the Rigi (5906 feet) every season, principally by means of two toothed railways—one from Vitznau (1871) on the Lake of Lucerne, the other from Arth (1875) on the Lake of Zug, 4¼ and 7 miles long respectively. There are half-a-dozen hotels near or at the summit, as well as a Capuchin monastery (1689), the church of which contains a wonder-working image of the Madonna that attracts numerous pilgrims.

Rigidity is one of the properties of matter which sharply differentiate solids from fluids. In



THE ARCH OF AUGUSTUS AT RIMINI.

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abstract dynamics a rigid system is a collocation of particles which, however much they may move as a whole, never alter their mutual relative positions. Such a system has no true physical existence, since there is no known substance which can resist deformation. Nevertheless, those substances which yield but slightly to deforming stresses—all solids practically—are regarded as possessing a certain rigidity, which is measured by the ratio of the deforming stress to the deformation produced. The greater this ratio is, the more nearly does the substance approach the condition of the ideal *rigid* body, whose behaviour under the action of given forces forms the subject-matter of what it is usual to call Rigid Dynamics. The property of rigidity itself, as described above, falls to be discussed under the general subject of elasticity. Of ordinary substances steel possesses the highest rigidity. See ELASTICITY, ETHER, MATTER.

Rigor Mortis. See DEATH.

Rigveda, the first and principal of the four Vedas. See VEDA.

Rilievo. See RELIEF.

Rilo. See RHODOPE.

Rim'ini, a city of Italy, stands on the shore of the Adriatic, 69 miles by rail SE. of Bologna; it is still surrounded with walls, and contains many mediæval buildings. The cathedral, the temple altered and built to commemorate the unhallowed love of Sigismundo Malatesta and Isotta degli Atti, a beautiful Renaissance structure, dates from 1446–50; the church of St Giuliano is adorned with pictures by Veronese, and St Girolamo with a picture of that saint by Guercino. The ancient castle of the Malatesta is now used as a prison. The little river on which the city stands is spanned by a white marble Roman bridge, 236 feet long, with five arches. Beside one of the gates stands the triumphal arch, 46 feet high, erected in honour of Augustus. The spot where Cæsar stood to address his soldiers after crossing the Rubicon (about 10 miles NW. of Rimini) is marked in one of the squares by a monumental pillar. The city manufactures silks and sail-cloth. Pop. 10,838, with suburbs 19,158. One of these suburbs, half a mile distant on the seashore, is much visited for sea-bathing. Originally an Umbrian, and then for several centuries an Etruscan city, Rimini (Ariminum) fell into the hands of the Romans in 286 B.C. They made it the northern terminus of the Flaminian Way from Rome, and the southern terminus of the Æmilian Way to Piacenza and of the Popilian Way to Venice, and utilised the advantages of its position as a seaport for communicating with the east side of the Adriatic. After being battled for by Goths and Byzantines, and held by the latter, the Lombards, and the Franks, it became a shuttlecock between the emperor and the pope. At last, weary of this alternation of masters, neither of whom profited her, Rimini put herself under the protection of the House of Malatesta (1237), whose chiefs soon made themselves absolute masters of her fortunes. Amongst the tragic episodes that marked the family history of these rulers may be mentioned the killing of Francesca (q.v.) da Rimini and her lover by his brother, and the story of Parisina, the subject of Byron's poem. The most famous, or rather infamous, member of the family was Sigismundo (1417–68), a brave and skilful soldier, a scholar, a patron of the fine arts, but a man of brutal animal passions, and with no sense of right and wrong. The head of the house sold his rights over Rimini to the Venetians in 1503; but the pope wrested them to himself in 1528, and kept them until 1860. See Yriarte's *Un Condottiere au XV. Siècle: Rimini* (1882).

Rimouski, a Canadian town, stands on the south shore of the St Lawrence, at the influx of the Rimouski River, 182 miles by rail NE. of Quebec. It is the seat of a bishop, a summer watering-place, and a telegraphing station for arrivals and departures of ships. Pop. 1417.

Rinderpest. See CATTLE-PLAGUE.

Ring (Sax. *ring* or *hring*) is any circle or section of a cylinder. Rings of gold, silver, and of other metals and materials have been worn in all times and countries, and while they have been used to decorate the ears, neck, nose, lips, arms, legs, and toes, finger-rings have always occupied the most important and significant place among such ornaments. From the earliest period of civilised relationships the finger-ring was a convenient means for carrying the signet of its wearer. In Genesis, xxxviii. 17, 18, we read that Judah left his signet as a pledge with his daughter-in-law; and in chap. xli. 42 it is narrated that Pharaoh delivered to Joseph his royal signet as a token of deputed power and authority. From the fact that these ancient rings carried engraved signets early ring-lore is intimately mixed up with the origin and development of gem and seal engraving. Herodotus mentions the wearing of finger-rings by the Babylonians; and from Asia the habit probably passed into Greece, although the Homeric poems mention ear-rings alone. In the later Greek legends the ancient heroes are described as wearing rings, and every freeman throughout Greece seems afterwards to have possessed one. The Lacedæmonians wore iron rings. The Romans are said to have derived the use of rings from the Sabines; their rings were at first, as those of the Greeks, signet-rings, but made of iron. Every free Roman had a right to wear one; and down to the close of the republic the iron ring was worn by those who affected the simplicity of old times. Ambassadors, in the early age of the republic, wore gold rings as a part of their official dress—a custom afterwards extended to senators, chief-magistrates, and in later times to the equites, who were said to enjoy the *jus annuli aurei*, from which other persons were excluded. It became customary for the emperors to confer the *jus annuli aurei* on whom they pleased, and the privilege grew gradually more and more extensive, till Justinian embraced within it all citizens of the empire whether *ingenui* or *libertini*. Rings entered into the groundwork of many oriental superstitions, as in the legend of Solomon's ring, which, among its many magical virtues, enabled the monarch to triumph over all opponents, and daily to transport himself to the celestial spheres, where he learned the secrets of the universe. The Greeks mention various rings endowed with magic power, as that of Gyges, which rendered him invisible when its stone was turned inwards; and in old Saxon romances a similar ring legend is incorporated. The ring of Polycrates (q.v.), which was flung into the sea to propitiate Nemesis, was found by its owner inside a fish; and there were persons who made a lucrative traffic of selling charmed rings, worn for the most part by the lower classes. By many Mussulmans at the present day a ring having enclosed in it a verse from the Koran is worn as an amulet.

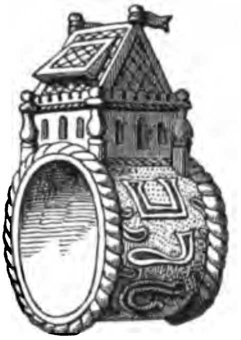


Fig. 1.

Various explanations have been given of the connection of the ring with marriage. It would appear that wedding-rings were worn by the Jews prior to Christian times. Fig. 1 shows a Jewish marriage-ring beautifully wrought in gold filigree, and richly enamelled, now in the possession of Lord Londesborough. It has been said that as the delivery of the signet-ring to any one was a sign of deputing or sharing of authority, so the delivery of a ring by husband to wife indicated her admittance to share his rights and privileges. In pagan times in Europe the ring seems to have been connected with fidelity or with espousals. Fig. 2 shows a form of betrothal-ring called a *gimmel*, or linked ring, which was used in later times; the upper fig. shows the three parts brought together, the lower fig. the parts separately. By an ancient Norse custom, described in the *Eyrbrygia Saga*, when an oath was imposed, he by whom it was pledged passed his hand through a silver ring, sacred to that ceremony; and in Iceland the ceremony of betrothal used to be accompanied by the bridegroom passing his four fingers and thumb through a large ring, and in this manner receiving the hand of the bride, as is represented in a woodcut in an old edition of *Olaus Magnus*. As lately as 1780 the practice existed in Orkney of a man and woman plighting their faith at the Standing Stones of Stennis by joining their hands through the perforated Stone of Odin. For betrothal, as well as for marriage, a ring is commonly bestowed; and in many countries both spouses wear wedding-rings. Although the third finger of the left hand is the official finger, rings are worn on all fingers, and in mediæval times even the thumbs were frequently decorated with large and massive rings. During the 16th, 17th, and 18th centuries it was a very common practice to have mottoes inscribed on rings (fig. 3), including wedding-rings, and the motto was called the *posy* or *chanson*. The ring was the symbol of the dominion of Venice over the Adriatic; and yearly, on Ascension Day, a ring was thrown by the Doge from the ship *Bucentaur* into the sea, to denote that as the wife is subject to her husband, so is the Adriatic Sea to the republic of Venice. The reception of a ring forms an essential feature in the investiture of many Catholic dignitaries; and even in the Anglican communion a sapphire 'pontifical' ring was presented in September 1891 to the new Archbishop of York. The 'fisherman's ring,' containing an engraved representation of St Peter in an ancient fishing-boat, is the official ring of investiture of the pope. It is broken and remade on the death of each pontiff, and when presented to the new head of the church he declares the name under which he desires to rule, which name is thereafter engraved on it. Cardinals on their elevation receive a sapphire ring, and bishops on their consecration are also invested with a special ring. The reception of novices into Catholic sisterhoods is accompanied with the presentation of a ring, which is worn as a badge of espousal to the church. In the investiture of sovereigns the ring also occupies an important place in the coronation ceremonial. In addition to these, special rings were formerly worn by serjeants-at-law, who also on receiving silk made presents to various functionaries of rings (100 sometimes, costing £55 in all, cf. *Notes and Queries*, 1884). Moreover, the knightly orders, masonic bodies, and merchants employed distinctive rings for enabling them to claim the privileges of their orders or to facilitate their business. The carrying of seals attached to the watch-chain in the first place, and next the introduction of gummed envelopes, have had no small influence in decreasing the official importance of rings.

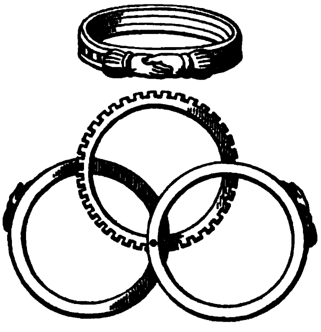


Fig. 2.

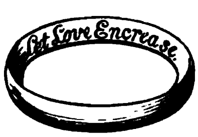


Fig. 3.

See the article Gem; *Finger-ring Lore*, by W. Jones (1877), an elaborate compilation of the practices, superstitions, and traditions connected with rings. See also King's *Antique Gems and Rings* (1872); *History and Poetry of Finger-rings*, by C. Edwards (New York, 1880); articles by Waterton, Fortnum, and others in *Archæological Journal*; and F. Schneider, *Die Gestaltung des Ringes vom Mittelalter bis in die Neuzeit* (Mainz, 1878).

Ringan, St. See Ninian.

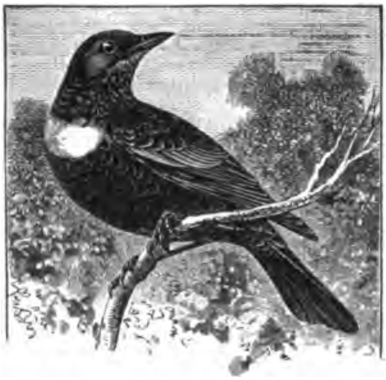
Ringbones. This term is applied to osseous or bony growths which are found upon the upper and lower pastern bones of the horse. They are of two kinds, true and false. The false ringbone is an exostosis situated above the middle of the long pastern bone, and as a rule gives no inconvenience, and unless very large is not looked upon as an unsoundness. The true ringbones, which are of two kinds—viz. high and, low—are always to be considered as constituting an unsoundness of the gravest character, involving the articular ends of the bones, and giving rise to obstinate and often incurable lamenesses. The high ringbone involves the pastern joint, and the low ringbone the coffin joint, and is partly within the horny foot; in many cases both the high and the low ringbones are coexistent. Ringbones vary in size, but the degree of lameness does not depend upon the mere size of the new formation. Very often the 'ring' may be a mere segment appearing only upon the side of the limb; in other cases it may completely envelop the whole circumference. Ringbones are hereditary, and it is unwise to breed from an animal having a ringbone.

The treatment should be complete rest, fomentations and poultices at first, and afterwards blistering, firing; and in cases that do not give way to these remedies the 'nerve operation' should be performed.

Ring-dove. See Pigeon.

Ring Money. In early commerce, before the invention of coinage, but after the inconveniences of direct barter became evident, the precious metals in the form of rings and other personal ornaments were used as a medium of exchange. The employment of gold and silver as currency in this form among the early Egyptians is proved by contemporary wall-paintings showing the weighing of gold and silver rings, one such picture occurring in the decorations of a rock-grotto associated with the cartouche of Amenophis II. The allusion also in Genesis, xliii. 21, to the sons of Jacob finding their money 'in full weight' in the mouth of their sacks, may be taken as indicative of such a currency at a time when coinage of definite weight and value did not exist. A similar currency appears to have been in use among certain western communities at a much later period. A Norse law made about 1220 alludes to an established ring money, of which, however, each ring was of definite weight. It has been suggested that many ancient Celtic ornaments of gold and silver had a definite weight and value to fit them for exchange purposes; but, while it is certain that these objects served both for personal adornment and for purposes of traffic, it has not been proved that they were made to any standard of weight or value. Cæsar mentions that in Gaul and Britain gold and silver rings were used as money. Among the modifications of ring money in use in different countries may be mentioned the silver fish-hook money of Ceylon, mentioned by Tavernier, of the form of a flat wire bent into a hook, and issued as late as 1659. At the present day ring money for African traders is regularly manufactured at Birmingham of copper, or an alloy of copper, and is known under the name of 'Manillas.'

Ring Ouzel (*Turdus torquatus*, or *Merula torquata*), a species of thrush, rather larger than a blackbird. It is a native chiefly of the western parts of Europe; it spends the winter in the south of Europe, Northern Africa, Syria, and Persia, and visits more northern regions in summer. It occurs frequently in many parts of the British Islands, where it breeds even in the Orkneys, but in very few districts does it remain all the year round. It is seldom seen in the more cultivated and thickly-peopled districts, preferring mountain-slopes, heaths, and their vicinity. It begins to breed in the later part of April, and makes its nest generally in heathy banks, often under a bush. The nest is made of coarse grass, within which is a thin shell of clay, and an inner lining of fine dry grass. The eggs are usually four in number, and are greenish blue in colour, flecked and spotted with reddish brown; and not infrequently there is a second brood in July. The food consists of worms, slugs, insects, and moorland berries, and the bird often makes raids upon fruit-gardens in its neighbourhood; while in vine countries it feeds largely upon grapes. In some parts of Scotland it is known as the *Moor Blackbird*. It is of a dark-brown, almost black, colour; the feathers are edged with blackish gray, the wing feathers more conspicuously with gray, and there is a broad crescentic white gorget—whence the name. The legs and feet are brownish black. The female is lighter and browner, with a narrower and duller gorget. The song consists of a few loud, clear, and plaintive notes, but is somewhat monotonous. See also OUZEL, and for the Water Ouzel, DIPPER.



Ring Ouzel (*Turdus torquatus*).

Ringwood, a town of Hampshire, on the Avon, 25 miles WSW. of Southampton. Pop. of district, 5545.

Ringworm (*Tinea tonsurans*) is a disease dependent on the presence of a parasitic fungus, known to botanists as the *Trichophyton tonsurans*, and discovered in 1844 by Malmsten. The fungus consists of a mycelium, or network of threadlike filaments, with oval, transparent spores, about $\frac{1}{7000}$th of an inch in diameter, for the most part connected in chains, but sometimes isolated. When found on the surface of the body the fungus grows in the epidermis; but on the scalp, where it is most common, it is chiefly seated in the interior of the hair-roots. The diseased hairs lose their elasticity and break when they have risen a line or two above the scalp.

Ringworm of the Body (*Tinea circinata; Tinea marginata*) first appears as a rose-coloured and slightly-elevated spot about the size of a threepenny-piece, on which a bran-like desquamation of epidermis soon begins, accompanied by slight itching. This spot gradually increases in size, but retains its circular form; and as it extends, the healing process commences at the centre, so that the circular red patch is converted into a ring, enclosing a portion of healthy skin; and a ring thus formed may continue to increase till it reaches a diameter of four inches, or even more. It is apt to affect the face, the neck, the back, and the outside of the wrist. This form of ringworm frequently terminates spontaneously.

Ringworm of the Scalp (*Tinea tonsurans*) usually occurs in children, and is especially prevalent when the nutrition is defective, or there is a scrofulous taint in the constitution. In infants, and after the age of puberty, it is rare, and can usually be readily cured. It appears in the form of round, scaly, irritable patches on different parts of the head; and the irritation often occasions the formation of minute vesicles. The hairs at these spots become dry and twisted, and are easily removed, but when the disease advances they break close to the scalp if an attempt is made to extract them. The stumps, and the epidermis surrounding them, become covered with a characteristic grayish-white powder, consisting of the sporules of the fungus. The diseased parts are slightly elevated and puffy, and differ from the healthy scalp in colour, being bluish or slate-coloured in dark persons, and grayish red or yellow in fair patients. The inflammation will last as long as the growth of the fungi continues; and even when they die spontaneously, as sometimes occurs, the affected spots may become bald in consequence of the hair-bulbs having become atrophied. This condition, however, generally passes off in time. In some children only single hairs here and there may become or remain affected, and such cases are particularly apt to lead to the spread of the disease, because they are difficult to detect, and often escape recognition.

Ringworm is also sometimes met with in the beard, giving rise to one form of the troublesome disease known as Sycosis. Ringworm is extremely contagious; and when a case of it occurs in a family or a school strict precautions are necessary to prevent its spreading to others. The greatest care should be taken that no brushes, sponges, towels, caps, &c. touched by the patient are used by others. The hair should be kept short, and the scalp anointed daily with carbolic oil, 1 in 20; a cap of linen or oilsilk should be worn night and day; and whatever remedy is selected should be steadily and perseveringly applied. No child with ringworm should be allowed to go to school, unless under very special precautions, nor to the hatter or hairdresser; and intercourse with other children should be permitted as little as possible except in the open air.

Treatment.—Ringworm of the body is usually not difficult to cure. The application of some parasiticide, white precipitate ointment, solution of sulphurous acid, tincture of iodine, usually quickly kills the parasite and so ends the disease. Ringworm of the scalp, on the other hand, is often an extremely intractable affection, because the parasite extends deep into the hair-follicles, and it is very difficult to bring the remedies employed satisfactorily in contact with it in this situation. In recent cases the remedies recommended above are often effectual; but those which have become chronic sometimes tax the ingenuity of the physician and the patience of the nurse to the utmost, and may even last till advancing years make the soil unfavourable for the further growth of the parasite.

Ringworm in the lower animals, as in the human subject, consists of the growth of a vegetable fungus on the surface of the skin, is common amongst young animals, is decidedly contagious, and communicable from man to the lower animals, and probably, also, from the lower animals to man. Commencing with a small itchy spot, usually about the head or neck, or root of the tail, it soon spreads, producing numbers of scurfy circular bald patches. It is unaccompanied by fever, and seldom interferes seriously with health. After washing with soap and water, run over the spots lightly every day with a pencil of nitrate of silver, or rub in a little of the red ointment of mercury, or some iodide of sulphur liniment. See works by A. Smith (3d ed. 1885) and G. Thin (1887).

Riobamba. See CAJABAMBA.

Rio Bravo. See RIO GRANDE.

Rio Cuarto, the second city in the Argentine province of Cordoba, formerly called Concepcion, occupies an important strategic situation on the river of the same name, 500 miles NW. of Buenos Ayres and 170 by rail S. of Cordoba. Pop. 12,000.

Rio de Janeiro, a maritime state of Brazil, lying between Espirito Santo, Minas Geraës, and São Paulo. Area, 26,627 sq. m.; pop. without the city (1888) 1,164,468. The coast is low and swampy, the interior mountainous and healthy; the chief ranges are the Serras dos Orgãos (5750 feet) and da Mantiqueira in the extreme west (8900). The principal river is the Parahyba. There are still considerable forests, though they have been greatly thinned. Coffee is the chief agricultural product, and after that sugar and cotton. Sugar-houses, distilleries, breweries, and manufactories of cottons, hats, and cigars are numerous. The state contains iron, kaolin, marble, &c. The capital is Nicteróhy, on the Bay of Praia Grande; with São Domingo and Praia Grande it has 20,000 inhabitants. The German colonies in the state have a pop. of over 15,000.

Rio de Janeiro, the capital of Brazil, stands on the west side of one of the most magnificent natural harbours in the world. An inlet of the Atlantic, the bay of Rio de Janeiro runs northwards for some 15 miles, varying in width from 2 miles to 7; it is girdled on all sides by picturesque mountains, covered with tropical vegetation. The entrance, which is less than a mile wide, passes between two bold headlands, on one of which is a steep conical mass called the Sugar-loaf (1270 feet). The city and its suburbs stretch nearly 10 miles along the shore, climbing up the numerous irregular eminences and dipping into the little green valleys between them, whilst great mountain-ranges (1500 to 3000 feet) shut in the background. About 3 miles SW. of the city stands the precipitous cone of Corcovado (2336 feet), up which a cog-railway carries 50,000 visitors every year to enjoy the magnificent view. The streets are mostly narrow and often mean, and the houses and public buildings, though generally quaint and gay with colour, seldom boast of any very striking architectural features. Although Rio has few magnificent public buildings, it possesses very useful public institutions, as the vast hospital of La Misericordia (1200 patients), the national library (1807), with nearly 150,000 volumes, the national museum (with unique collections), the large lunatic asylum (1841) at the suburb of Botafogo, the botanical gardens with a celebrated avenue of palms (beyond Botafogo), the observatory, the Geographical and Historical Institute (1838), the former royal palace at São Christovão, the arsenal, the naval dockyards, the academy of fine arts, a cadet-school, a school of medicine, a 'Pasteur' institute, a conservatory of music, a polytechnic school, &c. In spite of a good water-supply, chiefly by an aqueduct (1750) 12 miles long, and a new system of sewage-draining, the city is not very healthy; the surrounding hills shut out the breezes, and the heat grows intense in summer. Yellow fever prevails during the hot season; and the Negro population suffer from smallpox. Pop. (1872) 274,972; (1890) 522,651, including many foreigners—Portuguese, British, French, and Germans.

Rio is also the commercial capital, sending out 51 per cent. of the total exports of the country, and bringing in 45 per cent. of the imports. The exports average £10,895,000 a year in value, all except about half a million sterling being for coffee; of the total, £6,500,000 go to the United States, more than £1,000,000 to Germany; Great Britain buys £500,000 less than France and Austria. The imports, chiefly cotton, gold and silver, metals, wool, provisions, and machinery, average about £12,735,000 a year. Great Britain supplies 5¼ millions sterling of this, Uruguay and Argentine Republic about 3½ millions, France close upon 2 millions, and Germany nearly 1½ million. The whole sea-frontage of the city is lined with quays, and in 1889 extensive new harbour-works were begun, embracing a dock of 75 acres, a breakwater 3200 yards long, an elevated railway, hydraulic cranes, warehouses, &c. There enter every year some 1500 vessels of 1,674,000 tons, about one-third (614,000 tons) British. The city possesses cotton, jute, and silk mills, tobacco and hat factories, machine-shops, tanneries, &c.

On 1st January 1531 a Portuguese captain, Alphonso de Souza, entered the bay, and thinking it was the mouth of a large river he called it Rio de Janeiro—i.e. January River. The French established themselves on one of its islands (Villegagnon) in 1555; but they were driven away by the Portuguese in 1567. Rio was founded in the preceding year; was plundered by Duguay-Trouin in 1711; supplanted Bahia as the capital of the viceroy in 1763; and in 1822 was made the capital of the empire of Brazil. The revolution of 15th November 1889, which transformed the empire into a republic, centred in Rio; and its bay was the scene of most of the naval fighting in the civil war of 1893–94. The federal district in which the city stands (area, 538 sq. m.; pop. 800,000) is administered directly by the federal authorities.

Rio Grande, also *Rio Grande del Norte,* and *Rio Bravo del Norte,* a large river of North America, rises in the San Juan Mountains in south-western Colorado, and flows generally south-eastward into the Gulf of Mexico, forming on its way the entire boundary between Texas and Mexico. Its length is about 1800 miles; it is for the most part a shallow stream, but small steamboats can ascend for nearly 500 miles. Its chief affluent is the Rio Pecos.—See also, for other Rio Grandes, PARANÁ and SENEGAMBIA.

Rio Grande do Norte, a maritime state of Brazil, occupies the north-east angle of the country, and is bounded on the N. and E. by the Atlantic. Area, 22,195 sq. m.; pop. (1888) 308,852, one-half Indians. It derives its name from the river Rio Grande, which flows into the Atlantic at the capital, Rio Grande do Norte or Natal (q.v.); but the principal river is the Piranhas. The surface is flat along the shores, which are skirted by dangerous shoals and reefs, but is mountainous in the interior. The principal crops are sugar and cotton; large herds of horses and cattle are reared on the extensive pastures.

Rio Grande do Sul, the southernmost state of Brazil, is bounded on the N. and W. by the river Uruguay, on the S. by the republic of Uruguay, and on the E. by the Atlantic. Area, 91,310 sq. m.; pop. (1888) 564,527, of whom 100,000 are Germans and 52,000 Italians. The northern portion of the state consists of an elevated plateau, the edges of which are heavily timbered; the southern half is a rolling grassy plain, on which large numbers of cattle are kept. The climate is healthy, well suited for Europeans, and the Germans and Italians have established large and prosperous colonies here. All the cereals and fruits of central Europe can be grown advantageously, and the inhabitants are awakening to the importance of developing the immense agricultural resources of the state. The fisheries are of some importance Along the coast stretch the two lagoons, Dos Patos (174 miles long by 34 wide) and Mirim, connected by a navigable channel. The principal articles of export are beans, horns, hair, hides, bones, tallow, jerked beef, tongues, and mandioc flour, reaching nearly half a million sterling in value. The imports, valued at 1¼ million pounds sterling, consist of cotton, woollen, and linen manufactures, coal, earthenware, and hardware. The principal towns are Porto Alegre (q.v.), the capital, Rio Grande, and Pelotas.—The town of Rio Grande stands on the south side of the strait leading into the southern end of the Lagôa dos Patos. Pop. 18,000. In January 1891 a beginning was made with the work of removing the sand-bar that obstructs the entrance, the intention being to deepen the harbour and eventually make Rio Grande a great port for southern Brazil.

Rioja, a western province of the Argentine Republic, with an area of 34,365 sq. m. and a pop. of about 80,000. Much of it is desert, but in the west there are very fertile Andes valleys, where wheat, maize, vines, cotton, and tropical fruits are grown. Copper, silver, and gold are mined.—RIOJA, the capital, founded in 1591, lies at the foot of the Sierra Velasco, among orange groves and vine-clad hills, 350 miles by rail NW. of Cordoba. Pop. 6000.

Riom, a town of France (dept. Puy-de-Dôme), is picturesquely situated on a hill, 8 miles by rail N. of Clermont-Ferrand. It is built of dark lava, and is a perfect treasure of domestic architecture, especially of the Renaissance period. There is considerable trade, and tobacco, linen, and machinery are manufactured. Pop. (1891) 11,189.

Rion. See PHASIS.

Rio Negro, (1) one of the principal affluents of the Amazon River, rises as the Guainia in south-eastern Colombia, and flows east into Venezuela, then south into Amazonas in Brazil, and again east and south-east until it empties into the Marañon, after a course estimated at 1350 miles. Its chief tributary on the right is the Uaupes; on the left it receives the Cassiquiare (q.v.), by means of which communication is established between the Orinoco and the Amazon, and also the Cababuri, Branco, and other streams. It is over a mile broad when its clear, inky-black stream enters the yellow, muddy Amazon. A few miles from its mouth is Manáos (q.v.), on the left bank; and higher up the river opens into great lagoons, nearly choked with numerous islands. See A. R. Wallace's *Travels on the Amazon and Rio Negro* (1853).—(2) A river of Argentinia, which rises in the Andean lake of Nahuel-Huapi, flows north-east as the Cunuonilla and afterwards the Limay, and receives the name of Rio Negro at its junction with the Neuquen, after which it flows east and south-east into the Atlantic Ocean. It is over 500 miles long, and for small steamers it is navigable all the way. Near its mouth there are great saline lakes, from which immense quantities of salt are collected. It bounds on the north and gives its name to a national territory, formerly part of Patagonia, and now containing an area of 81,895 sq. m. of for the greater part level but barren soil. The chief town is Viedma (pop. 1500), 20 miles from the mouth of the Rio Negro.

Rionegro, a town of Colombia, in Antioquia, some 15 miles SE. of Medellin. It was founded in 1545, and the National Convention met here in 1863. Pop. 9000.

Rionero, a town of Southern Italy, 12 miles N. of Potenza; it suffered greatly from earthquake in 1851. Pop. 11,383.

Riot consists in the joint unlawful action, by breach of the peace or by causing terror to the public, of three or more persons assembled together whether they originally assembled for these purposes or no. When a riot becomes formidable any justice of the peace may command the persons assembled, if not less than twelve in number, to disperse peaceably by a form of words called reading the Riot Act (1 Geo. I. chap. 5), thus: 'Our Sovereign Lord the King (or Lady the Queen) chargeth and commandeth all persons being assembled immediately to disperse themselves, and peaceably to depart to their habitations, or to their lawful business, upon the pains contained in an Act of King George for preventing tumults and riotous assemblies.—God save the King (or Queen).' (The omission of these last four words makes the reading nugatory.) To justify the use of military force in the prevention of serious outrages and damage to persons and property, it is not necessary to wait for the proclamation to be read, still less to wait for an hour after it has been read. Though death or wounds result to those composing the mob, such hurt is not a criminal offence. The rioters are guilty of felony, and are liable to penal servitude for life. Prosecutions under the Riot Act must be commenced within twelve months of the time of committing the alleged offence. Sometimes the Riot Act is read more than once during the disturbance, in which case the second or third reading does not supersede the first. The Riot Damages Act, 1886, provides compensation from the rates to those whose property is damaged during a riot. Less serious than *riot* are *unlawful assembly*, a meeting of three or more for an unlawful object, but where no part of the object is actually carried out; and *rout*, where the assembly proceeds to execute the act, but does not actually accomplish it; and *affray*, that is, a fight between two or more in some public place (e.g. a prize-fight), but it must not be premeditated. In private the disturbance would be an *assault*. Among notable riots have been those in Scotland on account of the Union (1707); the Porteous Mob in Edinburgh (1736); Lord George Gordon's 'No Popery' Riots (1780); at Birmingham (1791) in connection with the Commemoration of the French Revolution; the Luddites (1811, 1812); Peterloo (1819); Reform Riots at Bristol (1831); Chartist Riots (1838–39); Rebecca Riots in Wales (1843); religious riots at Belfast

(1852, 1862, 1872, 1886, 1887); Reform Riots in Hyde Park (1866); Trafalgar Square Riots (1886, 1887); Tithe Riots in Wales (1887). See S. Hastings, *The Law relating to Riots* (1886). The American laws as to riots follow in the main the law of England, but are less stringent in their application, and less severe in the punishments incurred. Amongst the most memorable riots in the United States were the Doctors' Riot at New York (1788); the Astor Place Riot, directed against the English actor Macready (1849); the Draft Riots in New York (1863); and the Anarchist Riot in Chicago (1886).

Rio Tinto, a river in southern Spain, in the province of Huelva, near whose sources are rich copper-mines; the annual output (copper and sulphur) reaches 1,400,000 tons; these minerals are exported from the port of Huelva (q.v.), 45 miles distant by rail, near the mouth of the river. These mines were worked by the Romans—their *Tharsis.* During the years of Moorish supremacy they were unused, but they have been worked again since the middle of the 16th century. They were bought in 1872 by the Rio Tinto (London-Bremen) Syndicate for £4,000,000. Some 10,500 persons are employed in the works, of whom unhappily something like 10 per cent. are usually ill by reason of the unhealthiness of the work. See W. R. Lawson, *Spain of To-day* (1890).

Riouw, capital of the island of Bintang (q.v.) and headquarters of a Dutch residency comprising Bintang, the Lingga islands, and other groups between the extremity of Malacca and the coast of Sumatra.

Riparian Rights. See RIVER.

Ripley, (1) a town of Derbyshire, 10 miles NNE. of Derby, with silk-lace manufactures and large neighbouring collieries and ironworks. Pop. (1851) 3071; (1891) 6815.—(2) A pretty village in the West Riding of Yorkshire, on the Nidd, 3½ miles NNW. of Harrogate. Rebuilt in 1829–30, it has an hôtel-de-ville (1854), an interesting church, and Ripley Castle (1555), where Cromwell is said to have slept the night before Marston Moor. Pop. 291.

Ripley, GEORGE, was born at Greenfield, Massachusetts, 3d October 1802, graduated at Harvard in 1823, afterwards studied theology there for three years, and was ordained to a pastorate in Boston. This he held till 1841. In the meantime he had joined actively in the Transcendental movement—the first meeting of the club was at his house in 1836; and on leaving the pulpit he at once started the Brook Farm (q.v.) experiment. This came to an end in 1847, and Ripley removed to New York, when he afterwards engaged in literary and journalistic work. He was joint-editor with Charles A. Dana of Appleton's *New American Cyclopædia.* He died 4th July 1880. See Life by O. B. Frothingham in the 'American Men of Letters' series (1882).

Ripon, a city in the West Riding of Yorkshire, on the Ure, 23 miles NW. of York, 28 N. of Leeds, and 11 N. of Harrogate. A monastery, founded here in 660 by St Cuthbert and other monks of Melrose, was granted about 664 to St Wilfrid, who rebuilt the church with stone, and dedicated it to St Peter. Willibrord, the apostle of the Frisians, was trained in this monastery, which in 678 was made the seat of a short-lived bishopric, re-erected in 1836 after a lapse of more than eleven centuries. The beautiful minster, which from the Conquest to the Dissolution was the church of Augustinian canons, was built between 1154 and 1520, so exhibits every variety of style from Transition-Norman to Perpendicular. A cruciform pile, 266 feet long, with three towers 120 feet high, which lost their spires in 1660, and with a Saxon crypt, where a hole called 'St Wilfrid's Needle' was anciently used as an ordeal of chastity, it suffered much through the Scots (1319), decay, and vandalism, but in 1861–76 was restored by Sir G. G. Scott at a cost of £40,000. An obelisk, 90 feet high, in the market-place was erected in 1781 by W. Aislabie, for sixty years one of the two members for Ripon, whose representation was reduced to one in 1867, and merged in the county in 1885. A free grammar-school was founded in 1546. Studley Royal, the fine seat of the Marquis of Ripon, is 2 miles south-west; and near it is Fountains Abbey (q.v.). Ripon spurs, once so famous, belong to the past, but saddle-trees are still manufactured, besides varnish, leather, machinery, &c. The municipal borough was chartered by James I. Pop. (1851) 6081; (1881) 7390; (1891) 7512.

See works by Gent (1733), Waddilove (1810), Walbran (9th ed. 1871), and the Rev. J. T. Fowler (3 vols. 1881–88).

Ripon, FREDERICK JOHN ROBINSON, EARL OF, was born 1st November 1782, the second son of the second Lord Grantham. After graduating at Cambridge, in 1806 he entered parliament as a moderate Tory, and had successively been Under-secretary for the Colonies, Vice-president of the Board of Trade, and Chancellor of the Exchequer, when, having that same year been created Viscount Goderich, in August 1827 he became head of a seven months' administration. He held office afterwards as Secretary for the Colonies, Lord Privy Seal, and President of the Board of Trade; in 1833 was created Earl of Ripon; and died 28th January 1859.

GEORGE FREDERICK SAMUEL ROBINSON, MARQUIS OF RIPON, was born in London 24th October 1827, and succeeded his father as Earl of Ripon and Viscount Goderich, his uncle as Earl de Grey, Baron Grantham, and a baronet. Since 1852 he had sat in parliament as a Liberal for Hull, Huddersfield, and the West Riding, and he became successively Under-secretary for War (1859), Under-secretary for India (1861), Secretary for War (1863), Secretary of State for India (1866), Lord President of the Council (1868), Grand-master of the Freemasons (1870, which office he resigned in 1874 on his conversion to Catholicism), Marquis of Ripon (1871), Viceroy of India (1880–84, where he was popular with the natives, unpopular with Anglo-Indians), First Lord of the Admiralty in 1886, and Colonial Secretary in 1892 and 1894.

Rip Van Winkle, the hero of Washington Irving's delightful sketch (1820), an idle, good-natured, henpecked scapegrace, who neglects—he cannot be said to cultivate it—a patch of maize and potatoes in a small village near the Hudson River, and who, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried but termagant wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon,* who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is directed to wait on them, and while doing so tastes and returns to the liquor he hands, till his senses forsake him. He wakens on a bright summer morning, his dog gone, and a rusty firelock by his side; his beard has grown a foot long, and in the village he finds new buildings, new names over the doors, new faces at the windows. His own house is fallen into decay, his wife is dead—there is a drop of comfort, at least, in this intelligence—and he who went away a subject of George the Third has returned to find himself a free citizen of the United States. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognised by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn. The story has been often dramatised in America, but no version has held the stage except Boucicault's (1865), with which the name of Joseph Jefferson is identified. The opera by Planquette (1882) also deserves mention, as keeping pretty closely to the story.

Rishanger, WILLIAM, a monk of St Albans, who styles himself 'Chronigraphus' in an extant memorandum written by himself in 1312. He tells us, moreover, that he had been forty-one years a monk, and was then sixty-two years old, so that he must have been born in the year 1250. It has been usual to consider his *Chronica*, which covers the period from 1259 to 1307, as a continuation of Matthew Paris, and it has been to a large extent borrowed from the *Annales* of the Dominican Friar, Nicholas Trivet. For example, as Mr Gairdner points out, the whole reign of Edward I. is almost exactly identical in the two. As a chronicler Rishanger is full and truthful, but his work is fragmentary towards the close, and besides some confusion has crept into the order of the narrative. The story is told with considerable spirit, and reveals high admiration for Simon de Montfort. The *Willelmi Rishanger Chronica et Annales*, forming vol. iii. of the *Chronica Monasterii S. Albani*, was edited for the Rolls series by H. T. Riley (1865).

Rishi is the title given to the inspired poets of the Vedic hymns. See VEDA.

Risotto, an Italian dish, consisting chiefly of rice. Onions are shred into a frying-pan with plenty of butter, and they are fried together until the onions become very brown, and communicate their colour to the butter. The butter is then run off, and to this is added some rich broth, slightly coloured with saffron, and the whole is thickened with well-boiled rice, and served up instead of soup at the commencement of a dinner.

Ristigouche. See RESTIGOUCHE.

Ristori, ADELAIDE, an Italian tragédienne, was born on 26th January 1821, at Cividale in Friuli. Her parents were strolling players, and she almost began life in the theatre. At the age of fourteen she played in *Francesca da Rimini*, and in a few years became the leading Italian actress. In 1847 her marriage with the Marquis Del Grillo (died 1861) temporarily interrupted her dramatic career; but she soon returned to the stage. After having acted in Italy for some years with immense applause, she presented herself before a French audience in 1855, when Rachel was at the height of her fame. But Ristori won a complete triumph; and thereafter gained fresh laurels in nearly every country of Europe, in the United States (in 1866, 1875, and 1884-85), and in South America, where her magnificent tragic acting roused the greatest enthusiasm. The rôles in which she especially shone were Mary Stuart (Schiller's), Elizabeth (Giacometti's), Medea and Marie Antoinette (Legouvé's), Lady Macbeth, and Adrienne Lecouvreur (Scribe's). See her *Studies and Memories* (Eng. trans. from French, 1888).

Ritchie, MRS RICHMOND. See THACKERAY.

Ritornello, in Music, in its original sense, a short repetition, like that of an echo, or a repetition of the closing part of a song by one or more instruments. The same term has, by later usage, been applied to all symphonies played before the voices begin which prelude or introduce a song, as well as the symphonies between the members or periods of a song. The name is also given to the oldest form of the Italian popular poetry, and consists typically of a strophe of three Iambic lines, the first and third rhyming.

Ritschl, ALBRECHT, Protestant theologian, was born 25th March 1822, at Berlin, where his father was a clergyman. His university studies were carried on at Bonn, Halle, Heidelberg, and Tübingen. In 1846 he 'habilitated' at Bonn, the subject of his thesis (in the treatment of which he substantially reflected the views of his Tübingen master, Baur) being the relation between the gospel of Marcion and the canonical gospel of Luke. His next published work, on the origin of the early Catholic Church, was of similar tendency, though seeking to modify the conclusions of his contemporary Schwegler as to the influence and extension of Ebionitism in the apostolic and post-apostolic age; but in the second and completely rewritten edition of the same work he took up towards the fundamental positions of the Tübingen school an attitude of antagonism, which he ever afterwards maintained. He now denied the alleged Ebionitism of primitive Christianity altogether, and, accepting as genuine the epistles of James and Peter as well as the Apocalypse and Acts, maintained that none of the apostles had regarded the law as religiously binding, and that they only continued its observance as a national custom among Jews, leaving Gentile converts free. Ritschl, who had become professor extra-ordinarius of Theology at Bonn in 1853, was promoted to an ordinary professorship in 1860, and in 1864 was transferred to Göttingen, where the rest of his life was spent. His lectures, especially those on Christian ethics, soon became famous for their originality and vigour. While in Bonn he had also published a tract on the relation between the church and its confession (1854), and a Latin dissertation on the wrath of God (1859). The list of his Göttingen publications includes, besides his principal work, a treatise on Christian perfection (1874), a tract on conscience (1876), a history of Pietism (1880-86; 3 vols.), a tract on theology and metaphysics (2d ed. 1887), and a volume containing three academical discourses (1887). He died at Göttingen, 20th March 1889.

His principal work, on the Christian doctrine of justification and reconciliation, was published in three volumes (1870-74; 3d ed., with noteworthy alterations, 1888), the first of which traces the history of the doctrine, the second discusses its biblical premises, and the third its theological meaning. An English translation of the first volume by the present writer appeared in 1871. The work as a whole expounds with much force and effectiveness a theological system marked by great dialectic acuteness and subtlety, ingenious and searching exegesis, and bold disregard of ecclesiastical tradition. The distinguishing feature of the Ritschlian theology is perhaps the prominence it gives to the practical, ethical, social side of Christianity. As a reasoned system it starts from a definite theory of cognition, eclectically derived from Kant through Lotze, which has sometimes been called a subjective idealism, and criticised as denying all objective reality to the objects of theology. But hardly with justice. For, though doubting the possibility of demonstrating God to the merely speculative intellect, Ritschl holds that God is really, effectively, practically revealed to man on his religious side; in other words, becomes known to those who have found their need of Him. God is to be thought of as love; there is no other conception of equal value. In particular the conception of His holiness is an obscure one, and His righteousness is in fact identical with His grace. All metaphysical statements as to His absoluteness or existence through, or in, or for Himself are of no religious value. In connection with his doctrine of God, Ritschl attaches high importance to the conception of the church as being the community within which alone men can have reconciliation with God and freedom from the sense of guilt, and so be able to act from motives of love, and realise that human and divine fellowship of perfect love which is the kingdom of God. In this Ritschl expressly differs from Schleiermacher (in many other respects a master whom he follows closely); but, while rejecting the Protestant formula of the latter, that the relation of the individual to the church depends on his relation to Christ, he is very far removed from the position of Roman Catholicism. His doctrine of Christ attaches no value to the hypostatical distinction of persons in the Godhead or to the ecclesiastical doctrine of the two natures or the three offices, but states the divinity of Christ in terms of His peculiar and unique relation to the church, which He founded by His life and work on earth. This work was atoning work; but the reconciliation with God and immunity from the sense of guilt which He secured for the church were obtained not by vicarious endurance of the punishment due to sinful men, but by His perfect fulfilment, in loving deed and word, of the work of His calling, and by His perseverance in it in spite of all opposition, and by His patient endurance of all suffering even unto death. The justification possessed by the Christian as a member of Christ's community is practically shown in his freedom or dominion over the world. This dominion is exercised, in trust in God's providence, by patience, by humility amid all the vicissitudes of life, by faithfulness of the individual to his calling as being his contribution to the kingdom of God, and by Christian prayer, which is chiefly thanksgiving or humble recognition of the divine rule. Ritschl is usually classified as an 'eclectic mediating theologian;' perhaps 'intermediate' would be a better word, for his theology is uncompromisingly opposed alike by the 'rationalist' and by the 'orthodox' parties. The Ritschlians now form a large and important school in Germany, the most prominent among them being Kaftan, Herrmann, and Bender.

See Stählin, *Kant, Lotze, and Ritschl; a Critical Examination* (Eng. trans. 1889); Pfleiderer, *Development of Theology* (1890) and *Die Ritschl'sche Theologie* (1891).

Ritschl, Friedrich Wilhelm, German philologist, was born at Grossvargula, near Erfurt, in Thuringia, 6th April 1806. He studied at Leipzig under Hermann and at Halle under Reisig, held chairs of Philology at Breslau (from 1834), Bonn (from 1839), and Leipzig (from 1865), and died at Leipzig on 9th November 1876. As a teacher he exercised great influence over his pupils, amongst whom were Curtius, Ihne, Brugmann, &c. His greatest work is an edition of Plautus (3 vols. Bonn, 1848–54; new ed. 1881–87), provided with the richest critical apparatus. This standard work was preceded by *Parerga Plautina et Terentiana* (Leip. 1845). He achieved a second triumph in the department of Latin inscriptions, his collection, *Priscæ Latinitatis Monumenta Epigraphica* (Berlin, 1864), being the forerunner of the great *Corpus Inscriptionum Latinarum*. Ritschl's numerous critical papers and dissertations are collected in *Opuscula Philologica* (5 vols. Leip. 1867–79). Ribbeck's Life of him is the best (2 vols. 1879–81); see also another by L. Müller (1878).

Ritson, Joseph, a learned and honest, but pedantic, acrid, and ill-mannered antiquary, was born of Westmorland yeoman family at Stockton-on-Tees, in 1752. He was bred to the law, and practised as a conveyancer in London, but was enabled by the profits of the office of Deputy High-bailiff of the Duchy of Lancaster to give most of his time to antiquarian studies. He made himself as notorious by his crazy vegetarianism, his whimsical spelling, and irreverence, as by the ascerbity of his attacks on much bigger men than himself. Scott alone of his contemporaries kept good terms with him, but then none other had his large heart and genial humour. Undoubtedly Ritson's mind was deranged, and he died in a fit of gloom, 3d September 1803. Ritson's industry was remarkable, and all his forty books are valuable despite the blemishes in which they abound. His first important work was an abusive but well-grounded attack on Warton's *History of English Poetry* (1782). Next year he assailed Johnson and Steevens for their text of Shakespeare; in 1790 he attacked Bishop Percy with absurd ferocity in the preface to a collection of *Ancient Songs;* in 1792 appeared his characteristic *Cursory Criticisms* on Malone's Shakespeare.

Other works were *A Select Collection of English Songs* (3 vols. 1783); *Pieces of Ancient Popular Poetry* (1791); *The English Anthology* (3 vols. 1793–94); *A Collection of Scottish Songs* (2 vols. 1794); *Poems*, by Laurence Minot (1795); *Robin Hood: a Collection of all the Ancient Poems, Songs, and Ballads* (2 vols. 1795); *Bibliographica Poetica: a Catalogue of English Poets of the XII.–XVI. Centuries* (1802); and *Ancient English Metrical Romances* (3 vols. 1802). His various North Country *Garlands* and his *Essay on Abstinence from Animal Food as a Moral Duty* (1802) were less important. Joseph Haslewood wrote a short account of his Life (1824); his Letters were edited, with a Life, by Sir N. Harris Nicolas (2 vols. 1833).

Ritter, Heinrich, German philosopher, was born at Zerbst in Anhalt on 21st November 1791, studied theology and philosophy at Halle, Göttingen, and Berlin; was professor of Philosophy successively at Berlin (1824–33), Kiel, and Göttingen (1837–69); and died in Göttingen on 3d February 1869. His fame rests upon an extremely careful and impartial *Allgemeine Geschichte der Philosophie* (12 vols. 1829–55), with a continuation carrying on the work from Kant (1853); and upon *Die Christliche Philosophie* (2 vols. 1858–59).

Ritter, Karl, a geographer, was born August 7, 1779, at Quedlinburg in Prussia, was educated at Schnepfenthal under Guts Muths, studied in Halle, was in 1820 nominated professor of Geography at Berlin, became subsequently member of the Academy and Director of Studies of the Military School, and died 28th September 1859. With Ritter as the founder of general comparative geography begins a new epoch in the history of geographical science. His chief work (uncompleted) was *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen* ('Geography in its Relation to Nature and the History of Men,' 10 vols. Berlin, 1822–59). The work is divided into four parts—(1) Central Asia, Siberia, China, and India; (2) West Asia; (3) Arabia; (4) Sinai Peninsula, Palestine, and Syria. Besides this he wrote an *Introduction to General Comparative Geography* (1852); *Europe* (2 vols. 1807); and *The Stupas, or the Architectural Monuments on the Indo-Bactrian Royal Road, and the Colossus of Bamian* (1838). His lectures were published in three volumes—*History of Geography* (1861), *General Geography* (1862), and *Europe* (1863)—by Daniel. His name is perpetuated in two geographical institutions in Berlin and Leipzig. See Life by Gage (Edin. 1867) and Kramer, *Carl Ritter, ein Lebensbild* (2d ed. Halle, 1875).

Ritual (Lat. *rituale*, 'book of rites'), the name of one of the service-books of the Roman Church, in which are contained the prayers and order of ceremonial employed in the administration of certain of the sacraments (communion out of Mass, baptism, penance, marriage, extreme unction) and other priestly offices of the church, forms for churchings, burials, and blessing. In its present form it dates from the Council of Trent, which directed a revision of all the different rituals then in existence (also known as *manuale*, *sacerdotale*, &c.), which were numerous, and exhibited considerable variety of detail. Paul V., in 1614, published an authoritative edition, which has frequently been reprinted, and of which a further revision was issued by Benedict XIV. Besides the Roman Ritual there are many diocesan rituals, some of which are of much historical interest. In the Greek Church, as in the other eastern communions, the Ritual forms part of the general collection (which contains also the Eucharistic service) entitled *Euchologion*. In the Anglican Church the *Book of Common Prayer* may be said to contain the Ritual. The most approved commentary on the Roman Ritual is that of Barrufaldo (3d ed. 1763).

Ritualism, the name popularly but inaccurately given to the remarkable increase of ceremonial in the Church of England since about 1860–65. It may be considered as a development of Tractarianism, though it is one not contemplated by the authors of that movement, whose aim was rather to disseminate doctrines than to introduce ritual changes. Dr Pusey and his associates deprecated any innovations in the way of conducting the services, anything of ritualism, or especially any revival of disused vestments. Collateral causes of the movement may be said to be the great advance of æsthetic taste, and the increased cultivation of the fine arts in the service of religion; as also the extended study by the clergy of ancient liturgies, and the connection discovered to exist between them and the offices of the English Church. With the spread of High Church principles certain changes in the mode of conducting divine service had been introduced by the clergy, which, though unpopular at first, were widely adopted, and up to a certain point had received the sanction of the law. But the restored church with low and open benches; the separated chancel; the altar-table with coverings of different colour according to the ecclesiastical seasons, and candlesticks and a cross upon or over it; choral services, and weekly celebration of the communion, were all that had hitherto been attempted. To these comparatively small alterations important additions were subsequently made, bringing the usages of the Church of England nearer those of the Roman communion, such as special vestments at the celebration of the holy communion, and at certain other times—for the celebrant an alb, stoles of different colour, according to the seasons, and chasuble, and for the assisting ministers albs with tunicles; lighted candles on the altar at holy communion; incense burned either in a 'thurible' or in a standing vessel; the mixing of water with wine for the communion; the use of wafer-bread; elevation of the elements either during or after consecration; and processions with crosses, banners, and vested attendants.

The Public Worship Regulation Act, passed after fierce discussion in both Houses of Parliament, was expressly designed, as Mr Disraeli admitted, for the repression of ritualistic practices, and constituting a new judgeship for offences against the rubrics (see ECCLESIASTICAL COURTS). By its provisions, a complaint against the use of vestments, ornaments, and rites and ceremonies, or the omission of such as are ordained in the Book of Common Prayer, in the churches or burial-grounds of the Church of England, may be presented to the bishop of the diocese by an archdeacon or churchwarden, or by three parishioners, members of the church, of full age, and a year's residence in the parish. In the event of the parties not submitting to the directions of the bishop, he shall forward the case for trial by the judge, from whose decision an appeal lies to the Privy-council. Since the date of the act numerous trials have taken place, and several clergymen charged with ritualistic practices have been imprisoned (A. Tooth, 1877; Pelham Dale and Enraght, 1880; S. F. Green, 1882; J. C. Cox, 1887). See MACKONOCHIE, and ENGLAND (CHURCH OF.) In 1889–90 proceedings were taken in the Archbishop of Canterbury's court against the Bishop of Lincoln. The decision was given in November 1890, and related to nine heads: (1) The mixing of the cup during the service is to be discontinued; (2) but the use of a cup already mixed is not an ecclesiastical offence; (3) the court dismissed the charge as to ablution after service, holding that all the bishop had done was the reverent consumption of what remain of the consecrated elements; (4) as to the eastward position, the court decided that there is liberty as to using the north end of the altar or the north end of the west side; (5) the breaking of the bread must be performed so as to be visible to the people; (6) the singing of the anthem 'O Lamb of God' is not prohibited; (7) candles which are kept lighted throughout the service are not an offence; (8, 9) the sign of the cross must be discontinued both in absolution and in benediction. See the articles ALTAR, CHASUBLE, LIGHTS, VESTMENTS, &c.; ENGLAND (CHURCH OF), and PRAYER-BOOK; Lee's *Directorium Anglicanum* (1865); and the *Priest's Prayer-book, with a brief Pontifical* (6th ed. 1884).

Rivarol, ANTOINE, French writer, was born at Bagnols in Languedoc, 26th June 1753. Though but the son of an innkeeper, when he appeared in Paris in 1780 he laid dubious claim to rank, and soon worked his way by his wit into the best society of the time. Already he had written his treatise, *Sur l'Universalité de la Langue Française* (1784), and paraphrased rather than translated the *Inferno*, when in 1788 he set all Paris laughing at the sarcasms in his *Petit Almanach de nos grands Hommes pour 1788*. At the Revolution he took his place in the royalist ranks, and saved his head by emigrating in June 1792. Supported by royalist pensions, the 'Tacitus of the Revolution,' as Burke styled him in one of the least happy of hyperboles, employed himself fitfully in writing pamphlets and weaving dreams of books to be written, in Brussels, London, Hamburg, and Berlin. He had married an English wife, but she quarrelled with him, and not without reason. Rivarol died at Berlin, 13th April 1801.

His works were collected by Chênedollé and Fayolle (5 vols. 1805), but their terse epigrammatic quality shows better by compression in the *Esprit de Rivarol* (2 vols. 1808) and the *Œuvres Choisies*, edited by Lescure (1862; new ed. 1800). See Lescure's *Rivarol et la Société Française pendant la Révolution et l'Émigration* (1883).

Rivas, a decayed town of Nicaragua (q.v.), 6 miles from Lake Nicaragua. Pop. 8000. The fertile department of Rivas, between the lake and the Pacific Ocean, has an area of 1080 sq. m. and a pop. of some 25,000.

Rivaulx Abbey. See RIEVAULX.

Rive-de-Gier, a town of France (dept. Loire), stands on the Gier, in the middle of the best coal-field in France, 13 miles NE. of St Étienne by rail. It was formerly a stronghold, surrounded by high walls, and defended by a castle. In 1815 it had less than 4000 inhabitants; in 1886, 13,728. Around the town there are about fifty coal-mines in operation, and in it and close to it several silk-mills, glass-works, factories for steam-engines and other machinery, and iron and steel factories.

River. Water falling on the land in the form of rain, or resulting from melting snow, or rising to the surface in springs, flows over the surface to a lower level. Where two slopes of land dip together the surface drainage collects to form a stream, and when evaporation is not very rapid several such streams ultimately unite and the volume of water they carry flows to the sea or to a salt lake. Small streams are termed runnels, rivulets, rills, brooks, becks, or burns; large streams are termed rivers, but the word has no precise reference to the magnitude of the stream to which it is applied. Dr Johnson gives as definitions: 'Brook, a running water less than a river;' and 'River, a land current of water bigger than a brook,' and this fairly illustrates the use of the words as popularly applied.

The beginning of a stream—whether brook or river—is called its source, and may be a spring issuing from underground, a lake or marsh in which rainfall accumulates, melting snow, or simply the gathering tricklings from falling rain. The path of a stream is its course, and is the line of lowest level from the source to the end, which if occurring in a lake or the sea is termed its mouth. The connected streams which unite in one river form a river-system. The series of convergent slopes down which a river-system flows—the land which it drains—forms its basin or catchment area, and the name watershed is also sometimes erroneously applied to it. The names watershed, water-parting, and divide are used to designate the boundary line separating adjacent basins. A watershed is always the meeting-place of the highest part of divergent slopes, and from the characteristic form of continents the main watershed of a continent is almost always the crest of a range of mountains. In many cases, however, the diverging slopes meet in a low plain the summit of which may be occupied by a great marsh whence rivers creep away in opposite directions. The basins of all the rivers draining into the same ocean are called collectively the drainage area of that ocean. The main river to which the others are said to be tributary gives its name to the whole river-system. It is often difficult to decide which of several converging streams is entitled to carry the name of the main river to its source. Some geographers give this distinction to the longest, others to that with the highest source, and others to that with the most direct course. This diversity of opinion is increased when the name of a river leaving a large lake is given to one of several nearly equal streams which enter it. Hence it is that different computers disagree as to the length of rivers. The course of a typical river has been divided into three parts, although these are not represented in all cases. The *torrential* or mountain track is the steepest, its gradient usually exceeding 50 feet in a mile, and the velocity of its current being very great. The *valley* or middle track has a gradient which is rarely greater than 10 feet and often less than 2 feet in a mile. The *plain* track nearest the mouth of a river has a gradient of only a few inches in a mile. Rivers such as the Amazon, Mississippi, Ganges, Volga, and the long rivers of Siberia, in which the plain track is of very great length, are the most valuable for navigation, the limit of easy navigability being a gradient of about 1 foot in a mile.

The velocity of a river is proportional to the slope of the bed, but it also bears a relation to the depth of the channel and the volume of water flowing in it. On account of friction on the bottom and sides of the channel retarding the stream, the water flows fastest on the surface and in the middle. The carrying power of a river for suspended solid particles and for stones and gravel pushed along the bed depends on the velocity alone. The following table shows how rapidly the carrying power falls off as the velocity diminishes.

0·170	mile	per hour	will	just begin to work on fine clay
0·340	"	"	"	lift fine sand.
0·454	"	"	"	lift sand as coarse as linseed.
0·682	"	"	"	sweep along fine gravel.
1·364	"	"	"	roll along rounded pebbles 1 inch in diameter.
2·045	"	"	"	sweep along slippery angular stones as large as an egg.

Rivers in flood, even in the plain track, sometimes attain a velocity of over 5 miles an hour, and torrents may even flow as fast as 20 miles an hour. The course of a river is gradually carved out and shaped by the flow of the water. The sediment and stones carried along are powerful erosive agents in the torrential and valley tracts, and the character of the valleys or gorges produced depends largely on the geological structure of the region. The course of a river is frequently determined by lines of faults, but perhaps more often it appears to be independent of the nature of the strata. Some great rivers, notably the Volga, press against the right bank, cutting it into a steep cliff, while the left bank is left as a very gentle slope. This is explained by the directive influence of the earth's rotation (see EARTH, Vol. IV. p. 165).

Rivers are of very great importance as agents of change in dynamic geology, the form of valley they excavate being determined partly by the nature of the rocks, partly by the climate. In rainless or arid regions steep-walled Cañons (q.v.) are cut to a great depth across high plateaus; in rainy regions subaerial denudation leads to the formation of wide valleys of much gentler slopes. Bars of more durable rock crossing the course of a stream lead to the formation of Waterfalls (q.v.) or rapids from the rapid erosion of the softer strata below. The river above the obstruction is reduced to what is termed the base-level of erosion; the velocity of the current is checked, and wide alluvial deposits are laid down on either side. In course of time the bar of hard rock is completely cut through by a gorge, and the gradient of the stream is ultimately rendered uniform. In this way the common features of gorge and meadow are produced again and again along the course of a stream. The deposits of alluvium form terraces along the valley track of a river, and as the stream cuts its channel deeper they are left at various heights as monuments of its erosive power. When a river is fairly established in its valley it is, geologically speaking, a more permanent feature than lakes or mountains. Upheaval, which acts very slowly, may even elevate a range of mountains across its course, yet all the while the river, cutting its way downward, remains at the same absolute level. The Uintah Mountains, as they were upheaved, were divided in this way by the Green River, the chief tributary of the Colorado. In limestone regions the solvent power of river-water on carbonate of lime leads to the formation of Caves (q.v.) and underground rivers, which as a rule emerge from their subterranean channels on lower ground. Sometimes they do not reappear on land, but discharge their fresh water through openings in the bed of the sea. Such submarine river entrances are not uncommon along the shores of the Adriatic, off the coast of Florida, and in other calcareous regions. When a river advances along a nearly level plain toward the sea its carrying power falls off; gravel, sand, and finally mud are deposited on its margin, and the stream pursues a peculiar winding course. During a flood the swift and muddy stream rises, overflows its banks, and widens out on the level land. The current is at once checked and a long bar of deposit forms along each margin. These are increased in height by each successive flood, and, the river-bed being simultaneously silted up, broad muddy rivers like the Mississippi, Po, and Hoang-ho come in time to flow along the top of a gently sloping natural embankment, the sides of which are termed levees in Louisiana. Professor Lapparent, calculating from Dr Murray's data regarding the amount of sediment carried down by rivers, finds that they would suffice to wear the entire surface of the land down to sea-level in four million years. The entrances of rivers into lakes or the sea are usually marked by great banks of deposit (see DELTA), or by bars of gravel or sand. In some cases, however, such as the River Plate, the Thames, and Tay, the mixture of river and sea water is gradual, and the sandbanks are spread over a very large area, but not built up into a delta at any one place. Professor Osborne Reynolds has shown, by a remarkable series of experiments, that the form of the sandbanks is due to the outline of the coasts of the estuary and to the tides. In a few instances, such as the Forth, rivers enter deep arms of the sea in which neither banks nor bars are formed. The Congo sweeps directly into the ocean, throwing down great banks of deposit along the continental slope to right and left, but leaving a deep cañon-like gully for the bed of the stream itself; a similar condition occurs where the Rhone enters the Lake of Geneva.

The ultimate source of all rivers is the condensation of water-vapour from the atmosphere in the form of rain, snow, and even dew. If the land were composed of impermeable rocks all the rain-water not lost by evaporation would run off directly over the surface, and rivers would only flow during and immediately after showers. A large part of the rainfall, however, soaks into the soil, which retains it as in a sponge, especially if the land be marshy, and allows it to flow off gradually as superficial springs. Some also percolates deeply into the rocks, ultimately emerging as deep-seated springs at a great distance. The indirect and permanent supply of water to rivers by springs and by the outflow of lakes is independent of local rainfall at the time, and serves to maintain the volume of the river at a certain minimum during the dry seasons. When a river flows toward a region of great evaporation and small rainfall, such as exists in the interior of each of the great continents, evaporation removes more water than is supplied by the remote tributaries, and the stream may fail to fill the hollow it enters, and therefore cannot overflow into the sea. This is the case with the Oxus entering the Aral Sea, and the Volga entering the Caspian. It may be that evaporation is so far in excess of contributions from distant rainfall or snow-melting that the river dries up as it flows, and its last remnant is absorbed in the desert sand. This is the fate of the Murghab, the Heri-rud, the Zerafshan, and many other rivers of central Asia.

Contrasted with these cases are those in which the periodical or occasional increments of direct inflow increase the volume so much as to cause a great rise of level or even extensive inundations. The annual inundations of the Nile are due to the monsoon rainfall on the great mountains of Abyssinia, which increases the discharge at Assouan to fifteen times the amount of the river at its lowest. The Orinoco is another instance of seasonal rains producing tremendous inundations, over 40,000 square miles of the Llanos being said to be laid under water by the summer rains. The Amazon is an instance of a river which is always more or less in flood as the various tributaries attain their greatest height at different seasons. In June, when the highest level occurs in the main river, 20 or 30 miles of forest on each side of its banks are laid under water for hundreds of miles. The Ganges overflows its banks in summer when the monsoon rainfall is reinforced by the melting of snow on the Himalayas. Where the seasons of maximum rainfall and of snow-melting are different, as in the Mississippi, the Tigris, and Euphrates, there are two regular floods in the year.

The danger of flooded rivers arises from the suddenness with which the water rises and overflows narrow valleys or even plains. Frightful devastation follows the bursting of glacier obstruction lakes in mountain-valleys (see LAKE). The great rivers of Siberia remain frozen at their mouths long after the ice and snow have been melted in the interior, and broad strips on their margins are necessarily laid under water by the natural outflow being stopped. The most serious floods in the Danube and Theiss have resulted from the constriction of the channel at the Iron Gates, which prevents the flood water from passing away as rapidly as it comes down; the current of the Theiss is sometimes reversed for many miles. The widening of the channel has been repeatedly attempted as a remedy by increasing the outlet; and an elaborate system for regulating the river here, to be completed in 1895, was begun in 1890. In other cases, such as the tributaries of the Loire, and the southern rivers of the Argentine Republic, the melting snow swells the torrential track, and, on account of the abrupt change of level and the flatness of the plain, the lower part of the rivers cannot carry away the immense volume of water rapidly enough, and floods result. In some instances torrential rivers have been successfully diverted into lakes, which regulate their outflow, preventing either dangerously high or extremely low water. Great rivers which have embanked their course above the level of the plain are the most dangerous of all when flooded. The damage caused by the bursting of the levees on the lower Mississippi necessitates a great expenditure in strengthening the embankments, and the most disastrous inundations recorded in history have followed the bursting of the banks of the Hoang-ho (q.v.) and its consequent changes of course.

River-water is spoken of as fresh, but it always contains a certain amount of solid matter in solution, varying from two grains in the gallon or less in rivers draining hard crystalline rocks to fifty grains in the gallon or more in limestone districts. The nature of the salts dissolved naturally differs according to the geological character of the country traversed, but all samples of river-water differ from sea-water in containing a much smaller proportion of chlorides, and a very much larger proportion of carbonates and of silica.

The temperature of rivers as a rule follows that of the air, but is subject to variations on account of the effect of rain. During sudden floods in summer the temperature of the water may fall many degrees in a few hours as the melted snow or hail precipitated on the lofty mountains is carried toward the sea.

The great rivers of Europe and Asia, such as the Rhine, Danube, Volga, Indus, Ganges, Brahmaputra, Yang-tsze-kiang, afford access to the sea to enormous populations. The Amazon, with its plain track extending for nearly 3000 miles, is in many ways less like a river than a fresh inland sea; but the Mississippi and St Lawrence, although less extensive, are of greater value for carrying sea traffic to inland places. In their torrential and upper valley tracks rivers are of use chiefly for transporting timber and driving machinery. It is interesting to note that in Switzerland, Norway, and Sweden, where there is no coal, there exist exceptional facilities for the use of water-power on account of numerous mountain-torrents. In hot countries rivers are of the utmost service in irrigating agricultural land; the Zerafshan and Murghab are entirely consumed in that service, and since the completion in 1890 of the barrage on the Nile no water escapes to the Mediterranean in the low Nile months except along irrigation canals.

THE LARGEST RIVER-SYSTEMS.

River.	Area of Basin, sq. m.	Length, miles.	Annual Rainfall of Basin. cu. miles.	Mean Annual Discharge. cu. miles.
Amazon	2,230,000	3400	2834	528·0
Congo	1,540,000	2600	1218	419·0
Nile	1,290,000	3700	892	24·3
Mississippi	1,290,000	4100	678	126·0
Niger	1,060,000	2600	..	..
Ob	1,190,000	3200	..	..
La Plata	995,000	2300	905	189·0
Lena	942,000	2900	..	..
Yenisei	880,000	3200	..	..
Yang-tsze-kiang	689,000	3200	409	125·0
Mackenzie	607,000	2300	..	..
Volga	592,000	2200	152	43·7
Ganges and Brahmaputra	588,000	1800	549	43·3
Zambesi	570,000	1600	..	..
St Lawrence	565,000	2400	339	87·3
Winnipeg-Nelson	504,000	1500	..	..
Yukon	433,000	2200	..	..
Orinoco	430,000	1400	608	122·2
Amur	403,000	2800	..	..
Hoang-ho	387,000	2600	118	28·6
Indus	360,000	1900	104	26·0
Danube	320,000	1700	199	67·5
Murray	300,000	1500	..	..

The statistics of this table, in which account is taken of rainfall and discharge, are taken from Dr John Murray's paper in *Scot. Geog. Mag.* iii. (1887) p. 65. The lengths in all cases and the areas of basins in those for which no rainfall statistics are available are according to the statistical tables in Justus Perthes' *Taschen-Atlas.*

Rivers in Law.—A distinction is made between public navigable rivers and private fresh-water rivers. Where the tide ebbs and flows, the ownership of the bed is in the crown for behoof of the public, and, consequently, the crown is entitled to deepen the channel or perform any other operation on the *alveus* that may improve the navigation. The banks, however, beyond the foreshore are the private property of the riparian owner. It is settled in England—and an opinion to the same effect has been delivered in Scotland—that the public have no common law right to set up even a towing-path along the bank of a navigable river; but, of course, such a privilege of roadway along a public waterway may be established by prescriptive possession. Above the flow and reflow of the tide all rivers and streams are *primâ facie* private, although, either by immemorial uses or by act of parliament, many have become subject to public rights of navigation. In the case of private rivers the *alveus* belongs to the proprietor through whose ground the river runs; or, if the river separates the lands of two owners, each is owner of the soil of the bed to the middle of the stream. The waters of a stream passing through or between the lands of different proprietors may be subject to two kinds of rights, natural and acquired. Natural or proprietary rights are those possessed by every riparian proprietor; they consist principally of a right to a reasonable use of the water, while it is flowing past his land, and a right to have the water flow in its accustomed manner, without sensible disturbance or diminution by the superior or inferior riparian proprietors. Thus, although each proprietor may employ the water while it is within his own grounds, he must allow it to pass onwards to the inferior proprietors in its original channel, and cannot alter its level, either where it enters or leaves his property. The riparian proprietor, either in a public or private river, may protect his side of the stream by embankments; but such embankment must be constructed only for defence, and not in such a manner as to throw the force of the current upon the opposite bank. Acquired rights, on the other hand, are those easements which entitle a riparian proprietor to interfere with a natural stream of water to an extent not justified by his natural or proprietary rights—by diminishing or obstructing the flow of water, by polluting it, &c. Such acquired rights in respect of water may exist in the inhabitants of a district by virtue of immemorial custom, and, both as to kind and extent, are regulated wholly by prescriptive use.

The pollution of rivers has of late years, in consequence of the extension of manufactures, caused serious concern. No person has a right to poison or pollute a stream, and if he do so any of the persons whose lands abut on the stream lower down may bring an action to recover damages. While, however, this right to object to an existing nuisance may be excluded by acquiescence or by prescription, it is so excluded only to the extent of the actual use or possession, and any material increase of the pollution or annoyance may be challenged and interdicted by the injured parties. At common law, indeed, in every question of river-pollution, the real question of fact is whether there has been any material increase of pollution beyond that which is natural to the particular stream, or beyond that which has existed there for the prescriptive period. Questions of river-pollution are eminently fitted for submission to a jury, and are generally disposed of in that way. The whole circumstances must be considered; for example, the size and character of the stream, the uses to which it can be and is applied, the nature and importance of the use claimed and exercised by one party, as well as the inconvenience or injury to the other party. In England, where the pollution of a stream amounts to a public nuisance, the party causing it may be prosecuted by indictment, or proceeded against by information at the suit of the Attorney-general. All the chief modern sanitary acts have provisions regarding the pollution of water; but most of them are local or deal with the pollution of water used for special purposes. In 1868 a Royal Commission was appointed to consider the question of river-pollution, and its recommendations were followed in 1876 by the Rivers Pollution Act (39 and 40 Vict. chap. 75), which is applicable to both Scotland and England. See Higgins, *On the Obstruction and Pollution of Water-courses* (1877).—For fishing rights, see SALMON, and TROUT.

In the United States the common law of England was at first followed; but in some of the states it is expressly declared that the common law is inapplicable. Mining rights have been specially determined in some districts; and the laws as to irrigation rights have been elaborately defined in Colorado and elsewhere.

Rivera, a department in the north-east of Uruguay, separated by a mountain-chain from Brazil. Area, 3790 sq. m.; pop. 17,087.

Riverina, a name given to the extensive grazing districts in the western part of New South Wales, Australasia.

Rivers, RICHARD WOODVILLE, or WIDVILE, EARL, was esquire to Henry V., and during his son's reign was made Governor of the Tower (1424) and knighted (1425). He fought in France and in England, in the Wars of the Roses for the Lancastrians. He took to wife Jaquetta of Luxembourg, widow of the Duke of Bedford, and it was their daughter Elizabeth whom Edward IV. married. This led Sir Richard Woodville to change over to the Yorkist side, and his royal father-in-law made him successively Constable of England, Baron Rivers (1448), and Earl Rivers (1466). But the favour shown to the Rivers family offended the old nobility, and their avarice aroused the enmity of the people. In 1469 Earl Rivers was seized and beheaded at Northampton, but accounts differ as to who were his executioners—whether Robin of Redesdale or the officers of the Duke of Clarence and the Earl of Warwick.—His son ANTHONY, known as Lord Scales during the father's lifetime, succeeded to the earldom in 1469. He stuck closely to his royal brother-in-law, who made him captain-general of the forces. After Edward's death he acted on the council of regency for his infant son, but was seized by order of Richard, Duke of Gloucester, and put to death at Pontefract in 1483.

Rivet, a metal pin for connecting two plates of metal or other material together. The rivet is put through holes in both plates, and the projecting ends are then beaten down so as to represent the head of a nail on each side, and thus hold the plates in close contact. Rivets are of most essential importance in boiler and tank making, and in building iron ships. They are usually put through the holes and beaten down while red-hot, in order that the contraction of the rivet, as it cools, may produce more intimate contact of the plates. Both steam and hydraulic riveting-machines have been in use for a good many years.

Riviera ('seashore), a term applied to the narrow strip of coast-land bordering the Gulf of Genoa, strictly from Nice to Spezzia, but generally understood to include the whole coast of the department of the Alpes Maritimes, and the Italian coast as far as Leghorn. West of Genoa it is called the Riviera di Ponente, or western coast, and beyond Genoa the Riviera di Levante, or eastern coast. From Hyères to Genoa is 203 miles; from Genoa to Leghorn, 112; sheltered on the north by mountains, the district enjoys an exceptionally favoured climate, no other region north of Palermo and Valencia being so mild in winter. The western section is the mildest and most frequented. It abounds in the most striking and beautiful scenery, and is planted with numerous health and fashion resorts—Nice, Monaco, Mentone, Ventimiglia, San Remo, Bordighera, &c.; and west of Nice are Hyères, Fréjus, Cannes, Grasse, Antibes. The various sections of the coast have each certain distinctive peculiarities; but none of them are entirely exempt from occasional cold winds. There are guidebooks by Baedeker, Murray (1890), C. B. Black (1890), the Rev. Dr Hugh Macmillan (new ed. 1892); Augustus J. C. Hare's *South-eastern France* (1890), and Miss Dempster's *Maritime Alps and their Seaboard* (1884); and for the health aspects, Dr E. S. Spark's *The Riviera* (1880), and works cited at the article HEALTH-RESORTS.—The famous *Corniche* (Ital. *Cornice*) road, widened by Napoleon I., leads along the coast from Nice to Genoa, and commands magnificent views.

Rivière, BRITON, was born in London, August 14, 1840, son of a drawing-master at Cheltenham College, and afterwards at Oxford. His ancestors were French Huguenot refugees. He studied at Cheltenham College, and at Oxford, where he graduated B.A. in 1867. He had exhibited at the Royal Academy as early as 1858, and again in 1864, but from the appearance of 'The Poacher's Nurse' in 1866 he has been continuously represented by a succession of pictures, which have grown in vigour and impressiveness, in dramatic power, in humour, in pathos, no less than in mastery of technique. No painter of his time approaches him in his treatment of wild animals, and many of his masterpieces in this kind have reached the widest popularity through engravings. He was made A.R.A. in 1878, R.A. in 1881. Of his numerous works we may here merely name 'Daniel in the Lions' Den,' 'Persepolis,' 'A Roman Holiday,' 'Giants at Play,' 'Actæon,' 'Væ Victis,' 'Rizpah,' and 'A Mighty Hunter before the Lord.' See Armstrong in *Art Journal Annual* (1891).

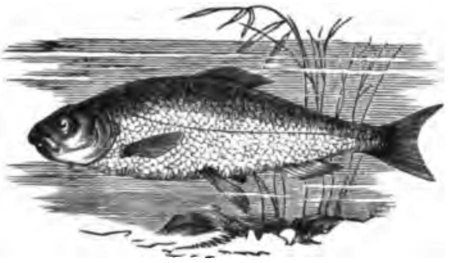
Rivingtons. See LONGMANS.

Ri'voli, a town of Northern Italy, 8 miles W. of Turin, with two royal castles and some industry. Pop. 5314. It was not near this place, but near Rivoli, 12 miles NW. of Verona, that Napoleon won on 14th and 15th January 1797 one of his most decisive victories over the Austrians.

Rizeh, a town of Asia Minor, on the coast of the Black Sea, 40 miles E. from Trebizond, manufactures linen and copper utensils. Pop. 30,000.

Rizzio. See MARY QUEEN OF SCOTS.

Roach (*Leuciscus rutilus*), a fish of the family Cyprinidæ, abundant in England, the south of Scotland, and many countries of Europe. It measures from 10 to 15 inches; the body generally has a silvery appearance, the back is a dull green, the lower fins are red, and there are no barbels. The roach is gregarious in habit, and large shoals are found usually in lakes, but towards the breeding season they migrate up streams and rivers to spawn. Even at best it is not highly esteemed for food, its flesh, like that of all the Cyprinidæ, being soft and flavourless.


Roach (*Leuciscus rutilus*).

Roads. Roads form a primary element in the material advancement of a nation, being essential to the development of the natural resources of the country. Canals and railways have no doubt, in modern times, superseded to some extent the common highways; still these retain their importance, were it only as essential auxiliaries.

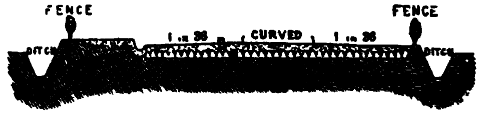
The Romans were great constructers of roads, and regarded them as of vital importance for conquest and the maintenance of their empire. They are said to have learned the art from the Carthaginians. Except where some natural barrier made it impossible, the Roman roads were almost invariably in a straight line; probably because the chief means of transport then in use were beasts of burden, and not wheeled vehicles, which made the preservation of the level of less consequence. The substantial character of the Roman roads is well demonstrated by the fact that they have in some instances borne the traffic of 2000 years without material injury. The plan of construction was pretty uniform, being that described in the article on the APPIAN WAY, one of the earliest and most famous of them; another was the Flaminian Way (q.v.). They varied in breadth from 15 to 8 feet, and had often raised footpaths at the side, and blocks of stone at intervals, to enable travellers to mount on horseback (see also PAVEMENT). The Roman empire was ultimately intersected by roads—not merely Italy, Spain, Gaul, Illyricum, Macedonia, Thrace, &c., but even in Egypt. In Britain the main lines of Roman roads were four; Elton (in his *Origins* *of English History*) gives them as follows: 'The Watling Street represents the old zigzag route from Kent to Chester and York, and northwards in two branches to Carlisle and the neighbourhood of Newcastle. The Fosse Way ran diagonally through Bath to Lincoln. The Ermin Street led direct from London to Lincoln, with a branch to Doncaster and York; and the obscure Ikenild Street curved inland from Norwich to Dunstable, and was carried eventually to the coast at Southampton.' Watling Street and Ikenild or Icknield Street have separate articles in this work.

The roads made by the Romans in Great Britain gradually fell into decay, and the attempts that were now and then made to repair them were insufficient to prevent England falling into a worse state with respect to its highways than most other European countries. In 1285 one of the earliest laws on the subject of roads was passed. It directed that all trees and shrubs be cut down to the distance of 200 feet on either side of roads between market-towns, to prevent the concealment of robbers in them. The first toll for the repair of roads was levied by the authority of Edward III. in 1346, on roads which now form part of the streets of London. In 1555 an act was passed requiring each parish to elect two surveyors of highways to keep them in repair by compulsory labour; at a later period, in place of the compulsory labour, the 'statute labour-tax' was substituted. But long after this the roads even in the neighbourhood of London were wretchedly bad, and in the other parts of the country they were still worse. For the most part, indeed, they were mere horse-tracks; the chief advantage in following them being that they led along the higher grounds, and so avoided bogs. These trackways were usually impassable in winter, being narrow, and in many places so deep and miry as to be liker ditches than roads. So late as 1736 the roads in the neighbourhood of London were so bad that in wet weather a carriage could not be driven from Kensington to St James's Palace in less than two hours, and sometimes stuck in the mud altogether. Much curious information on the state of the roads and means of conveyance in England during the long period which elapsed from the decay of the Roman roads to the middle of the 18th century, will be found in vol. i. of Smiles's *Lives of Engineers.* The Highlands of Scotland were opened up by the roads made by General Wade about 1725.

In laying out a new line of road the skill and ingenuity of the engineer are taxed to make the gradients easy, with as little expense as possible in excavating and embanking, and to do so without deviating much from the direct course between the fixed points through which the road must pass. To succeed well in this an accurate survey of the tract, including the relative levels of its different parts, and the nature of the strata, is a necessary preliminary. The formation of an extended line of road often involves the construction of extensive bridges, viaducts, and the like, which require the greatest engineering skill.

The importance of easy gradients or inclinations in roads is well understood in a general way; but it gives a more precise idea of it to state that, while, for example, the traction force requisite to draw a wagon weighing 6 tons along a level macadamised road is 264 lb., on a road of the same kind with an ascent of 1 in 50 the traction force is just double, or 533 lb., the speed of the wagon being 3 miles an hour. Compared with this, a stage-coach travelling on the level at the rate of 6 miles an hour, and weighing 3 tons, requires a traction force of 362 lb.; but the resistance on a hilly road is less unfavourable to the coach than to the wagon, because with an incline of 1 in 70 the forces necessary to draw the two vehicles are about equal, and the force is proportionally greater for the wagon as the incline increases. Experience seems to show that for a macadamised road the maximum slope should be 1 in 40, although a horse with a moderate load can easily enough trot over a gradient of 1 in 33. On the other hand, as it is not desirable for drainage to have a road perfectly level, the best minimum slope, in a longitudinal direction, has been variously given at from 1 in 80 to 1 in 125. The resistance to moving vehicles is less on paved than on 'metalled' roads; hence the maximum slope of the former should be less than that of the latter, from the greater tendency of a cart or coach to slide down the smoother surface.

What is the best transverse form for a road has been a much-debated question among engineers. It should be higher in the middle than at the sides; but some have thought it should be much higher than others. As a road can be better kept clear of water by a slight inclination in the direction of its length than by any form which can be given to its cross section, it has been found preferable that it should be as nearly flat as possible, because every part of its breadth will then be equally available for traffic; whereas it is almost necessary to keep on the centre of a highly convex road, and consequently wear deep furrows there, by confining the wheels and horses to pretty much the same track. The figure shows a transverse section of a road in the form of a segment of a circle—the most approved form—with only a slight rise in the centre. The slope from the side to the middle should not exceed 1 in 36.



Cross Section of a Road:
A, foundation of rough pavement or concrete; B, broken stones.

As respects the construction of the road itself, the first point to consider is the foundation or sub-road. The majority of roads have no artificial foundation. In such cases the surface on which the road-material is to be laid is generally made as solid as possible by means of efficient drainage, and by rolling and beating wherever there are embankments formed. It is the question whether or not a road should have a foundation of rough pavement below the broken stone covering which is the essential point of difference between the two great rival systems of Telford and Macadam. Telford, who began to construct roads in 1803, considered it of great importance that there should be such a foundation. He made it of stones varying in depth from 9 inches at the centre to 3 inches at the sides of the road, these being set with their broadest edge downwards, and no stone being more than 4 inches broad upon the upper edge; upon these were placed a coating of broken stones not exceeding 6 inches in thickness. The Glasgow and Carlisle and the Holyhead roads are excellent examples of the enduring character of those made on Telford's plan.

Macadam (q.v.) preferred a yielding and soft foundation to one which was rigid and unyielding, so that even on boggy ground, if it were but firm enough to allow of a man walking over it, he considered an artificial bottoming quite unnecessary. His roads were formed entirely of angular pieces of stone of such a size as to pass freely through a ring 2½ inches in diameter. This plan, first put into practice about 1816, has now fewer advocates than Telford's, or than the one subsequently proposed by Mr Thomas Hughes, where a concrete of gravel and lime is employed for the foundation of the road. But experience has shown that, except in the case of streets with very heavy traffic, Macadam's plan of employing angular pieces of stone is superior to every other as a mere covering for roads, whether they have an artificial foundation or not. So popular at one time was the system of macadamising that expensively paved streets were torn up to be re-formed on the new plan. The advantage of angular pieces of stone is that they dovetail into each other, and do not roll about like gravel.

A few of the best metropolitan roads which are not paved have a Concrete (q.v.) foundation with a layer of broken granite on the top of it. But even for the first-class macadamised roads of London the more general construction is to have a bottom or foundation of 'hard core' laid upon the natural surface levelled to receive it. This is composed of some cheap or waste material which is sufficiently hard and strong, such as fragments and chips of building stone and brick, or pieces of broken-up concrete, the whole layer being a foot thick until it is reduced by heavy rollers to about 9 inches. To fill up the interstices in this bottom, and to form a bed for the 'macadam,' a 5-inch layer of ballast is next put down and also compressed by rolling. The surface layer of the road, consisting of rough broken granite, is then laid down, first one layer 3 inches thick, and then a second layer of the same thickness. Both layers are separately rolled to a combined thickness of 4 inches, sand and water being put on the surface of the upper layer beforehand. The London macadamised roads over which there is a less heavy traffic have a somewhat thinner 'hard core,' covered with 4 inches of broken granite without a ballast layer. Broken flint is sometimes used instead of granite, and these second-class roads are only in some instances rolled. All roads of this nature should, however, be rolled.

In some English counties where flints are abundant the roads are made altogether of this material. Large pieces—say 7 inches or more across—form the bottom or foundation, which is 12 or 13 inches thick, and above this a 6-inch layer of flints, broken to the usual size of 2¼ to 2½ inches across, forms the surface, which is not generally rolled. In some of these country roads broken bricks or other hard waste material are put in as a bottom layer, with broken flints above. Large pieces of flint make an excellent foundation for such roads; but this material is too brittle to form a good surface layer.

The roads in many parts of Scotland and also in some English counties are macadamised with some variety of trap rock, such as basalt or dolerite (see BASALT). These are usually called whinstones, a term also applied to some very hard sedimentary rocks. Most of these form a good road covering. In the granite districts granite is used; Guernsey granite is one of the most durable kinds for heavy traffic. Hard limestone forms a very smooth and pleasant road; but many limestones and most sandstones are too soft for road metal, the stone for which should be tough as well as hard. Greywacke rock is also used.

The construction of paved streets is noticed under PAVEMENT; but we may state here that experience has shown that for heavy traffic the best road or street for a town is that formed of asphalt, 2 inches thick, on a foundation of concrete 6 inches thick. Its qualities of durability and cleanliness outweigh the disadvantage of its slipperiness. See ASPHALT.

It will be apparent from what has been said that drainage is in great part secured by the plan on which a road is made. What further drainage a road requires can in many situations be effected by ditches on either side. Where this is not possible, as in the case of portions situated in cuttings more or less deep, proper drains require to be constructed. In such circumstances a drain is either made down the centre, with branch-drains from the sides running into it; or drains are formed along the sides, with gratings at proper intervals to take in the surface-water.

Cyclists have established a Roads Improvement Association, which seeks to stimulate the local authorities to keep the roads in good repair.

See works on road-making by W. M. Gillespie (new ed. 1871), Codrington (1876), Gilmore (1876), Law and Clark (new ed. 1881), F. W. Simms (new ed. 1884), and Threpp (1887); also Jusserand's *English Wayfaring Life in the Middle Ages* (Eng. trans. 1888), and W. C. Sydney's *England in the Eighteenth Century* (1891).

Roads in Law.—Roads are included under the general name of highways, a highway being defined as a place over which a right of walking, riding, or driving is enjoyed by the public generally. It is called the King's (or Queen's) highway, because the sovereign is protector of the commerce of his subjects, and as such empowered to make regulations for traffic by sea and land. Highways are of several kinds—footways; foot and horse ways, sometimes called bridle-paths; pack and drift ways, used for driving cattle and pack-horses; foot, horse, and cart ways, over which the public may travel with vehicles of all ordinary descriptions. Navigable rivers are also described as highways. Where a Right of Way (q.v.) belongs not to the public generally, but to the owners or occupiers of land or house property, the way in question is private, not public, and the right to use it is classed among Easements (q.v.). A public way may exist over a place which is not a thoroughfare, as, for example, a street closed at one end. Highways are created by an express or implied grant, whereby the owner of the land dedicates it to the use of the public, by the necessity of things or by act of parliament. If an owner permits the public to pass and repass over his land without interruption, it is presumed that he intends to grant a public right of way; he loses his right to exclude the public, and the way is a highway for ever, unless it should be closed by a public authority under an act of parliament. Public rights may be limited to a particular purpose, as where the inhabitants of a parish have the right to use a way in going to or coming from church. If a highway be out of repair passengers may go over adjacent land; but this is a right to be exercised with caution. Any obstruction placed upon a public way is a Nuisance (q.v.), and may be abated or removed by any person aggrieved. Every part of a highway is equally open to the public; a foot passenger may walk on the carriage-way, and a blind or aged person has as good a legal right to be on the road as any one else. But passengers must use ordinary care to guard themselves against accident, and they must comply with the well-known 'Rules of the Road' (q.v.)—a person driving must keep to the left on meeting another vehicle, and to the right on passing another vehicle; and if he transgresses these rules without justification he will be liable for the consequences. No person is justified in using a highway for any purpose, however useful, which interferes with the general right of the public to pass and repass. Thus it has heen held that a local authority cannot lay down tramway lines so constructed as to damage the wheels of carriages using the street, although the tramway might be for the convenience of the public generally. On the same principle it was held an indictable nuisance for a telegraph company to place its posts on a strip of land adjoining the road. Nothing but an act of parliament can legalise such uses of a public way.

Subject to the rights which he has conferred on the public, the owner retains his right of property in the land. If the land on both sides of a highway belongs to the same owner, it is to be presumed that his rights extend over and under the road; if the land on one side belongs to A and on the other side to B, each is presumed to be owner up to the middle line of the way. If, for example, a mine should be opened in the neighbourhood of the road, the adjoining owner or owners would have the right to mine under it, so long as sufficient support is left for the surface of the road. If a gas or water company without authority of parliament takes up a road to lay its pipes, this is not only a nuisance but a trespass, for which damages may be recovered by the owner of the land. It has been held that a person loitering on a highway for the purpose of poaching may be indicted for trespassing on the land of the adjoining owner.

The repair of a carriage-way involves a regular outlay, and there are some cases in which this burden is imposed upon the owner of the land, *ratione tenuræ*, as a part of the service by which he holds his estate. But the general rule of common law is that the inhabitants of a parish must repair the highways within the same; they are liable to indictment if they fail to perform this duty, and no agreement they can enter into will relieve them of their liability. Many townships, &c., which are not separate poor-law parishes are separate highway parishes by ancient custom. The management of highways separately maintained by the parish is regulated by an act passed in 1835, and amending acts; a parish surveyor is elected by the ratepayers; in parishes over 5000 population a board may be elected. Under an act of 1862 many parishes have been grouped in districts; some counties are entirely districted; others prefer the parochial system; in some districts have been dissolved, owing to the dissatisfaction of the ratepayers with the working of an act passed in 1878. The highway board of a district consists of way-wardens elected for the parishes therein, and of the acting justices who reside in the district. Under the Public Health Act an urban sanitary authority is made the highway authority within its district; and in some cases the rural sanitary authority (the guardians) has been invested with highway powers. The Local Government Act of 1888 does not take away the authorities previously constituted; but certain boroughs formerly exempted were brought into the main road system of the county, and made liable to a contribution assessed by the county council. Many of the main roads throughout England were constructed or improved under Turnpike Trusts, constituted by acts of parliament. These trusts have now almost entirely disappeared, and the Act of 1878 already referred to has created a new class of main roads, managed by the authorities of the parish or district in conjunction with the county authority, the county paying half the cost of maintenance.

In the law of Scotland a highway is said to be *inter regalia*, but it seems that the presumption is that the land over which a road passes belongs to the adjoining owner or owners. Public rights of way are acquired by actual use for the prescriptive period of forty years. There were formerly two classes of roads—statute-labour and turnpike; by the Roads and Bridges Act, 1878, the management of all roads is vested in county road trustees; in the burghs they are managed by the town-council or commissioners of police.

For an outline of the English law, see Wright and Hobhouse, *Local Government in England*; for the Scotch law, Goudy and Smith, *Local Government*.

Roanne, a town of France (dept. Loire), 52 miles by rail NW. of Lyons, stands on the left bank of the Loire, which becomes navigable here, and is crossed by a stone bridge (1820). The principal church is St Stephen's (15th to 17th century). Roanne has besides an old castle with antiquarian collections, a new hôtel-de-ville with a museum, some manufactures, and a large transit trade, especially in Lyons manufactures, in iron and coal, and oriental wares. Pop. (1872) 18,615; (1886) 30,060; (1891) 29,744.

Roanoke, a river of Virginia and North Carolina, formed by the union, a mile above Clarksville, Virginia, of the Dan and Staunton rivers, which rise in the Alleghanies, flows south-east through the north-eastern portion of North Carolina, and empties into Albemarle Sound. It is navigable for steamboats to Weldon (130 miles); its length is 230 miles.

Roanoke, a city of Virginia, on the Roanoke River, 258 miles by rail W. of Norfolk, at the junction of the Shenandoah Valley and the Norfolk and Western railways. In 1880 it was a secluded hamlet; by 1890 it was grown to a bustling city, with a court-house, opera-house, hotels, churches, gaol, gas and electric lights, large machine-shops, steel and iron works, a rolling-mill, tobacco-, spoke-, and canning-factories, bottle-works, &c. Pop. (1880) 669; (1890) 16,159.

Roaring, popularly known as a disease, is only a symptom of disease in horses. It consists in a more or less loud unnatural sound emitted during the act of inspiration. As a rule it is first manifested by an animal making a slight noise, but this slowly increases in loudness and intensity, and in many cases the animal becomes useless whilst still comparatively young. Whistling is a modification of roaring, and is due to similar causes. The disease is found to be due, in the great majority of cases, to a wasting, atrophy, and fatty degeneration of the muscles of the larynx, but more particularly of those of the left side. This is partly at least explained by the fact that the nerve supplying the motor power to the left side is given off deep within the chest, winding round the posterior aorta, whereas that on the right is given off opposite the first rib, just at the entrance into the chest, and that the left nerve is more apt to be implicated in diseases of the organs within the chest. Still this theory is not quite satisfactory, as the same anatomical arrangement is found in other animals, yet roaring from muscular atrophy is not known among them, and many 'roarers' whose history has been known from birth have never suffered from chest affections, whilst others severely affected with chest disease have not become roarers. Again, mares and ponies are not nearly so prone to become roarers as males and larger horses.

The development of roaring is often due to catarrh, strangles, or some other disease affecting the respiratory organs; but it is generally concluded that these diseases are not sufficient of themselves to cause it, provided there be no hereditary taint, this hereditary taint alone being sufficient in many instances to induce roaring without the advent of another disease. There is no cure for it, all attempts made in this direction having hitherto proved abortive. In 1887 an operation for the cure of roaring was reintroduced by Dr Fleming, then principal veterinary surgeon to Her Majesty's forces. Similar operations had been performed by Günther, in Hanover, so far back as 1834. It consists in making a long incision into the larynx, the animal being under chloroform, and removing the arytenoid cartilage and vocal chord of the paralysed side. Some horses were slightly benefited, but many became worse than before the operation, and had to be destroyed. This proved a great disappointment to the veterinary profession, as hopes had been held out that at last a cure for roaring had been discovered.

Roaring is now included by the Royal Agricultural Society of England among the hereditary unsoundnesses, and their veterinary officers are instructed to disqualify all horses exhibited at the great national show that give any signs of this grave hereditary disease. See works by George Fleming (1889) and T. J. Cadiot (trans. 1893).

Roaring Forties, a sailor's term for a region of the great Southern Ocean lying south of 40° S. lat. (especially south of 45°), where the prevailing winds are strong WNW. and NW. winds, often stormy. It is owing to these winds that the outward voyage to Australia is made by the Cape, and the homeward voyage by Cape Horn. The same name is sometimes given by analogy to a belt of the North Atlantic about 40°–50° N.

Robben Island (Dutch, 'seal island'), an islet at the entrance of Table Bay, 10 miles NW. of Capetown. It contains a lunatic asylum and a leper colony, the management of which latter institution caused some discussion in 1889 and 1890.

Robber Council. See EUTYCHES.

Robbery is the taking and carrying away, either with violence or with threats of injury, of a thing which is on the body or in the immediate presence of the person from whom it is taken, under such circumstances that in the absence of violence or threats the act committed would be a theft. In order to constitute the crime, the robber must actually obtain possession of the goods. Further, it is well established that no sudden snatching of property unawares from a person is sufficient to constitute robbery, unless some injury be done to the person, or there be a previous struggle for the possession of the property, or some force used to obtain it. By statutory law in England and Ireland (24 and 25 Vict. chap. 96) the punishment for robbery is imprisonment or penal servitude, varying according to the nature of the violence or threats used. By the Criminal Procedure (Scotland) Act, 1887 (50 and 51 Vict. chap. 35), the jurisdiction of sheriffs has been extended to robbery and certain other crimes which formerly were cognisable only by the Court of Justiciary. It is, however, to be noted that this extension of jurisdiction does not render bailable crimes, such as robbery, which were not formerly bailable. By the above-mentioned statute it is now competent, under an indictment for robbery, to convict of reset or theft, or attempt to rob. An act of robbery committed upon the high seas constitutes the offence of piracy at common law; and each state is entitled to visit the crime with the penalties which its own laws may determine. In England cases of piracy are now tried at the Central Criminal Court and at the assizes.

Robbia, LUCA DELLA, sculptor and modeller of figures in relief, was born at Florence in 1399 or 1400, worked all his life there, and died there on 20th February 1482. He designed and executed between 1431 and 1440 ten panels of Angels and Dancing Boys for the cathedral, which Professor J. H. Middleton calls one of the greatest pieces of sculptured work in the 15th century. Another great work by him was a bronze door, with ten panels of figures in relief, for the sacristy of the cathedral, made between 1448 and 1467. In marble he sculptured, in 1457–58, the tomb of Federighi, Bishop of Fiesole (now in the church of San Francesco outside the city). The frame that surrounds this monument is made of exquisitely painted majolica tiles. His name is closely associated with the production of figures in glazed or enamelled terra-cotta, made by a process which, though he did not invent it, he yet perfected greatly. Amongst the works he executed by this process are numerous medallions, some white, some polychrome, and reliefs.—His principal pupil was his nephew ANDREA (1435–1525), who worked chiefly at the production of enamelled reliefs, retables, and medallions, these last for the most part reproductions of the Madonna and Child. Nearly all his works were of religious subjects; they were made chiefly for Florence, Arezzo, and Prato.—His son GIOVANNI (1469–1529?) continued the activity of the family in this style of work; his best productions are the frieze, representing the Seven Works of Mercy, outside a hospital at Pistoja, and a fountain in the sacristy of St Maria Novella in Florence.

The standard work on these artists is J. Cavallucci and É. Molinier's *Les Della Robbia, leur Vie et leur Œuvre* (1884). See also Prof. J. H. Middleton in *Ency. Brit.*, and (but exercise caution) Leader Scott's *Luca della Robbia* ('Great Artists' series, 1883).

Robert I. (OF SCOTLAND). See BRUCE.

Robert II., king of Scotland 1371–90, was born 2d March 1316, two years after the battle of Bannockburn. His father was Walter Stewart (q.v.), his mother Marjory, only daughter of Robert the Bruce; and both parents he lost in infancy. Throughout the disastrous reign of his uncle, David II., he was one of the most prominent of the patriotic nobles of Scotland, twice acting as regent during his exile and captivity, and fighting at Halidon Hill (1333) and Neville's Cross (1346). On David's death (22d February 1371) he obtained the crown, and became the founder of the Stewart dynasty, in virtue of the law of succession settled by the Council of Estates at Ayr in 1315. 'A man not valiant,' Froissart describes him, 'with red blear eyes, who would rather lie still than ride;' and partly from disposition, partly from the infirmities of age, Robert proved a peaceable, if not exactly a pusillanimous ruler. Such wars as were waged with England were not only conducted, but organised, by his powerful and intractable barons, particularly the Earls of Douglas, Mar, March, and Moray, who shaped the policy of the country very much according to their pleasure. The misery inflicted on both sides of the Border by the raids of these warlike chiefs, and the reprisals of the English wardens—the Percies and others—were frightful; famine and pestilence became chronic; but the most celebrated incidents of Robert's reign were the invasions of Scotland by an English military and naval force under the command of the Duke of Lancaster ('old John of Gaunt, time-honoured Lancaster') in 1384, and again by King Richard II. himself in 1385, which wasted the land as far as Edinburgh and Fife, and the grand retaliatory expedition of the Scotch in 1388, which culminated in the battle of Otterburn (q.v.). Robert died at his castle of Dundonald in Ayrshire, 19th April 1390. He married first, in 1349, his mistress, Elizabeth Mure of Rowallan, and secondly, in 1355, Euphemia, daughter of the Earl of Ross and widow of the Earl of Moray.

Robert III., king of Scotland 1390–1406, son of the preceding, was born about 1340. His baptismal name was John, but this name, out of hatred to the memory of John Baliol, was changed on his accession to the throne by an act of the Scottish Estates. His imbecility as a ruler virtually placed the reins of government in the hands of his ambitious brother, Robert, Earl of Menteith and Fife, in 1398 created Duke of Albany, during whose regime the Scottish barons first began to exercise that anarchic and disloyal authority which, in the reigns of the first three Jameses, threatened to destroy the power of the sovereign altogether. The principal events in Robert's reign were the invasion of Scotland in 1400 by Henry IV. of England, who, at the head of a large army, penetrated as far as Edinburgh, but did not inflict much injury on the country—more, however, from clemency than impotence—and the retaliatory expedition of the Scotch, two years after, under Archibald Douglas, which resulted in the terrible disaster at Homildon Hill (q.v.). Robert had two sons, the eldest of whom was David, Duke of Rothesay (1378–1402), a youth not destitute of parts, but shockingly licentious. As long as his mother lived he kept within bounds, comparatively speaking; but after her death, says Buchanan, 'he gave an unbridled license to his passions; laying aside fear and shame, he not only seduced married ladies and virgins of good family, but those whom he could not entice he forced to his embraces.' Albany received orders from the king to act as his guardian, and after a short time starved him to death at Falkland; for which he underwent a mock-trial by his own creatures, and was of course declared innocent. Robert now became anxious for the safety of his younger son, James, and, after consulting with Archbishop Wardlaw of St Andrews, he resolved to send him to France; but, while proceeding thither, the vessel in which he sailed was intercepted by an English cruiser, and James was taken prisoner (1405). When his father received the melancholy news he gave way to paroxysms of grief, and died at Rothesay Castle, 4th April 1406.

Robert of Brunne. See BRUNNE.

Robert of Gloucester. See GLOUCESTER.

Roberts, DAVID, landscape and architectural painter, was born at Edinburgh (in Stockbridge) on 24th October 1796, and was apprenticed to a house-painter. In 1818 he advanced to the grade of scene-painter, and in 1821 went to London to paint scenery for the stage of Drury Lane. All this while he was studying artistic drawing and painting, and in 1826 and 1827 he attracted the attention of the public with pictures of Rouen and Amiens cathedrals in the Royal Academy exhibitions. Then for several years he travelled in Spain, Morocco, Egypt, Palestine, Italy, Belgium, making drawings of grand and impressive buildings and landscapes with picturesque edifices, and working them up into pictures. From among this work the following stand out—the drawings from Spain for the illustrations to the *Landscape Annual* (1835–38); the magnificent volumes of *The Holy Land, Syria, Idumea, Arabia, Egypt, and Nubia* (1842); numerous interiors of churches, as St Miguel at Xeres, Holy Nativity at Bethlehem, St Jean at Caen, St Paul at Antwerp, St Peter's at Rome, the cathedrals of Milan and Seville; and the grandiose pictures, 'Departure of the Israelites from Egypt' (1829), 'Ruins of the Great Temple at Carnac' (1845), 'Jerusalem from the South-east' (1845), 'Destruction of Jerusalem' (1849), 'Rome' (1855), and 'Grand Canal at Venice' (1856). Roberts' style is essentially spectacular, producing grand broad effects, with magnificent architectural arrangements, to which the details are of course generally sacrificed. He was elected an A.R.A. in 1839, an R.A. in 1841; and died 25th November 1864. See Life by James Ballantine (1866).

Roberts, SIR FREDERICK, British general, was the son of an India officer, General Sir Abraham Roberts, and was born at Cawnpore on 30th September 1832. He was brought to England when two years old, educated at Clifton, Eton, Sandhurst, and Addiscombe, and entered the Bengal Artillery in 1851. His first taste of actual warfare was got in the hot time of the siege of Delhi, during the Mutiny, and he took an active part in the subsequent operations down to the relief of Lucknow, acting on the staff, in the quartermaster-general's department, and he won the V.C. He discharged the duties of assistant quartermaster-general in the Abyssinian expedition of 1868, and in the Lushai expedition of 1871–72. On the outbreak of the Afghan war in 1878, Roberts, now major-general, was appointed to command the Kurram division of the army. He forced in brilliant fashion the Afghan position on the peak of Peiwar Kotul (8500 feet above sea-level), and was rewarded with a knight-commandership of the Bath (1879). After the murder of Sir Louis Cavagnari and the escort of the British mission at Kabul, he was given the command of the force sent to avenge them. He defeated the Afghans at Charásia on 6th October, took possession of Kabul on the 12th, and assumed the government of the country, Yákúb Khan having abdicated. Events followed quickly: the fortified cantonment of Sherpur was occupied by the British army, the fortress of Bala Hissar in Kabul was dismantled, Yákúb Khan was sent a prisoner to India, the Afghans began to concentrate on Kabul, General Roberts sought to check them, and there was much sharp fighting round the city, Abdul Rahman was proclaimed Ameer, and General Burrows was crushingly defeated at Maiwand, and the British garrison of Kandahar besieged by the followers of Ayub Khan. On 9th August Sir F. Roberts set out with 10,148 troops, 8143 native followers, and 11,224 baggage animals on his memorable march through the heart of Afghanistan to the relief of Kandahar, which he reached three weeks later. He immediately gave battle to Ayub Khan, and routed him completely, capturing all his artillery and his camp. When he visited England towards the close of the year he was honoured with a baronetcy, and on his return to India was appointed commander-in-chief of the Madras army (1881), and from 1885 till he resigned the post in 1893, held the rank of commander-in-chief in India. His full title is Lord Roberts of Kandahar and Waterford; and he holds various honorary degrees, such as LL.D. of Cambridge. There is a Life of him by C. R. Low (1883).

Robertson, FREDERICK WILLIAM, a great English preacher, was born, the eldest of seven children, in London, 3d February 1816, in the house of his grandfather, Colonel Robertson. His father was a captain in the Royal Artillery, and the first five years of the boy's childhood were passed at Leith Fort. He had his schooling at Beverley, a year at Tours, and at the Edinburgh Academy, and from the beginning was marked as an eager and imaginative child, gentle and unselfish, of singular purity of spirit and uprightness of character, and with an altogether un-childlike sense of the dignity of duty. After a short time of study at Edinburgh University, and a year of wearing drudgery in a solicitor's office at Bury St Edmunds, he returned to his home at Cheltenham to prepare for the army, but while waiting for his commission was, after much misgiving, persuaded of his vocation to the ministry. He matriculated at Brasenose College, Oxford, on 4th May 1837, and five days later came the offer of a commission in a cavalry regiment. At Oxford he lived a secluded life, and gave himself with fervour to the study of the Scriptures. From the beginning he felt no real affinity with Newmanism, but clung firmly to the Evangelicalism of his upbringing, tempered by a charity and tolerance all his own. Although he did not compete for honours, he read hard, especially in Plato, Aristotle, Butler, with Shelley, Coleridge, and Wordsworth. He was ordained by the Bishop of Winchester in July 1840, and for nearly a year thereafter held a curacy at Winchester. His health now broke down at once from over-devotion to work and a course of ascetic austerities through which, in this period of bondage to the letter, a hypersensitive conscience prompted him to seek after a higher level of Christian life. A walking tour on the Continent restored him to health, and at Geneva he married, after a short acquaintance, a daughter of Sir George William Denys. In the summer of 1842 he became curate to the incumbent of Christ Church, Cheltenham, and here for nearly five years he laboured with unbroken devotion, despite depression of spirits, conviction of failure, and a painful and prolonged mental struggle through which he fought his way upwards to certainty in his grasp of the realities of Christian truth. His faith in Evangelicalism was first shaken by the intolerance and bitterness of its partisans, and the spiritual agony of the revulsion shook his soul to its foundations, and again broke down his health. In September 1846 he set out for the Continent, and, after three months of travel and preaching at Heidelberg, returned a follower of no school to accept the curacy of St Ebbe's in Oxford. Here the power of his preaching had already made itself felt among his poor and even among the undergraduates, when in August 1847 he accepted an invitation to Trinity Chapel, Brighton.

He had now grown to his full stature as a disciple of Christ, and his rare union of imaginative with dialectic power, the beauty and freshness of his thought, his earnestness, originality, wide sympathy, and knowledge of the human heart at once arrested public attention. He brought the religion of Jesus to bear on everyday life and the perplexing social problems of the time, and pointed out the path to the true liberty, equality, and fraternity in service and disciplineship as sons of God and joint-heirs with Jesus Christ. But his motives were misunderstood by many, and, especially after the excitement of 1848, he was branded for his sympathy with working-men as a revolutionist and enemy of social order, and subjected to much misrepresentation and many a cruel and unjust attack. He established the Working-men's Institute in Brighton, and taught its members how to govern and to respect themselves, and he flung himself with a passionate and chivalrous enthusiasm into every battle waged in his day against tyranny and wrong. Stern in denunciation of moral evil, he was tolerant of intellectual error, and thus his influence, like his Master's, extended to men hitherto outside the pale of Christian sympathy. The strength and absolute sincerity of his convictions, and the broad rationality and certitude on which these were based, gave new strength to many a troubled and doubting heart, and added in almost unexampled degree the seal of power and comprehensiveness to his ministry. To him the Incarnation was the centre of all history; Christ, God's idea of human nature realised. He was no mere negative theologian, for the central point of his preaching was ever the historical reality of the life of Christ, revealing at once sonship with God and brotherhood with man. Men are sons of God by virtue of His image stamped upon them in creation; they become so *de jure* by baptism, but *de facto* by faith. The suffering of Christ makes atonement for our sins by making possible in us the potentiality of sympathetically suffering for others; while faith converts this potentiality into an actual reality, as the foundation of union with God and the spring of Christ-like qualities within us. The characteristic fruit of faith is a pervasive love to Christ and to one another; and one of the privileges that flow from it is an elevation from the bondage of the letter, and a security in the freedom of the spirit. Hence came Robertson's honest refusal to sign the petition for an enactment against opening the Crystal Palace on Sundays—a protest against binding the chains of Judaical legalism on the Christian conscience which cost him much odium and inspired one noble sermon. Robertson grasped the idea of the vast comprehensiveness of the Christian ideal, with its unity of spirit under diversity of form, recognising that theological systems must be continually modified by new conditions of life and thought in the historical development of the ages. The intolerant absolutism of the Evangelical school, and the High Church subservience to form, as well as its search for an ideal in the Christianity of the past rather than in the present or the future, were alike repugnant to him; yet he possessed all the emotional fervour which used to be claimed as the monopoly of the one, and which he loved in his own day to recognise in the fresh enthusiasm of the other, together with the strength of thought and the philosophic breadth usually associated with the more liberal theology. He himself summed up the cardinal principles of his teaching in these propositions: (1) The establishment of positive truth, instead of the negative destruction of error. (2) That truth is made up of two opposite propositions, and not found in a *via media* between the two. (3) That spiritual truth is discerned by the spirit, instead of intellectually in propositions; and therefore Truth should be taught suggestively, not dogmatically. (4) That belief in the human character of Christ's humanity must be antecedent to belief in his divine origin. (5) That Christianity, as its teachers showed, works from the inward to the outward, and not *vice versâ*. (6) The soul of goodness in things evil.

In the pulpit Robertson's voice was low but clear and musical, with occasional startling modulations, and that peculiar thrill of suppressed emotion which is the innermost secret of eloquence. He stood almost motionlessly erect, his fine face, delicate and mobile features, and deep blue eyes all eloquent in harmony with his words. Intensely sensitive as he was, all self-consciousness vanished as he spoke, his brain and heart aglow with a fire of earnestness that burned up his physical strength. His sermons were kneaded with his heart's blood, hence their reality, as he never spoke what had not become a part of himself. In preparing them he jotted down his thoughts on scraps of paper, next wrote out his main ideas with some fullness in logical sequence of thought, then made on a small slip of paper a brief abstract of the whole with merely the heads and a few of the leading thoughts. This he took with him into the pulpit, but hardly had he warmed to his subject ere it was crushed in his grasp and flung aside as useless.

During his last years Robertson suffered intense pain from a disease of the brain, which was heightened by the excitability and unrest of his temperament, and the misrepresentations that fell like blows upon a hypersensitive nervous organisation. He preached his last sermon in Trinity Chapel on 5th June 1853, having resigned because his vicar had refused on entirely inadequate grounds to confirm his nomination of a curate. After a few more weeks of cruel suffering he died, 15th August 1853, with the last words on his lips, 'I must die. Let God do His work.' Eight days later he was laid in the Extra-mural Cemetery at Brighton amid the sorrow of the entire population of the town. Its citizens knew well what Stopford Brooke's biography twelve years later revealed to the wider world, that his whole life had been a passionate Imitation of Christ.

Robertson of Brighton published in his lifetime but one sermon—the four series (1855, 1855, 1857, 1859-63) so well known over the English-speaking world, and constituting so unique a monument of religious genius, were not written for delivery or preservation, but are really recollections sometimes dictated by the preacher himself to the younger members of a family in which he was interested, sometimes written out by himself for them when they were at a distance. Yet another volume, *The Human Race*, &c., was issued in 1880. Other works that have also been published are *Expository Lectures on St Paul's Epistle to the Corinthians* (1859); *Lectures and Addresses* (1858); *An Analysis of 'In Memoriam'* (1862); a translation from Lessing—*The Education of the Human Race* (1858); and *Notes on Genesis* (1877). The *Life and Letters*—the latter only inferior in value to the sermons—by the Rev. Stopford A. Brooke, appeared in 1865, and has already taken its place among the classics of English biography.

Robertson, Joseph, Scottish antiquary, was born, a small shopkeeper's son, at Aberdeen, 17th May 1810, and was educated at Udny Academy, and the grammar-school and Marischal College of his native city. An Episcopalian and Conservative, he was apprenticed to a lawyer, but took early to writing, and, after six years of literary work at Edinburgh, was a newspaper editor at Aberdeen, Glasgow, and Edinburgh from 1839 to 1853. He was in that year appointed curator of the historical department of the Edinburgh Register House, received in 1864 the degree of LL.D., and died 13th December 1866. He was an originator of the Aberdeen Spalding Club (1839–70), for which he edited four works; and for the first edition of this encyclopædia he wrote eighty articles (Columba, Culdees, Cuthbert, Mary Stuart, &c.), many of which have, with revision, been retained. Of his other works may be noticed *The Book of Bon-Accord, or a Guide to the City of Aberdeen* (1839); *Catalogues of the Jewels, Dresses, Books, and Paintings of Mary Queen of Scots* (Bannatyne Club, 1863), the invaluable *Concilia Scotiæ: Ecclesiæ Scoticanæ Statuta, 1225–1559* (2 vols. Bannatyne Club, 1866), and an admirable article in the *Quarterly Review* for June 1849 on 'Scottish Abbeys and Cathedrals.' See the Memoir prefixed to a reprint of the last (Aberdeen, 1891).

Robertson, Thomas William, dramatist, was born at Newark-on-Trent, on 9th January 1829. The family had for some generations back been actors and actresses, and young Tom was brought up almost on the boards. About the middle of the century the Lincoln circuit, with which his father was connected, ceased to pay; the company was broken up, and Tom proceeded to London. There he struggled for a living, acting as prompter and stage manager, writing unsuccessful plays, acting himself, writing for newspapers and magazines, *Fun* amongst them, translating French plays, and so forth; but Robertson was never an actor of any mark. His first success as a dramatist was with *David Garrick*, in 1864, the title rôle of which was one of Sothern's great things. This was followed by the production of the comedy *Society* at Liverpool (1865), where, and later in London, it was received with the warmest approval. His next comedy, *Ours* (1866), produced by the Bancrofts at the Prince of Wales's Theatre, London, thoroughly established Robertson's fame; and from that time his pen was kept incessantly busy. *Caste* (1867), *Play* (1868), *School* (1869), *M.P.* (1870)—all brought out by the Kendals at the Prince of Wales's—and *Home* (1869) and *Dreams* (1869), the former at the Haymarket, the latter at the Gaiety, were all equally successful. But in the midst of his triumphs Tom Robertson died, in London, on 3d February 1871. His best comedies still retain their popularity, thirty years after they were first produced. This is owing in the first place to the excellence of their construction and stagecraft, and in the next to their bright and merry humour, their wholesome, healthy tone, their happy contrasts, and the sunny spirit that shines through them. See his *Principal Dramatic Works*, with Memoir by his son (2 vols. 1889), and the *Life and Writings*, by Pemberton (1893).

Robertson, William, the historian, was born 19th September 1721, at Borthwick in Midlothian, of which parish his father was minister. He went to school at Dalkeith, at twelve entered the university of Edinburgh, and at twenty-two was ordained as minister of Gladsmuir. On the sudden death of his father and mother soon after, the care of a younger brother and six sisters devolved upon him, and this duty he at once cheerfully undertook, although his income was but £100 a year. At the same time he was assiduous in preaching, in catechising, and in all the duties of his office. His vigour and patriotism he showed by joining a body of volunteers formed for the defence of Edinburgh against the Jacobite rebels in 1745, and after the surrender of the city he offered his services to the royalist commander at Haddington. As early as 1751 we find Robertson taking a prominent part in the debates of the General Assembly, and indeed his influence soon became supreme as leader of the 'Moderate' party in the church. He carried the deposition of Gillespie in the Assembly in 1752, and in 1757 the acquittal of Carlyle of Inveresk before the Synod for having been present at the performance of Home's tragedy of *Douglas* on the Edinburgh stage. From 1759 till his death he was joint-minister with Dr Erskine of Greyfriars Church, Edinburgh, and in the same year he was appointed chaplain of Stirling Castle. Still further, in 1761 he became a royal chaplain, in 1762 principal of the university of Edinburgh, and in 1764 the office of king's historiographer was revived in his favour, with a salary of £200 a year. Tempting offers of golden preferment in the English church were held out to him, but these he was too sensible and honest to accept. All this was because of the splendid and immediate success of his *History of Scotland* (1758–59), which earned the warmest praises from Hume, Horace Walpole, Lord Chesterfield, Bishop Warburton, David Garrick, and Baron d'Holbach, if not Dr Johnson—'Sir, I love Robertson; and I won't talk of his book,' said the doctor to Boswell. Next followed the *History of the Reign of the Emperor Charles V.* (3 vols. 1769), to which was prefixed an admirably synthetic and suggestive *View of the State of Society in Europe from the subversion of the Roman Empire to the beginning of the Sixteenth Century*. This is the most valuable of Robertson's works. The field has been often since traversed by authors who have discovered much new material, but all the use they have made of it has become an indirect tribute to the natural sagacity of Robertson. He received £4500 for the copyright, and was gratified by the most flattering praises from Voltaire and Gibbon. The *History of America* appeared in 1777; *An Historical Disquisition concerning the Knowledge which the Ancients had of India* in 1791. Robertson died near Edinburgh, 11th June 1793, and was buried in the Greyfriars churchyard.

Robertson's Histories are still excellent reading, although in every case they have been left behind by the more valuable works of a later day. Their merit is great, considering the slenderness of the materials then available and the fact that he lived almost half a century before the modern conception of the scope and method of history awoke. None of his contemporaries philosophised on defective data with greater dignity or less unconsciousness of 18th-century limitations; but it is true that many of the remarks in his review of the state of Europe display a quite remarkable sagacity and power of generalisation. His style is clear and correct, but is formal, and lacks idiomatic vigour and spontaneity.

See the short account of his life by Dugald Stewart; Carlyle's *Autobiography;* Brougham (a grand-nephew, who, a boy of fifteen, had stood beside the historian's grave), *Lives of Men of Letters of the Time of George III.;* and Lord Cockburn's *Memorials of his Life and Times*, for an interesting sketch of his appearance and conversation in his last years.

Robertson, Rev. William Bruce, D.D. (born 24th May 1820, died 27th June 1886), always called 'of Irvine'—his first and only charge—was ordained to the United Presbyterian church there in 1843. As a student he had spent many hours with De Quincey, and largely owing to his advice had finished his theological course at Halle, chiefly under Tholuck. Serious illness in 1871 incapacitated him from ever resuming regular work. Between 1871 and 1878 he was much in Italy. Thereafter he was able to undertake occasional preaching, his sermons and week-day lectures at Cambridge, 1879–81, being the most memorable. Possessed of a strong sense of humour, he could make it serve the highest ends, or could pass at once without effort or jar to the most solemn subjects. Gifted with a striking presence and a sonorous, well-regulated voice, Calvinist in doctrine, but catholic in sympathy; a staunch Presbyterian, but with a keen eye to the artistic beauty of cathedrals; an ardent admirer of Luther, but a loving student of the liturgy and hymns of the Roman Church; a seer rather than a theologian, he made music and painting, sculpture and architecture all minister by illustration and analogy to the evangelical setting forth of the gospel and cross of Christ. Unfortunately he published nothing beyond a translation of the *Dies Iræ* and one or two sacred songs.

For other poems and jottings of a few of his sermons, see his Life, by Rev. James Brown, D.D. (1889); and *Robertson of Irvine, the Poet Preacher*, by A. Guthrie (1889).

Robes, Mistress of the. See Household.

Robespierre, Maximilien Marie Isidore, was born of a legal family, originally of Irish origin, at Arras, 6th May 1758. His mother died in 1767, his broken-hearted father two years later, and the four children were brought up by their maternal grandfather, an Arras brewer. Maximilien, the eldest, early showed unusual promise, and was educated at Arras and at the Collége Louis-le-Grand at Paris, where Camille Desmoulins was a fellow-student. He was admitted *avocat* in 1781, and next year was named criminal judge by the bishop of Arras, but resigned his place soon after to avoid passing a sentence of death. All through life a fanatical devotee of the gospel according to Rousseau, his sentimentality and taste for verses made him popular among the *Rosati* at Arras. He drew up the *cahier* or list of grievances for the guild of cobblers, and was elected to the States-general in 1789 as one of the deputies for the *tiers état* of Artois. He soon attached himself to the extreme Left—the 'thirty voices,' and though his first speeches excited ridicule, it was not long before his earnestness and his high-sounding phrases commanded attention. 'That young man believes what he says; he will go far,' said Mirabeau, forecasting his future with the divination of genius. Indeed his influence grew daily, both in the Jacobin Club and in the Assembly, and thousands amongst the mob of patriots outside became fanatical in their admiration of his sincere cant and his boasted incorruptibility. Three days after the death of Mirabeau he called upon the Assembly to prevent any deputy from taking office as minister for four years, and in the following month (May 1791) carried the motion that no member of the present Assembly should be eligible for the next. This policy grew out of the narrow and acrid suspiciousness of his own nature, and reveals the inherent meanness of his aims and his failure to grasp that grand idea of real parliamentary government by a responsible ministry, which had been the dearest dream of Mirabeau. Next followed Robespierre's appointment as public accuser, the king's flight to Varennes (June 21st), Lafayette's last effort to control the sacred right of Insurrection on the Champ-de-Mars (17th July), the abject terror of Robespierre, his sheltering himself in the house of Duplay, a carpenter, his hysterical appeal to the Club, the theatrical oath taken by every member to defend his life, and his being crowned with chaplets, along with Pétion, and carried home in triumph by the mob at the close of the Constituent Assembly (30th September).

After seven weeks of quiet he sold his small patrimony and returned to Paris, to the house of Duplay, where he remained to the last day of his life. He was much beloved in the family, and a passion quickly sprung up betwixt himself and his host's eldest daughter Eléonore, a romantic girl of twenty-five. His room was a humble chamber in which he worked and slept; its decorations, a few busts and portraits of himself. Alone amongst the patriots he was noted for the carefulness of his dress, which never varied in the slightest—powdered hair, a bright blue coat, white waistcoat, short yellow breeches, with white stockings and shoes with silver buckles. Small and feeble in frame, solitary and reserved in habits, he ever wore an anxious look upon his straitened and spectacled face; his complexion was atrabilious, even *verdâtre;* and he retained to the last the sobriety of the cynic, drinking only water.

Meantime the Girondist party had been formed in the new Legislative Assembly, its leaders—the loudest, Brissot—eager for war. Robespierre, who ever feared and disliked war, offered a strenuous opposition in the debates of the Jacobin Club, and sometimes, if seldom, in his endless and windy harangues rose into the region of real eloquence. Fundamentally an empty pedant, inflated with words which he mistook for ideas, in his orations he is ever riding in the air on theories, his foot never on the solid ground of the practical. In April 1792 he resigned his post of public prosecutor. He was invisible during the crisis of the 10th August, but he joined the Hôtel-de-Ville faction, and on the 16th August we find him presenting to the Legislative Assembly its petition for a Revolutionary Tribunal and a new Convention. It does not appear, however, that he was in any sense directly responsible for the atrocious September massacres in the prisons, or more than a mere accessory after the fact. For his reward he was elected first deputy for Paris to the National Convention, which opened on the 21st September. The bitter attacks upon him by the Girondists were renewed only to throw Robespierre into a closer union with Danton and his party, but the final struggle was interrupted for a little by the momentous question of the king's trial. Robespierre opposed vigorously the Girondist idea of a special appeal to the people on the king's death, and his execution (21st January 1793) opened up the final stage of the struggle, which ended in a complete triumph of the Jacobins on the 2d June of the same year. The first Committee of Public Safety—a permanent Cabinet of Revolution—was decreed in April 1793, but Robespierre was not elected till the 27th July. He was now for the first time one of the actual rulers of France, but it is open to question whether for the whole twelve months from this time to the end he was not merely the stalking-horse for the more resolute party within the Twelve. His vaunted respectability, his great popularity with the mob, and his gift of fluent, if vague and windy, oratory made an admirable cover for the truculent designs of strong and completely unscrupulous men like Billaud-Varennes and Collot d'Herbois, and at least it is certainly the case that Couthon and Saint-Just were the only members whose political and social ideals coincided with his own. Destitute of political intuition, without foresight or sagacity, himself the mere dupe of a few borrowed phrases, he was strong because within his narrow limits he was honest, and because he actually had a horizon of social ideals, not nakedly identical with his own advantage. He was astute enough, moreover, to play off one forcè against another—the Convention, the Commune, and the Committee, while he derived his strength from the constant worship of the Club.

The next scenes in the great drama of Revolution were the dark intrigues and desperate struggles that sent Hébert and his friends to the scaffold on the 24th March 1794, and Danton and Robespierre's school-fellow, Camille Desmoulins, on the 5th of April after. Hébert Robespierre had long disliked, and Chaumette's crazy deification of the Goddess of Reason had filled him with disgust; Danton he at once hated and feared with that fierce and spiteful hatred he ever felt instinctively for men like the great Tribune and Vergniaud with natural gifts beyond his own. 'Robespierre will follow me: I drag down Robespierre,' said Danton with prophetic truth. The next three months he reigned supreme, but his supremacy prepared the way for his inevitable fall. He nominated all the members of the Government Committees, placed his creatures in all places of influence in the commune of Paris, sent his henchman Saint-Just on a mission to the armies on the frontier, assumed supreme control of the Revolutionary Tribunal, and completely revolutionised its method of operation by the atrocious measure introduced by his creature Couthon on the 22d Priarial (10th June), to the effect that neither counsel nor witnesses need be heard if the jury had come otherwise to a conclusion. The fatal significance of this change —a complete abrogation of all law—is seen in the fact that from this time till the day of Robespierre's death the daily tale of victims of the guillotine averaged almost thirty. But, in accordance with the law that governs all human things, as Robespierre's power increased his popularity decreased, and still further he had committed the fatal folly of making himself publicly ridiculous. Already his voluntary bodyguard of *Tappe-durs* had excited derision and resentment, but his declaration on 7th May of a new religion for the state—the foundation of a new regime of public morality—awakened in the mind of Paris the slumbering sense of humour. The Convention at Robespierre's instance agreed to compliment the Supreme Being with an acknowledgment of His existence and themselves with the Consolatory Principle of the Immortality of the Soul, to be celebrated in thirty-six annual festivals. The first of these was held on the 8th of June, when Robespierre, glorious in a new violet-blue coat, walked in front of the procession and delivered his soul of a vapid harangue, and set fire to pasteboard figures representing Atheism, Selfishness, Annihilation, Crime, and Vice. An old mad woman named Catherine Theot, who thought herself the mother of God, now declared Robespierre to be the new divine Saviour of the world, and drew down upon him still further ridicule in the Convention. Meantime the pace of the guillotine grew faster, although apparently Robespierre hoped to bring it to a close as soon as all his more dangerous enemies, like Tallien, Fouché, and Vadier, were cut off. Meantime the public finance and the work of government generally drifted to ruin, and Saint-Just openly demanded the creation of a Dictatorship in the person of Robespierre as alone possessing intellect, energy, patriotism, and revolutionary experience enough. On the 26th July (8th Thermidor), after about a month's absence, the Dictator delivered a long harangue complaining that he was being accused of crimes unjustly. He was listened to in deep and unsympathetic silence, and the Convention, after at first obediently passing his decrees, next rescinded them and referred his proposals to the committees, and the sitting ended without anything being concluded. That night at the Jacobin Club his party again triumphed, and the Tallien party in despair hurried to the members of the Right, the Girondist remnant, and implored their help against the common enemy at this dèsperate juncture. Next day at the Convention Saint-Just could not obtain a hearing. Tallien, Billaud-Varennes, and Vadier vehemently attacked Robespierre, and the voice of the Dictator himself was drowned with cries of 'Down with the tyrant!' Turning to the Right, 'I appeal to you whose hands are clean,' he cried, but the Right sat in stony silence. 'President of Assassins, I demand to be heard,' he cried, but his voice died down in his throat.—'The blood of Danton chokes him,' cried Garnier. An unknown deputy named Louchet proposed that Robespierre should be arrested, and at the fatal words his power crumbled into ruins. His younger brother and Lebas demanded to be included in the honourable sentence. Vain attempts were made by the Jacobin Club and the Commune to save their hero, but Paris refused to move, and even Henriot's artillerymen to obey. Robespierre broke his arrest and flew to the Common Hall, whereupon the Convention at once declared him out of the law. The National Guard under Barras turned out to protect the Convention, and Robespierre had his lower jaw broken by a shot fired by a gendarme named Merda, or, as many believed, by his own hand. Next day (28th July; 10th Thermidor 1794), still in his sky-blue coat, the miserable, trembling wretch died with Saint-Just, Couthon, and nineteen others by the guillotine; the day after seventy-one members of the municipality followed, twelve more on the third day, and the Reign of Terror was extinguished in a sea of blood.

See the histories of the Revolution by Lamartine, Michelet, Louis Blanc, Carlyle, Von Sybel, H. Morse Stephens, and M. Taine; the Life by G. H. Lewes (1849); and especially Ernest Hamel's exhaustive and authoritative, although vastly over-eulogistic, *Vie de Robespierre* (3 vols. 1865–67), also his *Thermidor* (1891).

Robin. See REDBREAST. The American Robin is a Thrush (q.v.)—the *Turdus migratorius*; and the name of Golden Robin is sometimes given to the Baltimore Bird (q.v.).

Robin Goodfellow. See PUCK.

Robin Hood, the hero of a group of old English ballads, represented as an outlaw and a robber, but of a gallant and generous nature, whose familiar haunts are the forests of Sherwood and Barnsdale, where he fleets the time carelessly in the merry greenwood. He is ever genial and good-natured, religious, respectful to the Virgin and to all women for her sake, with a kind of gracious and noble dignity in his bearing. He lives by the king's deer, although personally most loyal, and wages ceaseless warfare on all proud bishops, abbots, and knights, taking of their superfluity, and giving liberally to the poor and to all honest men in distress, of whatever degree. He is unrivalled with the bow and quarter-staff; but in as many as eight of the extant ballads comes off the worse in the combat with some stout fellow, whom he thereupon induces to join his company. His chief comrades are Little John, Scathlok (Scarlet), and

Much; to these the *Gest* adds Gilbert of the White Hand and Reynold. A stalwart curtal friar, called Friar Tuck in the title though not in the ballad, fights with Robin Hood, and apparently accepts the invitation to join his company, as he appears later in two broadsides, which also mention Maid Marian. Such is the romantic figure of the greatest of English popular heroes—a kind of yeoman-counterpart to the knightly Arthur.

The earliest notice of Robin Hood yet found is that pointed out by Percy in *Piers Plowman*, which, according to Skeat, cannot be older than about 1377. Here Sloth says in his shrift that, though but little acquainted with his paternoster, he knows 'rymes of Robyn Hood and Randolf, erle of Chestre.' In the next century we find him mentioned in Wyntoun's *Chronicle of Scotland* (*c.* 1420); a petition to parliament in the year 1439 represents a broken man in Derbyshire taking to the woods 'like as it hadde be Robyn-hode and his meyné;' Bower, in his *Scotichronicon* (1441–47), describes the lower orders of his time as entertaining themselves with ballads both merry and serious about Robin Hood, Little John, and their mates, and preferring them to all others; and Major or Mair (*c.* 1470–1550) says in his *Historia Maioris Britanniæ* that Robin Hood ballads were sung all over Britain. The last passage gives apparently the earliest mention of those more romantic and redeeming features of Robin Hood which earned him a place in Fuller's *Worthies of England*, under his proper county, sweet Nottinghamshire, 'not for his thievery but for his gentleness.' Yet another 15th-century mention occurs in the *Paston Letters*, where Sir John Paston writes in 1473 of a servant whom he had kept to play Robin Hood and the Sheriff of Nottingham.

Fragments of two Robin Hood plays exist, one dating from 1475, the other printed by Copland with the *Gest* about 1550. The latter is described in the title as 'very proper to be played in May-games.' Robin Hood was a popular figure in these during the 16th century, as we find from Stow, Hall, and other writers, and there is evidence that in this connection he was known as far north as Aberdeen. In place-names again we find traces of him in cairns, mounds, hills, rocks, crosses, fountains, caves, and oaks from Somerset to Whitby. In the *Gest* the localities around Barnsdale are topographically correct, down to the place of his death at the priory of Kirkless between Wakefield and Halifax. Here the valiant outlaw is treacherously bled to death by his kinswoman the prioress, to whom he had gone for relief in his sickness. His last charge to Little John is completely true to his character, and is expressed in lines of touching simplicity:

Lay me a green sod under my head,
  And another at my feet;
And lay my bent bow by my side,
  Which was my music sweet;
And make my grave of gravel and green,
  Which is most right and meet.

There is no evidence worth anything that Robin Hood was ever more than a mere creation of the popular imagination, but in due time the yeoman became a political personage, and was transformed into an Earl of Huntingdon for whom a suitable pedigree was constructed. Both Sir Walter Scott, in *Ivanhoe*, and Thierry, in his *Conquête de l'Angleterre*, make him a Saxon chief holding out like Hereward against the Normans; Bower, the continuator of Fordun, distinctly calls him one of the proscribed followers of Simon de Montfort; Joseph Hunter (1852) makes him an adherent of the Earl of Lancaster in the insurrection of 1322. The last scholar discovered a still further and exceptionally amusing mare's nest in the name of one Robyn Hode, who entered the service of King Edward II. about Christmas 1323 as one of the 'vadlets, porteurs de la chambre,' and was eleven months later found unfit for his duties, and paid off with a gift of five shillings. 'To detect "a remarkable coincidence between the ballad and the record" requires,' says Professor Child, 'not only a theoretical prepossession, but an uncommon insensibility to the ludicrous.' Kuhn again identifies our outlaw with Woden; others with a sun-god, a woodland deity, and the like—all which subtleties of speculation are unnecessary if we readily admit that the hero of popular creative imagination may well have formed a peg round which to hang much old-world wood-lore even then fast fading into forgetfulness.

Of Robin Hood ballads there have come down to us in more or less ancient form as many as forty, of which eight may be said to be of the first importance, and of almost the finest quality of ballad poetry. Of the remaining thirty-two, as Professor Child points out, about half a dozen have in them something of the old popular quality; as many more not the least snatch of it. Fully a dozen are variations, sometimes wearisome, sometimes sickening, upon the theme 'Robin Hood met with his Match.' The best of all the cycle are perhaps 'Robin Hood and the Monk,' and 'Robin Hood and Guy of Gisborne,' and both open with a delightful glimpse of the green wood a century and more before its time in English poetry—

In somer, when the shawes be sheyne,
  And leves be large and long,
Hit is full mery in feyre foreste
  To here the foulys song:

To se the dere draw to the dale,
  And leve the hilles hee,
And shadow hem in the leves grene,
  Under the grene-wode tre.

The second begins no less beautifully—

When shawes beene sheene, and shradds full fayre
  And leeves both large and longe,
Itt is merry, walking in the fayre fforrest,
  To hear the small birds songe.

The *Lytell Geste of Robyn Hode* was printed by Wynken de Worde, most probably before 1500, a long poem of over 1800 lines, arranged in eight *fyttes*, being a not unskilful redaction of at least four earlier distinct ballads.

See Ritson's collection of Robin Hood ballads (2 vols. 1795); J. M. Gutch's *Lytell Geste of Robin Hode* (2 vols. 1847); the *Percy Folio Manuscript*, vol. i. (1867), and the Introduction to the Robin Hood ballads there by Professor Hales; and especially part v. (Boston, 1888) of Professor Child's magistral *English and Scottish Popular Ballads*. The first known 'Garland' was printed in 1670, and in 1678 there appeared a prose version of it, reprinted by W. J. Thoms in his *Early English Prose Romances* (vol. ii. 2d ed. 1858).

Robin Hood's Bay, a fishing-village in the North Riding of Yorkshire, 6¾ miles SE. of Whitby by the coast railway to Scarborough, opened in 1885. The bay on which it stands is picturesquely fringed by lofty cliffs, rising in the Old Peak, its southern horn, to a height of 585 feet. It owes its name to traditions of Robin Hood, whose arrows shot from the tower of Whitby Priory reached Hawkser, 3 miles distant.

Robinia, a genus of trees and shrubs of the natural order Leguminosæ, sub-order Papilionaceæ. The most important species is the Locust Tree (q.v.), also known as the False Acacia, or Thorn Acacia, often simply designated Acacia. It is a native of North America, extending from Canada to the southern states, and is there much valued for the hardness and durability of its timber. With it, it is alleged, the houses of the Pilgrim Fathers were built, and the city of Boston founded. When green it is of soft texture, but when mature and seasoned it rivals the oak for strength and durability. It is close grained and finely veined, and in America is the most valued of all timbers for cabinet-work. On account of its quick growth, its spines, and its property of submitting to be clipped into any form, it is very suitable for hedges. In the south of Europe it succeeds well as a timber-tree, but in more northern regions it suffers from frost in severe winters; and in Britain it often suffers from frost, owing to the imperfect ripening of the wood in summer. It does not readily rot in water, and is used for shipbuilding. The tree is very ornamental, and of rapid growth. The flowers are fragrant and white, in large pendulous racemes. In San Domingo its flowers are used for making a distilled liquor and a syrup. The roots throw up many suckers, and are very sweet, affording an extract resembling liquorice.—*R. viscosa* is a smaller tree, but even more ornamental, a native of the south-western parts of the Alleghany Mountains. It has rose-coloured scentless flowers. The young branches are viscid.—The Rose Acacia (*R. hispida*) is a native of the south-western ranges of the Alleghanies, and is a highly ornamental shrub, with hispid branches, and large rose-coloured scentless flowers.

Robins, Benjamin, mathematician, the father of the military art of gunnery, was born at Bath in 1707 of a poor Quaker family. Having obtained a little instruction in mathematics, he prosecuted this branch of science with great zest, and, having removed to London, set up for a teacher of mathematics, and published several mathematical treatises which gained for him considerable reputation. Robins next commenced his great series of experiments on the resisting force of the air to projectiles, varying his labours by the study of fortification, and invented the Ballistic Pendulum (q.v.). In 1734 he demolished, in a treatise entitled *A Discourse concerning the Certainty of Sir I. Newton's Method of Fluxions*, the objections brought by the celebrated Berkeley, Bishop of Cloyne, against Newton's principle of ultimate ratios. His great and valuable work, the *New Principles of Gunnery*, upon the preparation of which he had spent an enormous amount of labour, appeared in 1742, and produced a complete revolution in the art of Gunnery (q.v.). In consideration of his able defence of the policy of the then government, by means of pamphlets which he wrote and published from time to time, he received (1749) the post of 'Engineer-in-general to the East India Company;' but his first undertaking, the planning of the defences of Madras, was no sooner accomplished than he was seized with a fever, and he died July 29, 1751. His works were collected and published in 1761.

Robinson, Edward, philologist and biblical scholar, was born at Southington, Connecticut, April 10, 1794, graduated at Hamilton College, New York, in 1816, and there remained till 1821, when he went to Andover, Massachusetts, to see through the press an edition of part of the *Iliad*. Here he studied Hebrew under Professor Stuart, but in 1826 went to Germany, where he studied under Gesenius and Neander, and married as his second wife Therese A. L. von Jakob, daughter of a professor at Halle. In 1830 he became extra-ordinary professor of Sacred Literature at Andover, in 1837 professor of Biblical Literature in the Union Theological Seminary, New York. He now made an extensive survey of Palestine, collecting materials for *Biblical Researches in Palestine and Adjacent Countries* (3 vols. 1841). A second visit in 1852 yielded fruit for its second edition (1856). Robinson died in New York, 27th January 1863.

His other works are a translation of Buttmann's *Greek Grammar* (1832); *Greek and English Lexicon of the New Testament* (1836; 1850); *Harmony of the Gospels*, in Greek (1845), and in English (1846). He was also editor of the *Biblical Repository*, *Bibliotheca Sacra*, Calmet's *Bible Dictionary*, and a translation of Gesenius' *Hebrew Lexicon*.

His wife, Therese Albertine Louise von Jakob, well known to the world of letters as 'Talvi,' a name composed of her initials, was born at Halle, January 26, 1797. At ten she went to Kharkoff in Russia, where her father had become professor, but in 1810 they removed to St Petersburg. In 1816 they returned to Halle, and here she studied Latin, and wrote her volume of tales, *Psyche* (1825). As 'Ernest Berthold' she published translations of Scott's *Black Dwarf* and *Old Mortality*, and also two volumes of Servian popular songs, *Volkslieder der Serben* (1825–26). In 1828 she married Robinson, and in 1830 accompanied him to America. After his death she lived mostly at Hamburg, where she died 13th April 1870.

Robinson, Henry Crabb, born of middle-class parentage at Bury St Edmunds on 13th May 1775, was educated there and at Devizes, and then was articled to a Colchester attorney (1790–95). He studied five years at Jena, Weimar, &c. (1800–5), making friends or acquaintances of nearly all the great German spirits of the day, and during 1807–9 was engaged on the *Times*—in Spain, the first war-correspondent. In 1813, at the age of thirty-eight, he was called to the bar, from which, having risen to be leader of the Norfolk circuit, he retired in 1828 with £500 a year. 'In looking back on his life, Mr Robinson used to say that two of the wisest acts he had done were going to the bar and quitting the bar.' Thenceforth he lived chiefly in London, with frequent tours both at home and abroad till 1863, giving and receiving much hospitality, until at the ripe age of ninety-one he died unmarried on 5th February 1867. A dissenter and a Liberal, he was one of the founders of the London University (1828), an early member of the Athenæum Club (1824). Withal he was a splendid talker, who 'talked about everything but his own good deeds,' a buoyant companion, an earnest thinker, a prodigious reader, content not to publish but to keep a diary. 'I early found,' he says, 'that I had not the literary ability to give me such a place among English authors as I should have desired; but I thought that I had an opportunity of gaining a knowledge of many of the most distinguished men of the age, and that I might do some good by keeping a record of my interviews with them. True [which was not quite true], I want in an eminent degree the Boswell faculty; still, the names recorded in *his* great work are not so important as Goethe, Schiller, Herder, Wieland, the Duchesses Amelia and Louisa of Weimar, Tieck, as Madame de Staël, La Fayette, Abbé Grégoire, Benjamin Constant, as Wordsworth, Southey, Coleridge, Lamb, Rogers, Hazlitt, Mrs Barbauld, Clarkson, &c., &c., &c., for I could add a great number of minor stars. And yet what has come of all this? Nothing. What will come of it? Perhaps nothing.' Yes, something has come of it—the three delightful volumes, edited in 1869 by Dr Sadler, of his *Diary, Reminiscences, and Correspondence*, which will last as long as literature itself.

Robinson, John, pastor of the Pilgrim Fathers, was born, probably in Lincolnshire, about 1575, was a Fellow of Corpus Christi, Cambridge, and ministered to a church near Norwich, until he was suspended for his Puritan tendencies. In 1604 he resigned his fellowship and all connection with the Church of England, and gathered a congregation of dissenters at Gainsborough. He was afterwards a minister at Scrooby, but in 1608 he and his flock escaped to Amsterdam; in 1609 he passed to Leyden, and there in 1611 he established a church, and in 1613 met Episcopius, Arminius' successor, in debate. In 1620, after a memorable sermon, he saw the younger members of his congregation set sail in the *Speedwell* (which vessel they afterwards changed for the *Mayflower*). He himself intended to, and his son in 1631 did, follow them to Massachusetts. He died at Leyden in March 1625. His works, with a memoir by R. Ashton, were collected in 3 vols. (Lond. and Boston) in 1851. In 1891 a large bronze tablet to his memory was placed by the American Congregational churches on the outer wall of St Peter's, Leyden, in one of whose vaults he is buried.

Robinson, Mary, poetess, born at Leamington, 27th February 1857, resided long in Italy, and in 1888 was married to M. Darmesteter, the French Orientalist, and became a resident in Paris. Amongst her poetical works are *A Handful of Honeysuckle* (1878), a translation of Euripides' *Hippolytus* (1881), *The New Arcadia* (1881), *Songs, Ballads, and a Play* (1886). She has also written Lives of Emily Brontë (1883) and Margaret of Angoulême (1880), and a historical work, *The End of the Middle Ages* (1889).

Robison, John, was born at Boghall in Stirlingshire in 1739, and educated at Glasgow grammar-school and university. He devoted himself early to physical science, became acquainted with James Watt and Dr Black, and succeeded to the latter's chair on his transference to Edinburgh in 1766. Four years later he went to Russia as secretary to Admiral Knowles, who had been appointed president of the Russian Board of Admiralty. In 1774 he accepted the chair of Natural Philosophy at Edinburgh, but he made an indifferent lecturer, and disliked experiments. He died January 28, 1805. His *Elements of Mechanical Philosophy* was edited by Sir D. Brewster (4 vols. 1822). His foolish *Proofs of a Conspiracy against all the Religions and Governments of Europe, carried on in the Secret Meetings of Freemasons, Illuminati, and Reading Societies* (1797) is a lasting monument of fatuous credulity.

Rob Roy (Gaelic, 'Red Robert'), the Scottish Robin Hood, was born in the year 1671, the second son of Lieut.-colonel Donald Macgregor of Glengyle. Till 1661 the 'wicked clan Gregor' had for more than a century been constantly pursued with fire and sword; the very name was proscribed. But from that year until the Revolution the severe laws against them were somewhat relaxed; and Rob Roy, who married a kinswoman, Mary Macgregor, lived quietly enough as a grazier on the Braes of Balquhidder. From youth, however, he was a master of the claymore, the uncommon length of his arms giving him much advantage, for without stooping he could tie the garters of his Highland hose, 2 inches below the knee. Then his herds were so often plundered by 'broken men' from the north that he had to maintain a band of armed followers to protect both himself and such of his neighbours as paid him blackmail. And so with those followers, espousing in 1691 the Jacobite cause, he did a little plundering for himself, and, two or three years later having purchased from his nephew the lands of Craigroyston and Inversnaid, laid claim thenceforth to be chief of the clan. In consequence of losses incurred about 1712 in unsuccessful speculations in cattle, for which he had borrowed money from the Duke of Montrose, his lands were seized, his houses plundered, and his wife shamefully used, turned adrift with her children in midwinter. Maddened by these misfortunes, Rob Roy gathered his clansmen and made open war on the duke, sweeping away the whole cattle of a district, and kidnapping his factor with rents to the value of more than £3000 Scots. This was in 1716, the year after the Jacobite rebellion, in which at Sheriffmuir Rob Roy had 'stood watch' for the booty, and had been sent by the Earl of Mar to raise some of the clan Gregor at Aberdeen, where he lodged with a kinsman, Professor Gregory. Marvellous stories are current round Loch Katrine and Loch Lomond (where a cave near Inversnaid still bears his name) of his hairbreadth escapes from capture, of his evasions when captured, and of his generosity to the poor, whose wants he supplied at the expense of the rich. They in return gave him timely warning of the designs of his two arch-foes, the Dukes of Montrose and Athole, and of the red-coats they called to their aid from Dumbarton and Stirling; besides, Rob Roy enjoyed the protection of the Duke of Argyll, having assumed the name Campbell, his mother's. Late in life he is said to have turned Catholic, but in the list of subscribers to the Episcopalian church history of Bishop Keith occurs the name 'Robert Macgregor *alias* Rob Roy.' The history came out in 1734, and on the 28th December of that same year Rob Roy died in his own house at Balquhidder. He left five sons, two of whom died in 1734—James, an outlaw, in Paris; and Robin, the youngest, on the gallows at Edinburgh for abduction.

See the introduction and notes to Scott's *Rob Roy* (1817); Dorothy Wordsworth's *Tour in Scotland in 1803*, with her brother's poem; and the Lives of Rob Roy by K. Macleay (1818; new ed. 1881) and A. H. Millar (1883).

Robsart, Amy. See Leicester, Earl of.

Robson, Frederick, whose real name was F. R. Brownhill, low comedian, was born at Margate in 1821. He was apprenticed to a London copper-plate engraver; but became smitten with stage fever and took to the actor's life (1844). From 1853 he was inseparably associated with the Olympic Theatre of London, where he attracted large audiences for years by his representations in comedy, farce, and burlesque. An actor of original genius, Robson excelled in parts that were grotesque, eccentric, quaintly humorous or droll; he was particularly effective in sudden transitions from comicality to pathos, and the reverse, and in the delineation of violent and tumultuous passion. He gave a vivid portrait of the street outcast as Jem Baggs in the *Wandering Minstrel*, in which he sang the once celebrated 'Villikins and his Dinah.' He burlesqued Macbeth and Shylock, uniting in his playing the ludicrous and the terrible. One of his principal characters was Desmarets, a spy of Fouché's, a shabby-looking, fawning, cunning, malicious old man in the play *Plot and Passion*. Others of his strongest impersonations were as the dwarf in Planché's *Yellow Dwarf*, the Doge of Duralto, Daddy Hardacre, Sampson Burr, and Uncle Zachary in *Peter and Paul*. He died 12th August 1864. See Dutton Cook in *Gentleman's Magazine* (1882), and G. A. Sala in *Atlantic Monthly* (1863).

Roburite, a flameless explosive, composed of chlorinated dinitro-benzene mixed with sufficient ammonium nitrate to completely oxidise it.

Roc, or Rukh, a fabulous bird of immense size, able to carry off an elephant in its talons. The idea is familiar in the East, and every reader will remember it in the *Arabian Nights' Entertainments*. Colonel Yule pointed out that the huge fronds of the Raphia (q.v.) palms were brought from Madagascar as roc's feathers. Mythical birds of similar size and strength were the Arabian *'ankâ* and the Persian *simurgh*. The *amru* or *sinamrû* was an older Persian supernatural bird; the Indian *garuda*, which bears Vishnu, is the king of birds. It has been suggested, without good grounds, that the legends of the roc might have originated in traditions of extinct birds of great size, like the

Dinornis or Æpyornis, which, however, could not fly.

Rocambole (*Allium scorodoprasum*), a plant of the same genus with garlic, onion, leek, &c., and nearly allied to garlic, which it resembles in its habit, although larger in all its parts. The root forms rounder cloves than those of garlic, and of much milder flavour; the umbels are also bulbiferous. Rocambole has long been cultivated in kitchen-gardens. It is a native of sandy soils in Denmark and other countries near the Baltic.

Roccella. See ARCHIL.

Rocha, a south-eastern department of Uruguay, on the Atlantic; hilly in the south, in the north a swamp. Area, 4280 sq. m.; pop. (1887) 18,494.

Rochambeau, JEAN BAPTISTE DONATIEN DE VIMEURE, COMTE DE, was born at Vendôme, 1st July 1725, entered the army in 1742, was at the siege of Maestricht, and distinguished himself at Minorca in 1756. In 1780 he was sent out in command of an army of 6000 men to support the Americans, and in 1781 he rendered effective help at Yorktown. He became marshal in 1791, and in 1804 Napoleon made him a grand officer of the Legion of Honour. He died 10th May 1807. See his *Mémoires* (2 vols. 1809; Eng. trans. 1838).

Rochdale, a thriving manufacturing town of Lancashire, a municipal, parliamentary, and county borough, on the Roche, 11 miles N. by E. of Manchester and 202 NNW. of London. St Chad's parish church, on an eminence approached by a flight of 122 steps, dates from the 12th century, but is mainly Perpendicular in style. It is a handsome edifice, on which £10,000 was expended in 1884-85. The town-hall, erected in 1866-71, is a very fine Domestic Gothic building. The town besides has an infirmary (1883), a free grammar-school, founded in 1565 by Archbishop Parker, and rebuilt in 1846, a free library (1884), a post-office (1875), public baths (1868), a bronze statue of John Bright (1891), and a public park of 12 acres. Still, many as are the improvements in the architectural and sanitary condition of Rochdale within recent years, it is beautiful only in site, and derives its importance wholly from its extensive and varied manufactures. To the growing of wool was added a trade in woollen goods in the days of Elizabeth, when cotton goods also were sold here, and coal-pits worked. Under the Stuarts the woollen manufacture was in full activity; but it was not till 1795 that the first cotton-mill was built, in which in 1802 the father of John Bright began his career as a weaver. Flannels and calicoes are now the staple manufactures, but there are also cotton-mills, foundries, ironworks, machine-shops, &c. Rochdale is the birthplace of Co-operation (q.v.), and the membership of its Equitable Pioneers' Society (1844) has increased from 28 to over 11,000, with an annual business representing more than a quarter million. Since 1832 Rochdale has returned one member to parliament, and in 1856 it was incorporated as a municipal borough. The latter in 1872 was made co-terminous with the parliamentary borough, whose boundary had been extended in 1867. The manor of Rochdale (*Recedam* in Domesday) was originally held by the Lacys of Pontefract, and through their descendants, the Dukes of Lancaster, passed to the crown. In 1628 it was sold to Sir John Byron, whose ancestors had been connected with it since 1462, and whose descendant, the poet Lord Byron, in 1823 sold it to John Dearden, Esq. Pop. of parliamentary borough (1851) 29,195; (1861) 38,184; (1881) 68,866; (1891) 71,458. See Fishwick's *History of the Parish of Rochdale* (1889).

Rochefort, HENRI, whose full style is Victor Henri, Comte de Rochefort-Luçay, a stormy-petrel of French politics, was born in Paris, 29th July 1832. He studied medicine, and became a clerk in the hôtel-de-ville, but was dismissed for neglecting his duties, and now cast himself entirely upon journalism, contributing to the *Charivari*, the *Figaro*, and other papers, until in 1868 he started his own notorious weekly, *La Lanterne*, which was quickly suppressed by the government. To avoid fine and imprisonment Rochefort fled to Brussels, but returned in 1869 on his election to the Chamber of Deputies for Paris. He now started the *Marseillaise*, in which he renewed his bitter attacks on the imperial régime. One consequence of the cowardly murder of its contributor, Victor Noir, by Prince Pierre Bonaparte, was the suppression of the paper and the imprisonment of its editor. The fall of the empire gave him his release, and opened up a rôle for the frothy rhetorician in the government of National Defence. In February 1871 he was elected by Paris to the National Assembly, and soon made public his Communism in the pages of *Le Mot d'Ordre*. As soon as he foresaw the end of the Commune, about the middle of May, he left his dupes and comrades to their doom, and made his escape from Paris. But the Prussians caught him at Meaux and sent him to Versailles, where he was sentenced to imprisonment for life. Later he was deported to New Caledonia, whence he escaped in 1874. In London and Geneva he tried to revive the *Lanterne* and influence the Parisian press, but at length he was enabled to return by the general amnesty of 11th July 1880. In his newspaper, *L'Intransigeant*, he showed himself as impracticable as ever, sat in the National Assembly (1885-86), and finally buried his popularity and influence in the discreditable collapse of Boulangism.

Rochefort-sur-mer, a French seaport, naval arsenal, and fortress of the first class, in the department of Charente-Inférieure, stands on the right bank of the Charente, 9 miles from its mouth, and 18 miles SSE. of Rochelle, 89 SW. of Poitiers. It was founded in 1665 as a naval station by Colbert, Louis XIV.'s minister, and fortified by Vauban, being covered now on the sea side by strong forts; and it is a modern, clean, well-built place, with which few French towns can compare for the number and importance of its public works. The most celebrated of these is the naval hospital (1783-88), with nearly 1300 beds, and an artesian well 2758 feet deep. There are both a naval harbour and, higher up the river, a commercial harbour with three basins; and Rochefort besides possesses rope-walks, cannon-foundries, and other establishments for the manufacture and preservation of naval stores and marine apparatus of every kind. From 1777 till 1852 it was the seat of a great convict prison. Napoleon meant to take ship for America at Rochefort, but instead had to surrender to Captain Maitland of the *Bellerophon*, 15th July 1815. Pop. (1872) 26,619; (1891) 28,866. See Viaud and Fleury's *Histoire de Rochefort*.

Rochefoucauld. See LA ROCHEFOUCAULD.

Rochejaquelein. See LAROCHEJAQUELEIN.

Rochelle, LA, a seaport and second-class fortress of France, capital of the department of Charente-Inférieure, on an inlet of the Bay of Biscay, formed by the islands Ré and Oléron, 91 miles WSW. of Poitiers and 297 SW. of Paris. Its harbour, which consists of an outer tidal basin and an inner wet-dock, is still sheltered by the remains of Richelieu's famous dyke, and is surrounded by fine quays, close to which lie the principal streets and squares. Many of the latter are regular and well built, and present a handsome appearance from the number of houses which are adorned with porticoes and balconies. The most noteworthy public buildings are the hôtel-de-ville (1486–1607), the palais-de-justice (1614), and the heavy Grecian cathedral (1742–1862). Besides the fine promenade of the Place du Château, there are, outside the city, two extensive public gardens, known as La Promenade du Mail and the Champs de Mars. Shipbuilding is actively carried on, especially in connection with the Newfoundland fishing trade; and besides this branch of industry, and the manufacture of briquettes and cotton yarns, Rochelle has numerous glass-works, sugar-refineries, and brandy distilleries. Pop. (1872) 19,070; (1891) 23,924. Rochelle, which was known till the 12th century under its Latin name of *Rupella*, 'Little Rock,' of which its present name is a mere translation, originated in a colony of serfs of Lower Poitou, who, fleeing from the persecution of their lord, settled on the rocky promontory between the ocean and the neighbouring marshes. On the marriage of Eleanor of Aquitaine with Henry II. of England, Rochelle, as part of her dowry, came into the possession of the English kings, by whom it was retained till 1224, when it was taken by Louis VIII.; and, although it was ceded to England at the treaty of Bretigny in 1360, in the subsequent wars it was retaken by France, under whose sway it has remained since 1372. A stronghold of the Huguenots (q.v.), it was unsuccessfully besieged in 1573, and in 1627–28 it for fourteen months again offered a heroic though unavailing resistance, under its mayor Guiton, to Cardinal Richelieu. Buckingham's expedition to relieve it failed, and at last the defenders, reduced from 27,000 to 5000, had to surrender to the troops of Louis XIII. With the exception of three towers (1384–1476) its old fortifications were destroyed, and new lines of defences subsequently erected by the great Vauban. Réaumur, Bonpland, Billaud-Varenne, Fromentin, Bouguereau, and Admiral Duperré (1775–1846) were natives. Of the last a statue was erected in 1869. See Barbot's *Histoire de la Rochelle* (ed. by Denys d'Aussy, 1886–91).

Rochelle Salt is the popular name of the tartrate of soda and potash ($KNaC_4H_4O_6+4H_2O$), this salt having been discovered in 1672 by a Rochelle apothecary named Seignette. It occurs, when pure, in colourless transparent prisms, generally eight-sided; and in taste it resembles common salt. It is prepared by neutralising cream of tartar (bitartrate of potash) with carbonate of soda. After a neutral solution has been obtained, it is boiled and filtered, and the resulting fluid is concentrated till a pellicle forms on the surface, when it is set aside to crystallise. This salt is a mild and efficient laxative, and is less disagreeable to the taste than most of the saline purgatives. From half an ounce to an ounce, dissolved in eight or ten parts of water, forms an average dose. A drachm of Rochelle Salt added to one of the ingredients of an effervescing draught (bicarbonate of soda or tartaric acid, for example) forms one of the varieties of what are called Seidlitz powders.

Roches moutonnées, smooth, rounded, hummocky bosses and undulating surfaces of rock, of common occurrence in regions which have been overflowed by glacier-ice. Those which have not been much acted upon by the weather generally show the scratches and groovings which are the characteristic markings of glacial action. Sometimes roches moutonnées are smoothed and polished all over, and have the appearance of whales' or dolphins' backs. At other times they are smoothed only on one side—that side, namely, which faces the direction from which the glaciating agent flowed; the other side, protected from abrasion, being left in its original rough, unpolished condition. The name *roches moutonnées* is that used by the Swiss peasants—the bare rounded rocks of a valley-bottom when seen from above having a fanciful resemblance to a flock of sheep lying down.

Rochester, a city of Kent, 29 miles ESE. of London, lies chiefly on the right bank of the tidal Medway, continuous with Chatham, and joined to Strood by an iron swing bridge, constructed in 1850–56 at a cost of £170,000. The castle or keep, which crowns a steep eminence near the bridge, was the work of Archbishop William de Corbeuil (1126); but the wall overlooking the river contains Norman masonry of earlier date, built upon Roman foundations. It is 104 feet high and 70 feet square, with walls 12 feet thick, and is a very fine specimen of Norman architecture; it was taken by John (1215, the south-east corner being rebuilt shortly afterwards), vainly attacked by De Montfort (1264), and taken again by Tyler (1381). Both castle and grounds were purchased in 1883 by the corporation from the Earl of Jersey. The episcopal see was founded in 604 by St Augustine, and the foundations of the cathedral then built have lately been discovered. Bishop Gundulf (1077–1107) built a new cathedral, of which part of the crypt remains. This cathedral was rebuilt by Ernulf and John of Canterbury (1115–37), whose nave remains; and the choir was again rebuilt and enlarged in the 13th century in part out of offerings of pilgrims at the shrine of St William of Perth, a Scotch baker, who, on a pilgrimage to the Holy Land, was murdered near Chatham by his companion and adopted son; the tower rebuilt by Cottingham (1825–26), the choir and transepts restored by Scott (1871–77), and the west front being restored by Pearson in 1891. It measures 306 feet in length, and has double transepts; and special features of interest are the Norman west doorway and nave, the Early English choir, of singular plan and early character, the spacious crypt, and a fine Decorated doorway leading to the modern library. The ruins of an early Norman keep or residence (?) built by Gundulf, the architect of the Tower of London, stand on the north side of the choir. Of Rochester's bishops since 604, some eighty in number, may be mentioned Paulinus (previously first bishop of York), Gundulf, Walter de Merton, Fisher, Ridley, Atterbury, and Horsley. St Bartholomew's Hospital, founded by Gundulf in 1078 for lepers, was refounded in 1863; the Norman chapel remains. Watts' Charity House, founded in 1579 to lodge 'six poor travellers, not being rogues or proctors,' has been immortalised by Dickens, whose home, Gadshill (q.v.), is 3 miles distant, and who introduces Rochester into *Pickwick*, *Edwin Drood*, and others of his novels. Three schools are the cathedral grammar-school (Henry VIII.), Williamson's mathematical school (1701; reopened under a new scheme, 1880), and a grammar-school for girls (1888); and other buildings are Satis House, Restoration House (Charles II. slept here in 1660), the guild-hall (1687), and the corn exchange (1871). Rochester—the Roman station *Durobrivæ* and Anglo-Saxon *Hrofe-ceastre*—was made a municipal borough by Henry II. It lost one of its two members in 1885. James II. embarked here in his flight (1688). Pop. (1851) 16,508; (1871) 18,352; (1891) 26,170.

See Wharton's *Anglia Sacra* (1691); Thorpe's *Registrum Roffense* (1769) and *Custumale Roffense* (1788); and other works by Rawlinson (1717), Fisher (1772), Rye (two, 1861–65), Walcott (1866), and Langton (*Charles Dickens and Rochester*, 1880).

Rochester, (1) capital of Monroe county, New York, is on both sides of the Genesee River, 7 miles above its entrance into Lake Ontario, and on the Erie and Genesee Valley canals, by rail 67 miles ENE. of Buffalo and 360 NW. of New York.

The river has here three perpendicular falls of 96, 26, and 83 feet, and affords immense water-power. The city is well built, and laid out with almost unbroken regularity. Among the principal buildings are the city hall, of blue limestone, and the court-house; a state industrial school (formerly a 'house of refuge'), with accommodation for 900 boys and 400 girls; numerous churches, including a Roman Catholic cathedral; the Free Academy, and the university (founded 1850, and under Baptist control), and a Baptist theological seminary (whose library of 21,000 vols. includes that of Neander). There are also over thirty graded public and many private schools, libraries, asylums, hospitals, &c. But the most noteworthy structure in the city is the handsome stone aqueduct of seven arches (850 feet long) by which the Erie Canal crosses the river. The principal industries are flour-milling, which has always been extensively carried on here, and the manufacture of ready-made clothing and boots and shoes, rubber goods, furniture, carriages, agricultural implements and machinery, steam-engines, glass, cigars, tobacco, perfumery, &c.; and there are besides numerous foundries, iron-bridge works, cotton-mills, breweries, and fruit-canning establishments. In the neighbourhood there are great nurseries, and in the city large seed-packing establishments. Rochester is a port of entry, and has a considerable trade both by lake and rail. It was settled in 1810, incorporated in 1834, and in 1890 was, in order of population, the twenty-second city of the United States. Pop. (1840) 20,191; (1860) 48,204; (1880) 89,366; (1890) 133,896.—(2) Capital of Olmsted county, Minnesota, on the Zumbro River (crossed by three iron bridges), 347 miles by rail NW. of Chicago. It has flour-mills, foundries, and manufactories of furniture, farming implements, &c. Pop. (1890) 5321.—(3) A town of New Hampshire, 22 miles by rail NW. of Portsmouth, with manufactures of flannel, blankets, shoes, &c. Pop. 7396.—(4) A borough of Pennsylvania, on the north bank of the Ohio, at the mouth of the Beaver River, 25 miles by rail NW. of Pittsburgh, with manufactures of coffins, carriages, tumblers, &c. Pop. 3649.

Rochester, JOHN WILMOT, EARL OF, the wittiest reprobate at the court of Charles II., was born at Ditchley in Oxfordshire, 10th April 1647, and was educated at Burford school and Wadham College, Oxford. He next travelled in France and Italy, and on his return repaired to court, where his handsome person and lively wit quickly made him a prominent figure. In 1665 he showed conspicuous courage serving under Sandwich against the Dutch, as well as the summer after under Sir Edward Spragge—facts which agree but ill with the stories that he would slink away in street quarrels and evade duels which he had himself provoked. With a friend, Mr Windham, he had entered into a formal engagement that, 'if either of them died, he should appear and give the other notice of the future state, if there was any.' Windham was killed in an attack upon Bergen, but did not afterwards disturb the rest of his friend, who now plunged into a life of the grossest debauchery, was for five years together continually drunk, and diverted himself constantly with extravagant frolics and buffoonery, such as the pursuit of low amours in mean disguises, and the acting of assumed characters, as a mountebank, a quack doctor, and the like. In the scarce intervals of intemperance he wrote excellent letters to his wife and son, and devoted himself to letters, writing personal satires, bacchanalian and amatory songs, and too often obscene and licentious verses, many of which, however, were doubtless fathered on him after his day. In these wild excesses he blazed out his youth and his health, till at the age of one and thirty he had exhausted the fund of life. On his death-bed he was convinced of the necessity of repentance by the arguments of Bishop Burnet, who writes: 'I do verily believe he was so entirely changed, that if he had recovered he would have made good all his resolutions.' He died 26th July 1680. His last conversations are touchingly described by Burnet in *Some passages of the Life and Death of John, Earl of Rochester* (1680; in vol. iv. of Wordsworth's *Ecclesiastical Biography*), a book, says Dr Johnson, 'which the critic ought to read for its elegance, the philosopher for its arguments, and the saint for its piety. It were an injury to the reader to offer him an abridgment.'

Rochester's verses show more wit than poetry, but he possessed in rich measure the gift of satire. An excellent example of this is his memorable epitaph on Charles II.:

> Here lies our sovereign lord the king,
> Whose word no man relies on;
> He never said a foolish thing,
> Nor ever did a wise one.

Equally well known is the description—'a merry monarch, scandalous and poor,' the line rhyming with which it is characteristically impossible to quote. Horace Walpole's judgment of his work is thus expressed in *Royal and Noble Authors*: 'Lord Rochester's poems have much more obscenity than wit, more wit than poetry, more poetry than politeness.' Before his death he expressed a wish that his indecent verses should be suppressed, but that very year these, and much more, were published ostensibly at Antwerp, really at London. Among the best of his poems known to be genuine are an Imitation of Horace on Lucilius, Verses to Lord Mulgrave, a Satire against Man, and Verses upon Nothing.

Rochester, VISCOUNT. See KER, and OVERBURY.

Roche-sur-Yon, capital of the French department of Vendée, on the Yon, 50 miles SSE. of Nantes by rail, has a prefecture, lyceum, library of 12,000 volumes, a museum, and a theatre. Napoleon selected it in 1805—then a mere village—to be the departmental capital. From 1815 to 1848 it was called *Bourbon-Vendée*, from 1848 to 1870 *Napoléon-Vendée*. Pop. 8789.

Rochet (Low Lat. *rochettus*; Old High Ger. *rocch*, 'coat;' Ger. *rock*), a fine linen or lawn vestment proper to bishops and abbots, and worn also by canons of certain privileged chapters, and some other dignitaries. It is of the form of a surplice, but with sleeves fastened at the wrist; these formerly fitted more tightly to the arm than do the 'balloon sleeves' still commonly worn by Anglican bishops. In the Latin Church its use is very ancient. Formerly it appears to have been worn by clerics serving mass and by priests baptising, because it left their arms free (Lyndwood, quoted by Du Cange); but those priests who are privileged to wear the rochet are now commanded to regard it as a choir vestment, and are strictly forbidden to use it in the administration of the sacraments. In the First Prayer-book of Edward VI. the rochet was ordered to be worn by bishops at all public ministrations, and beside—i.e. over it—a surplice or alb. It is prescribed in the present Book of Common Prayer as part of the episcopal habit. The old 18th-century Anglican fashion of fastening the sleeves of the rochet to the chimere—leaving the rochet itself sleeveless—is almost gone out.

Rock. Though popularly restricted to masses of indurated matter, this term is extended by geologists to all substances which make up the crust of the earth, whether they be loose and friable like soil and sand, or compact and indurated like limestone and granite. The rocks of the earth's crust (aqueous, igneous, metamorphic, &c.) will be found described under numerous distinct headings in this work. See the classification given at Petrography, and the article Geology, with the list appended, including such articles as Denudation. See also Building Stone, Blasting, Boring.

Rockall, on a sandbank in the Atlantic 50 miles long and 25 broad, in 57° 36′ N. lat., 13° 41′ W. long., 184 miles W. of St Kilda, 290 from the nearest point of the Scottish mainland, and 260 from the north of Ireland. It is a granite rock of a rounded form, rising 70 feet above the sea, and about 100 yards in circumference. At a distance it looks like a ship in full sail, the upper part being covered with the dung of sea-fowl, and white as snow, and the lower part a dark-coloured stone. This curious peak is situated at a greater distance from the mainland than any other rock or islet of the same diminutive size in any part of the world. Martin, in his *Voyage to St Kilda* (1698), mentions that a crew of Frenchmen and Spaniards, whose ship had been wrecked at Rockall in 1686, escaped in their overladen pinnace to St Kilda, where they were hospitably received. Some time prior to 1861 it was found to be surrounded by considerable shoals of the larger kinds of fish; but a company formed in that year to carry on a fishery here proved a failure.

Rock-basins, a name given by Sir Andrew Ramsay to lacustrine hollows in rock which have been excavated by glacier-ice. See Lake.

Rock-butter, an impure alum efflorescence of a butter-like consistency found oozing from some alum slates.

Rock-crystal. See Quartz.

Rocket is a cylindrical case of paper or metal partially filled with an inflammable composition (saltpetre 68 parts, sulphur 12 parts, charcoal, or mealed powder, 32 parts), so that a large conical hollow is left inside. The base is open or has vents in it, and the head closed. On being ignited this composition burning over the whole surface of the hollow portion at once causes a great rush of gas out of the base, thus driving the rocket forward with great and increasing velocity. Rockets are used for signalling and to carry a light line for life-saving purposes (see Life-saving Apparatus). Early in the 19th century they began also to be used in war. Sir William Congreve in 1808 introduced iron war-rockets up to 24 lb. in weight, with thick iron heads adapted to act like a shell. They were fired from a tube and steadied in their flight by means of long sticks. In the more modern Hale rocket a rotatory motion is given by causing the gas to pass out of vents in the base bored between three projecting shields, shaped somewhat like the blades of a screw-propeller, against which it presses. The cumbrous stick is therefore no longer used, and the rocket is fired from a low trough with tripod stand, or even from the ground, by raising the head to the height necessary to give the required range, which may be as much as 4000 yards. Though extremely portable as compared with other missile weapons of similar power, rockets are so uncertain in their flight that they are not much used, except for incendiary purposes and against savages, who greatly dread them. Against cavalry they would be very useful if they could be depended on. The rocket troop of the Royal Horse Artillery did very good service in the Peninsular war, however, and ships' boats, which could not carry a gun firing a 24-pounder shell, can throw rockets of that weight into a place under bombardment. See Pyrotechny.

Rocket, a name given to a number of plants of the natural order Cruciferæ, and belonging to the genera Brassica, Sisymbrium, Erysimum, Barbarea, Hesperis, &c. Garden Rocket (*Brassica Eruca*, or *Eruca sativa*) is an annual plant, a native of Austria, with stem 2 feet high, upright and branching; the leaves smooth, succulent, cut and toothed. When in flower it has a strong, peculiar, and disagreeable smell; but when it is very young this smell is almost imperceptible, and the leaves are used as a salad, for which it is frequently sown on the continent of Europe, and was formerly cultivated also in Britain. The name Garden Rocket is given also to *Hesperis matronalis*, also called Dame's Violet (q.v.), a favourite ornament of our flower-borders. The Yellow Rocket of our flower-borders is a double-flowered variety of *Barbarea vulgaris* (see Cress). The Wild Rocket (*Sisymbrium officinale*, or *Erysimum officinale*) is common in Britain, and is sometimes sown and used as a spring potherb.

Rock-fish. See Wrasse.

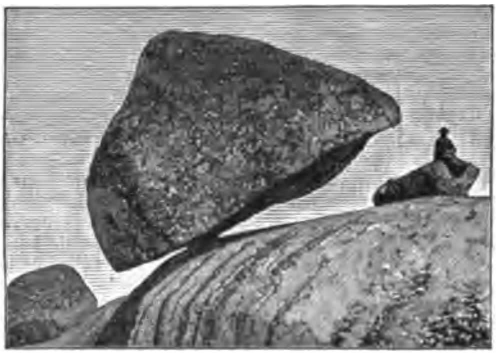
Rockford, capital of Winnebago county, Illinois, is on both sides of the Rock River, 86 miles by rail WNW. of Chicago. It is a well-built town, with shady streets, and contains foundries, flour, paper, cotton, and woollen mills, and numerous manufactories of agricultural implements, carriages, pumps, churns, furniture, cutlery, and plated ware, boots and shoes, watches, soap, &c. Pop. (1880) 13,129; (1890) 23,584.

Rockhampton, a town of Queensland, Australia, situated on the south bank of the Fitzroy, 35 miles from its mouth, and 420 NW. of Brisbane. The town has wide streets, lined with trees, and many substantial buildings, including the government offices, hospital, and town-hall. It owes its beginning (1858) to the extensive gold-fields in the neighbourhood, the annual yield of which is valued at £1,000,000 to £1,250,000; copper and silver are also worked to some extent. The land around is well adapted for grazing. The industries include tanning, soap and boot making, and meat-preserving. The chief port for central Queensland, its trade in exports (one-third) and imports reaches an annual value of £1,500,000. A bridge across the Fitzroy, with five spans of 232 feet each, connects Rockhampton (pop. 7431) with its suburb North Rockhampton (pop. 1700).

Rockingham, Charles Watson Wentworth, Marquis of, a statesman of importance beyond his abilities, was born in 1730, the only son of that Thomas Watson Wentworth who succeeded as sixth Lord Rockingham in 1746, and was created marquis the same year. He had his education at Eton, was created Earl of Malton in the Irish peerage in 1750, and succeeded his father as second Marquis of Rockingham in December of the same year. In 1751 he was nominated lord-lieutenant of the North and West Ridings of Yorkshire, and in 1760 made Knight of the Garter, but soon found himself in opposition to the policy of the young king George III. and his favourite minister, Bute, and was dismissed from his lord-lieutenancy in 1762. He found himself leader of the combination of Whig opposition, after the Duke of Devonshire's death in 1764, and in July 1765 was called on to form his first ministry. He repealed the Stamp Act, and would have done more for progress but for the secret intrigues of the court, added to the defection of the Duke of Grafton and his own want of influence in parliament. Rockingham resigned in August 1766, and remained out of office sixteen years in opposition to Lord North and the ruinous policy that lost America. He again became premier in March 1782, with Fox and Shelburne as his secretaries, but died 1st July of the same year. See the *Memoirs* by the Earl of Albemarle (2 vols. 1852).

Rocking-stones, or LOGANS, are large masses of rock so finely poised as to move backwards and forwards with the slightest impulse. They occur in nearly every country. Some of them appear to be natural, others artificial; the latter seem to have been formed by cutting away a mass of rock round the centre-point of its base. The former are chiefly granitic rocks, in which felspar is abundantly present; for, this mineral being readily decomposed, the rock becomes disintegrated to grit, sand, and dust, which are carried away by rains and wind, so that what was formerly a solid rock soon assumes the appearance of a group of irregularly-shaped pillars, separated into portions by horizontal and vertical fissures. As decay proceeds, the edges of the blocks forming the pillar are first attacked and disappear, and the pillar now becomes a pile of two or more spheroidal rocks, resting one upon the other. Should a mass of rock be so situated as to preserve its equilibrium in spite of the gradual diminution of its base or point of support, a rocking-stone or logan is the result. Although rocking-stones are most frequently of a granitic nature, they occur also among basalts and other crystalline igneous masses. For the principle regulating the stability of equilibrium of rocking-stones, see STABILITY. Various explanations have been given of the uses of these singular objects. They are supposed to have been used in very early times for purposes of divination, the number of vibrations determining the oracle; hence it came to be believed that sanctity was acquired by walking round them.

Some rocking-stones occur near to remains of ancient fortifications, which seems to bear out a statement in one of the poems of Ossian, that the bards walked round the stone singing, and made it move as an oracle of the fate of battle. In Greece rocking-stones occur as funeral monuments, and are generally found on conspicuous places near the sea. Rocking-stones are numerous in Yorkshire, Derbyshire, Cornwall, and Wales. The famous Logan Rock, near Land's End, in Cornwall, is computed to weigh over 70 tons. It was wantonly displaced in 1824 by Lieutenant Goldsmith, R.N., and his boat's crew of nine men. He had to replace it at a cost to himself of £2000; but whether it has since rocked as well as ever is a moot point. Near Warton Crag, Lancashire, are no less than seven of these stones; and in Scotland they occur in the parishes of Kirkmichael, Dron, and Abernethy, Perthshire, and Kells, Kirkcudbrightshire. In Ireland they are found in many places; one situated at a place called Islandmagee, on Brown's Bay, County Antrim, is popularly believed to acquire a rocking tremulous motion at the approach of sinners and malefactors. At Andafiord (Faroe Islands) a large block of basalt, measuring some 16 feet in length by 10 feet in breadth, and rising for about 10 feet out of the water, swings to and fro with the motion of the sea, which is about seven fathoms deep. All these, however, are as marbles compared with the rocking-stone of Tandil in the Argentine Republic, 250 miles S. of Buenos Ayres, for this weighs over 700 tons, yet is so nicely poised that it rocks in the wind, and may be made to crack a walnut. See Frank Vincent's *Around and About South America* (1890), from which our illustration is copied.

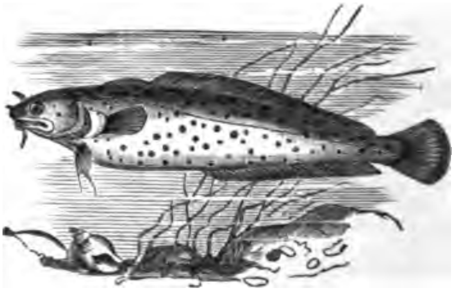

Rocking-stone of Tandil.

Rock Island, capital of a county of that name in Illinois, on the Mississippi, opposite Davenport, Iowa (the two are connected by a wrought-iron bridge which cost $1,300,000), 181 miles by rail WSW. of Chicago. The island from which the town is named belongs to the United States, and is used as a public park; on it the government has erected a great arsenal and armoury. The channel to the east of the island has been dammed so as to furnish immense water-power, and the city has flour and saw mills, besides foundries, machine-shops, glass-works, &c. Pop. (1880) 11,659; (1890) 13,634.

Rockland, (1) capital of Knox county, Maine, on the west side of Penobscot Bay, 88 miles by rail ENE. of Portland. The Boston and Bangor steamboats touch here. The city has granite quarries, and many lime-kilns; it ships a million casks of lime yearly, and the New York post-office and St Louis custom-house are among the structures built of its granite. Shipbuilding is carried on, and there are iron and brass foundries, &c. Pop. (1890) 8174.—(2) Rockland, Massachusetts, 19 miles by rail SSE. of Boston, contains large boot and shoe factories, and a pop. (1890) of 5213.

Rockland Lake, near the Hudson, 30 miles N. of New York City, is 3 miles in circumference, and furnishes 200,000 tons of ice annually.

Rockling (*Onus*), a genus of fishes of the Cod family Gadidæ, represented on the British coasts by several species distinguished among other things by the number (3–5) of barbels. The larger species reach a length of 17 inches; but none are of any value as food, their flesh acquiring an unpleasant smell a few hours after being taken out of the water.


Three-bearded Rockling or Sea Loach.

Rock-oil. See PETROLEUM.

Rock-plants, in Gardening, a term applied to a very miscellaneous group of plants, which by their habit of growth are adapted to adorn rockeries. The plants are generally of lowly habit, either tufted, creeping, or trailing. They may be shrubby or herbaceous perennials, and certain annuals of trailing habit are occasionally used for temporary effects. But the more restricted use of the term comprehends merely the numerous species of ALPINE PLANTS (q.v.) and such as resemble these in their habit and adaptability to the purpose in view—the clothing of rock-work with verdure and with flowers in imitation of the natural conditions in which the Alpine flora appears in Alpine regions and in high latitudes.

Rock River rises in the south-eastern portion of Wisconsin, and flows south into Illinois, thence south-west, and empties itself into the Mississippi 3 miles below Rock Island. Its course of 375 miles, much broken by falls, is through a region noted for its beauty and fertility.

Rock-rose. See Cistus.

Rock-salt. See Salt.

Rock-soap, a mineral consisting of silica, alumina, peroxide of iron, and water, the silica nearly one-half, the alumina and the water sometimes nearly each one-fourth of the whole. It is earthy, easily broken, black or nearly so, very soft, and easily cut with a knife, is greasy to the touch, and adheres strongly to the tongue. It is valued by painters for crayons. It is found in Poland, Thuringia, and Bohemia, and occurs in basaltic-rocks in the Isle of Skye and Antrim, in the form of nodules of a greenish-gray or brown colour. It is only found massive.

Rock-temples. In many parts of Western India, as at Ellora, Elephanta, Karli, and Salsette Island, natural rocks have been cut into temples; as also into caves and forts (see the articles mentioned). Out of India well-known instances of the same kind occur at Petra (q. v.) in the Arabian Desert, at Abu-Simbel (q.v.) in Egypt, and in China and Siam. There are remarkable cave-temples in the United States, one in Missouri, between the Salt River and Otter Creek, and another near Manchester in Ohio. The rock-dwellings of Colorado, &c., are described at Cave. See James Fergusson, *Rock-cut Temples of India* (1864), with seventy-four photographs by Major Gill.

Rocky Mountain Goat (*Aplocerus*), a beautiful animal of the antelope family, which inhabits the heights of the Rocky Mountains between the forests and the snow-line, from the 44th to the 65th degree of latitude. It is about the size of a goat, but is handsomer and more thickset, and has stronger legs. It is completely covered with long, thick, white hair, which forms an erect mane along the middle of the back from between the horns to the root of the tail. Though it is hunted by the trappers, its flesh is not valued as food. The above species and the Prong-horned antelope (*Antilocapra*) are the only antelopes which occur in the New World.—For the Rocky Mountain Sheep, see Argali, Sheep.

Rocky Mountains, a name formerly somewhat loosely applied to all the mountains of North America between the Great Plains and the Pacific Ocean, is a term now used to designate only the eastern ranges of the great Cordilleran system. This vast mountain-system acquires its greatest breadth within the limits of the United States, where between the parallels 38° and 42° N. lat. it attains a width of more than 1000 miles. Toward the north and the south the plateaus of this highland gradually diminish in breadth, but they are enclosed on the east and on the west by high mountain-chains. Those forming the western boundary are the Sierra Nevada and the Cascade Ranges (q.v.), and the eastern chains stretching with uninterrupted continuity from the southern borders of the United States through the Dominion of Canada to the Arctic Ocean constitute the Rocky Mountains. Between these eastern and western boundaries the plateau region is greatly diversified by chains which, as a rule, trend in the same general direction as the border ranges.

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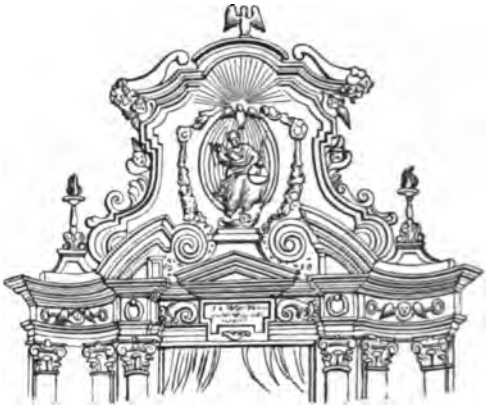
The name 'Rocky Mountains' is peculiarly appropriate, as there probably exists nowhere else such an extensive region of naked rock almost entirely devoid of vegetation. The geological structure is complex, but the greater part of the rocks exposed are Mesozoic intermingled with Tertiary and Quaternary deposits. As this system is consequently of much more recent origin than the Appalachians, it is naturally higher, and it presents also a sharper and more rugged outline. Its remarkably barren aspect is due also to other geological peculiarities and to climatic causes. In comparatively recent ages this whole region has been the scene of vast volcanic eruptions, and the lava overflows which have covered the stratified rocks in many places to a depth of thousands of feet have augmented the expanse of sterile surface. By resisting the erosion of the streams and of the atmosphere, these lava beds have also greatly aided in producing the precipitous and deeply furrowed watercourses by which this wonderful plateau region is traversed. The high mountain barrier at the western boundary of the highland robs the winds which sweep across the Pacific of much of their moisture, and the great aridity of this region thus prevents the growth of vegetation. The surface is consequently exposed to continued erosive action, which is specially rapid at such great elevations. The denudation is the more complete as the sand and smaller disintegrated fragments are swept away by the winds, and no opportunity is afforded for the accumulation of a soil. On account of these various causes the erosion of the surface is uneven, and the region displays a labyrinth of naked crags and peaks arising from plateaus crossed by towering cliffs or deep cañons, with here and there an isolated butte. The scenery of the wonderful *mesa* or plateau region which lies between the eastern and western ranges of the Rocky Mountains, and extends from southern Wyoming through western Colorado, eastern Utah, and south into New Mexico and Arizona, is unequalled by that of any other portion of the globe. The country is divided by faults, flexures, and deep cañons into numerous blocks or separate plateaus, and the wonderful carving of the rocks and the brilliant colouring of the exposed strata almost surpass belief.

A high plateau region in Wyoming, over which passes the Union Pacific Railroad, marks a separation of the Rocky Mountains into a northern and a southern group, each of which has its characteristic features. The continental divide which extends north and south with the ranges of the Rocky Mountains culminates in this plateau, where are found the extreme head-waters of the three great river-systems of the United States—the Mississippi, the Columbia, and the Colorado. The ranges of the southern group have a general north and south trend, and are higher than those of the northern group. As there are several elevated valleys known as 'Parks' enclosed between the parallel ranges, this group is sometimes known as the Park System. It extends southward from the Laramie Plains across central Colorado into New Mexico. Its greatest development is in Colorado, where there are nearly forty peaks each over 14,000 feet in height. The Medicine Bow Range and the Colorado or Front Range form the eastern edge of the Rocky Mountain System, and rise abruptly from the gentler slope of the Plains. In this range are the well-known landmarks, Long's Peak (14,271 feet) and Pike's Peak (14,134 feet), as well as Gray's Peak (14,341 feet), its highest point, which is too far west to be visible from the Plains. This range forms the eastern wall of North, Middle, and South Parks, and the Park Range constitutes their western boundary. To the west of the southern end of the Park Range lies the Sawatch Range, with the famous Mount of the Holy Cross (14,176 feet) and Mount Harvard (14,375 feet). Farther south are the San Juan Mountains, which constitute the western boundary of San Luis Park. To the north and west of this range lies a high broken country merging into the *mesa* region of western Colorado. Uncompahgre Peak (14,408 feet) is the culminating point of this section. The eastern border of San Luis Park is formed by the Sangre de Cristo Range, which is almost a continuation of the Sawatch. Its loftiest summit, Blanca Peak (14,463 feet), is the highest point of the 'Rockies.' The Elk Mountains, a series of short parallel ranges with sharp volcanic peaks, lie to the west of the Sawatch Range. In the Parks rise the head-waters of the North and the South Platte, the Arkansas, the Grand, and the Rio Grande. Beside these large parks there are among these ranges many smaller but beautiful valleys. West of the Park Range are the Uintah Mountains, composed of a broad fold of thick strata, of which the Upper Tertiary and Cretaceous layers have been eroded to the depth of more than 3 miles, exposing the underlying Carboniferous rocks. This range has an east and west trend, and connects the eastern and western ranges of the Rocky Mountain System. The most important of the western ranges are the Wahsatch Mountains, which form a part of the eastern rim of the Great Basin (q.v.), and which serve as the connecting link between the northern and southern groups of this system. The greatest development of the northern group is in Wyoming. The Wind River Mountains are the highest of the ranges, with Fremont's Peak (13,790 feet) as the culminating point. To the west are the Tetons, Mount Hayden (13,691 feet), and the Snake River Mountains. The mountains of the northern group are wilder and less accessible than those of the southern chains, but not so high. They also present scenery which is less varied; they are not so definitely marked by regular ranges, and there are but few prominent peaks except in the groups already mentioned and in the geyser region of the Yellowstone. In Idaho and Montana there are numerous enclosed mountain valleys, which are called 'Parks' or 'Prairies,' but they are not so high as the 'Parks' of Colorado. The Bitter Root Mountains form the divide between the head-waters of the Missouri and those of the Columbia, and also between the tributaries of Clarke's Fork and of the Snake River. The Lapwai and Cœur d'Alene ranges, which lie to the west and northwest, connect the Rocky Mountains with the Blue Mountains, and between these groups and the Cascade Range are the Great Plains of the Columbia River. Yellowstone Park (q.v.), in the northwestern part of Wyoming, is famous for its hot springs, geysers, mud volcanoes, and its wonderful scenery. The disposition of the mountains toward the east is peculiar, as they occur in more or less detached and isolated groups, among which are the Crazy Mountains, Judith Mountains, and the Big Horn Mountains. Still farther east are the Black Hills, completely detached from the main system, and noted for their mineral wealth. Beyond the Canadian line too little is known of the Rocky Mountains to warrant a detailed description. Mount Hooker and Mount Brown are the most noted peaks. The highland gradually descends toward the north, reaching an elevation of about 800 feet in the vicinity of the Arctic Ocean, and the northern ranges form the divide between the head-waters of the Mackenzie and the Yukon rivers.

Rococo, or ROCAILLE, a name given to the very debased style of architecture and decoration which succeeded the first revival of Italian architecture. It is ornamental design run mad, without principle or taste. The ornament consists of panels with their mouldings broken or curved at the angles, and filled with leafage, shell-work, musical instruments, marks, &c. This style prevailed in Germany and Belgium during the 18th century, and in France from the time of Henry IV. to the Revolution. The illustration shows an example from an altar in the church of St James, Antwerp.



Rococo Ornament.

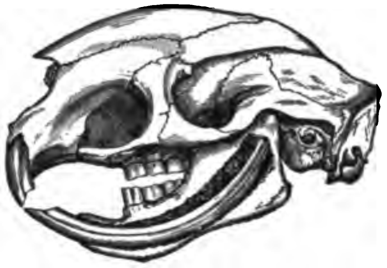
Rocroi, a third-class fortress of France, department Ardennes, 24 miles NW. of Sedan, and 2 from the Belgian frontier. It is situated in the forest of Ardennes. Pop. 1781. Here the Great Condé (q.v.) broke the reputation of invincibility long enjoyed by the Spanish infantry, May 19, 1643.

Rod, called also a *pole*, or *perch*, a measure of length, equivalent to 5½ yards, or 16½ feet. The square rod, called generally a *rood*, is employed in estimating masonry-work, and contains 16½ × 16½, or 272¼ square feet.

Rodbertus, JOHANN KARL, designated the founder of scientific socialism, was born the son of a professor at Greifswald on 12th August 1805, and studied law at Göttingen and Berlin. For a few years he held law appointments under the Prussian government, but in 1836 settled down on his country estate at Jagetzow in Pomerania, and turned his attention chiefly to economic studies. In 1848 he was elected a member of the Prussian National Assembly, and for a fortnight filled the post of minister of Worship and Education; in the following year he carried the adoption of the Frankfort constitution for the empire, but retired from public life when the Prussian electors were grouped in three separate classes. He died on 6th December 1875. Although a socialist, Rodbertus was not a demagogic agitator: he believed that the socialistic ideal will work itself out gradually according to the natural laws of change and progress. Indeed he fixed upon five centuries as the time it will take to educate the people, the democracy, up to the socialistic ideal. When that ideal is realised the state will be the owner of all the land and capital of a country, and will superintend the distribution of the total products of human labour amongst those who do the labour, apportioning to each a share corresponding to his work. (His fundamental economic principle was of course that labour is the true and only source of wealth.) In the meantime he would not interfere with the working of the established laws of capital and land, nor with the principles of monarchical government. On behalf of the workers he advocated that the government should fix a normal working-day, a normal day's work, and a maximum and minimum of wages. His views are laid down in *Zur Kenntniss unserer staatswirthschaftlichen Zustände* (1842), *Soziale Briefe* (1850–51 and 1884), *Zur Erklärung der Kreditnot des Grundbesitzes* (1868–69), 'Der Normalarbeitstag' and other papers in *Tübinger Zeitschrift* (1878 *et seq.*), and others in *Jahrbücher für Nationalökonomie.*

His *Briefe und Aufsätze* were edited by R. Meyer (2 vols. 1882), and his *Kleinere Schriften* by M. Wirth (Berlin, 1890). See monographs by R. Adler (1884) and Dietzel (1886–88). See also SOCIALISM.

Rodentia (Lat. 'gnawers'), an order of Mammals more rich in species than any of the others, including among its familiar representatives squirrels, marmots, beavers, rats and mice, lemmings, porcupines, guinea-pigs, hares and rabbits. Most are terrestrial, and many are burrowers, but a few are arboreal or even semi-aquatic. All are vegetarian, and gnaw their food. They are represented in all parts of the world.



Skull of Common Porcupine (*Hystrix cristata*): The lower jaw partly in section to show the lower incisor tooth.

Among the anatomical characteristics of Rodents may be noted the chisel-like edge of the incisor teeth, which wear away in front less rapidly than they do behind, where the enamel coating is thinner or absent; the reduction of the incisors to two above and two below, except in the hares and rabbits, in which there are four above; the fact that the incisors and sometimes the back teeth also are rootless, and continue growing from persistent pulps; the absence of canine teeth, and the presence of a large space between incisors and premolars; the condyle in which the lower jaw works is elongated from before backwards—an adaptation to the peculiar motion of the lower jaw characteristic of rodent gnawing; the cerebral hemispheres are smooth, and leave the cerebellum uncovered; the intestine, as in many herbivorous animals, has a large cæcum; the uterus is two-horned, the placentation discoidal and deciduate; the reproduction is in many cases very prolific.

Classification.—Sub-order Simplicidentata—with only one pair of upper incisors, having enamel only in front. This sub-order includes squirrels (Sciurus), flying squirrels (Pteromys and Sciuropterus), marmots (Arctomys), beavers (Castor), dormice (Myoxidæ), rats and mice, voles, lemmings, musk-rats (Muridæ), pouched-rats (Geomyidæ), the capybara (Hydrochærus), porcupines (Hystricidæ), agoutis (Dasyprocta), guinea-pigs (Cavia). Sub-order Duplicidentata—with two pairs of incisors in the upper jaw, the second pair behind the first, the enamel extending round the teeth, but thinner posteriorly. This sub-order includes only the Picas or tailless hares (Lagomys) and the hares and rabbits (Lepus).

See Waterhouse, *Natural History of the Mammalia*, vol. ii. 'Rodentia' (1848); Flower and Lydekker, *Mammals, Living and Extinct* (Lond. 1891).

Roderic, 'the last of the Goths,' whose tragic death, coincident with the downfall of the Visigothic monarchy in Spain, has inspired poets and romancers (Scott, Southey, Geibel, Dahn) to throw round him a halo of glory. Next to nothing authentic is known about him; but according to the commonly accepted legend, he was the son of a noble who was blinded by King Witiza. A conspiracy having been formed against the hated Witiza by the clergy and the nobles of Roman blood, Roderic was elevated to the throne (710). The sons of Witiza, however, bided their time, meanwhile submitting to the usurper. At length certain malcontent nobles were engaged in a plot to dethrone Roderic by Count Julian, the governor of Ceuta (in North Africa), whose daughter had been outraged by the Visigothic king. Julian brought over with him a Moorish chief named Tarik at the head of 12,000 men. Roderic met the invading army on the banks of the Guadalete, near Xeres de la Frontera, on 26th July 711. The battle raged six days; but the sons of Witiza, who commanded the wings of the Christian army, deserted during the contest, and the rout of the Visigoths was complete. Roderic either died on the field or was drowned in the Guadalete, whilst attempting to swim his horse across. A third version, however, relates that he escaped and passed the rest of his life as a pious hermit. By this victory the Arabs became masters of southern Spain.

Rodez, a town of southern France (dept. Aveyron), stands on a bold bluff encircled by the Aveyron, 148 miles by rail NW. of Montpellier. The Gothic cathedral (1277–1535) has a tower, 260 feet high, crowned by a colossal image of the Virgin. There are several mediæval houses, remains of a Roman amphitheatre, and a restored Roman aqueduct. Coal-mining, cloth-making, tanning, and cattle-dealing are the principal occupations. Pop. (1872) 12,111; (1886) 14,560; (1891) 12,065.

Rodgers, JOHN, American naval officer, was born in Maryland, 11th July 1771, the son of a Scotch colonel of militia. He was a captain in the merchant service by 1789, and in 1798 entered the navy. In 1805 he extorted from Tripoli and from Tunis treaties abolishing blackmail and forbidding the slavery of Christian captives. On 23d June 1812 he fired with his own hand the first shot in the war with Britain, and during the war he took twenty-three prizes. He died 1st August 1838.—His son, JOHN RODGERS (1812–82), a captain in the navy, captured a Confederate ironclad, and rose to be rear-admiral (1869), and superintendent of the United States naval observatory (1877).

Rodin, AUGUSTE, the foremost of contemporary French sculptors, was born at Paris in 1840, studied under Barye, and began to exhibit in the Salon in 1875. He has produced great scriptural and symbolical groups, but is best known by his portrait busts and statues, notably the bust and the monument of Victor Hugo. See Monkhouse in the *Portfolio* (1887); and Brownell, *French Art* (1894).

Rodman, THOMAS JEFFERSON (1815–71), an American soldier, inventor of a method of casting cannon. See article CANNON, Vol. II. p. 714.

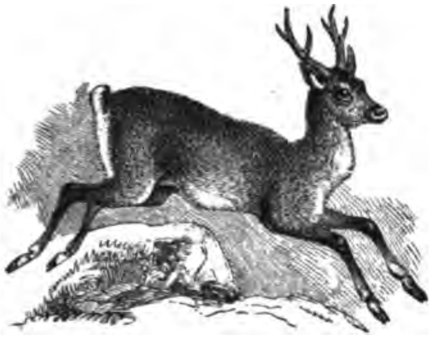
Rodney, GEORGE BRYDGES RODNEY, LORD, English admiral, born 19th February 1718, was the second son of Henry Rodney, a cadet of an ancient Somersetshire family, the elder branch of which had merged in that of Brydges, and was at this time represented by the first Duke of Chandos. Henry Rodney served for a few years as cornet of horse in the wars of William III. and Anne, and afterwards, settling at Walton-on-Thames, obtained an appointment under George I. as commander of one of the royal yachts. In this capacity he was noticed by the king, who offered to stand as godfather to his second son. The Duke of Chandos was the other godfather, and after the two the boy was christened George Brydges. He received his early education at Harrow, which he quitted at the age of twelve to enter the navy as a 'king's letter boy.' After serving chiefly on the Newfoundland station he was made a lieutenant in 1739 in the Mediterranean; in 1742 he was promoted by Admiral Mathews to be post-captain, and was sent home in command of the *Plymouth*, a 64-gun ship. He afterwards successively commanded the *Sheerness*, *Ludlow Castle*, and *Centurion*, and in 1747 the *Eagle*, in which he had a brilliant share in Hawke's victory over L'Etenduère on 14th October. In 1748 Rodney went out in the *Rainbow* as governor of Newfoundland and commander-in-chief on that station, where he remained till 1752; in 1753 he commanded the *Fougueux*, and from 1754 to 1757 the *Prince George*. He was then appointed to the *Dublin*, one of the fleet under Sir Edward Hawke in the futile expedition against Rochefort, and in 1758 under Boscawen at the capture of Louisburg. In May 1759 Rodney was promoted to be rear-admiral, and in July commanded the small squadron which bombarded Havre and destroyed the flotilla of flat-bottomed boats collected for the proposed invasion of England. In October 1761 he was appointed commander-in-chief on the Leeward Islands station, where in the early part of 1762, in co-operation with the land forces, he captured Martinique, St Lucia, and Grenada. In October he was promoted to be vice-admiral, and returning to England in August 1763 was created a baronet, 21st January 1764. In November 1765 he was appointed governor of Greenwich Hospital, but in 1771 was recalled to active service, was promoted to be admiral, nominated rear-admiral of Great Britain, and sent out as commander-in-chief at Jamaica. He hoped that he might succeed to the office of governor, which became vacant in 1773; but in his command he had shown an independence which was distasteful to Lord Sandwich, and his application was unsuccessful. In 1774 he returned to England, and for the next five years was left on half-pay, in very embarrassed circumstances, which compelled him to retire to France. It was not till October 1779 that he was again appointed commander-in-chief at the Leeward Islands, and on 29th December he put to sea with, in addition to the West Indian ships, a powerful squadron and a large convoy of store-ships for the relief of Gibraltar, then besieged by the Spaniards. On 9th January 1780, when broad off Cape Finisterre, he fell in with a convoy of Spanish store-ships under the escort of a 64-gun ship, all of which he captured. Passing Cape St Vincent on the 16th he met the Spanish squadron under Don Juan de Langara, which he attacked with a dash and vigour that carried everything before him. Seven ships out of eleven were taken or destroyed; the others managed to escape into Cadiz. Gibraltar was thus relieved without further difficulty than was caused by the weather; and on 13th February Rodney sailed for the West Indies. He had scarcely reached St Lucia, which he made his headquarters, when he had intelligence that the French fleet under the Count de Guichen had put to sea from Martinique. He immediately followed, and overtaking it on the 17th April fought an action in which, in despite of the fighting instructions, he attempted to concentrate his force on the rear of the enemy's line. Unfortunately his signals were not sufficiently clear, the flag-officers and captains did not understand what was proposed, and the clever attempt resulted in comparative failure. During the following May he again twice met De Guichen, but without being able to bring him to a decisive engagement. In November he was nominated a K.B.; and in January 1781, in obedience to special orders from home, he seized on St Eustatia and the other Dutch settlements; but his health having broken down he was compelled to return to England a few months later. In December 1781 he again sailed for the West Indies; and, as before, shortly after arriving at St Lucia he had intelligence of the French fleet, under Count de Grasse, having sailed, with some 5000 troops on board, for Cape François, where it was to join a strong Spanish fleet for an attack on Jamaica. Abreast of Dominica Rodney came in sight of it, and, after an indecisive skirmish on the 9th April, had the good fortune, on the 12th April 1782, to bring it to close action; and being enabled, by the varying nature of the wind, to pass through the enemy's line, he gained a brilliant victory, rendered still more crushing by the success of a small squadron detached to look out for stragglers in the Mona Passage. The French loss in killed and wounded was extremely severe, and seven of their ships were captured, one of them being the *Ville de Paris*, with the Count de Grasse himself on board. The victory placed the English on a very different footing in the negotiations which had been already commenced; and the terms finally agreed on were much more favourable than might otherwise have been expected. But before the news reached England Admiral Pigot had been sent out by the new administration to supersede Rodney, who was looked on as a partisan of Lord Sandwich; and though an express was sent to stop Pigot on the way it failed to overtake him. Rodney returned to England, where—though raised to the peerage as Baron Rodney, with a pension of £2000—he was but coldly received by the government. He had no further employment, and was allowed to live in comparative obscurity, which his shattered health perhaps rendered necessary. He died in London on 24th May 1792.

See his Life by General G. B. Mundy (2 vols. 1830), and Hannay's *Rodney* ('Men of Action' series, 1891).

Rodosto (anc. *Rhædestos*), a town of Turkey, stands on the north shore of the Sea of Marmora, 60 miles W. of Constantinople. It is the seat of a Greek archbishop, contains many mosques, and sends large quantities of fruits and vegetables to the capital. Pop. 18,600, about one-half Greeks.

Rodriguez, or RODRIGUES, a hilly volcanic island (1760 feet), 18 miles long by seven broad, lies 380 miles E. by N. of Mauritius, of which it is a dependency, being one of the Mascarene group. The soil is fertile, and agriculture is the chief occupation. The exports (agricultural produce and fruits) are valued at £6500 annually, the imports at £5100. Hurricanes often cause great damage to the island, which is encircled by a coral-reef. It was discovered by the Portuguese in 1645, and has been a British colony since 1814. The chief port is Port Mathurin. Owing to its isolation this island is particularly interesting to the botanist and the zoologist. Until near the close of the 17th century it was the home of the Solitaire (q.v.), now an extinct bird. Pop. (1890) 1978. See a paper by Lady Barker in *Macmillan's Magazine* (1882).

Roe (*Capreolus caprea*), a small species of deer inhabiting Europe and some parts of western Asia, chiefly in hilly or mountainous regions which are covered with forests or with scattered bushes and heath. It is seldom found in the higher and more naked mountain tracts, the haunt of the stag or red deer. It was once plentiful in Wales and in the hilly parts of England, as well as in the south of Scotland, but is now very rare south of Perthshire. The roe is about 2 feet 3 inches in height at the shoulder. Its weight is about 50 or 60 lb. Its colour is a shining tawny-brown in summer, more dull and grizzled in winter; on the under surface and around the tail the colour is whitish, but there is considerable variety. The hair is longer than in many deer. The tail is very short, concealed among the hair. The antlers, which are peculiar to the male or *Roebuck*, are 8 or 9 inches long, erect, round, very rough, longitudinally furrowed; having, in mature animals, two or three tines or branches, which, as well as the tip of the horn, are sharp-pointed, so that the antlers form very dangerous weapons. The habits of the roe are somewhat like those of the goat, or even of the chamois. It keeps its footing on rocks with great security, bounds very actively, and takes great leaps. Its usual pace, when not very hard pressed, is, however, a kind of canter. It is not gregarious, not more than a buck and doe with one or two fawns being usually seen together. Contrary to what is usual among deer, the male and female remain attached during life. The voice of the roe-deer, resembling that of a sheep, but shorter and more barking, is often heard through the night. The males are very combative at the breeding season. The roe browses on the tender shoots of trees and bushes as well as on herbage, and is thus very injurious to young woods. It is never very thoroughly tamed, and when partially so is apt to become mischievous, and the male dangerous. The venison is superior to that of the stag, but not equal to that of the fallow-deer. The horns are used for handles of carving-knives and similar articles.



Roebuck (*Capreolus caprea*).

Roe, Edward Payson, American novelist, was born in New Windsor, New York, 7th March 1838. On the completion of his theological studies he became a chaplain in the volunteer service (1862–65), and afterwards pastor of a Presbyterian church at Highland Falls. The great Chicago fire of 1871 furnished him with a subject for his first novel, *Barriers Burned Away* (1872), which proved very successful. He resigned his pastorate and settled at Cornwall-on-the-Hudson in 1874, where he devoted himself to the successful cultivation of literature and of small fruits. Fifteen novels came from his pen, all of which have been reprinted in Britain, and have been widely read on both sides of the Atlantic. The best known are *From Jest to Earnest* (1875), *Near to Nature's Heart* (1876), *Nature's Serial Story* (1884), and *He Fell in Love with his Wife* (1886). He is also the author of *Play and Profit in My Garden* (1873), and *Success with Small Fruits* (1880). He died suddenly, 19th July 1888; by which date the sale of his works had amounted to 750,000 copies.

Roe, Richard. See Doe, John.

Roe, Sir Thomas, diplomatist, was born near Wanstead in Essex about 1568, studied at Oxford, and, after holding court appointments under Elizabeth and James I., was sent as a political agent to the West Indies, Guiana, and Brazil. In 1614 he sat in parliament, but from 1615 to 1618 was ambassador to the Great Mogul Jahangir at Agra. His journal of this mission was partly printed in Purchas and other collections. He was ambassador to the Ottoman Porte in 1621–28, afterwards represented England in Poland, Denmark, and elsewhere, and died in 1644.

Roebuck, John Arthur, English politician, was born at Madras in December 1802, but passed his youth in Canada. Coming to England in 1824, he was in 1831 called to the bar at the Inner Temple, and in 1832 elected as a Radical reformer for Bath to the House of Commons. He represented Sheffield from 1849 to 1868, and again from 1874 till his death on 30th November 1879. The vigorous nature of his political warfare earned him the popular nickname of 'Tear 'em.' His greatest political triumph was the moving of a motion for inquiring into the condition of the army before Sebastopol in January 1855, which he carried by a large majority, causing the fall of the administration of the Earl of Aberdeen. He was appointed chairman of the committee which conducted the inquiry moved for. During the civil war in America he displayed a strong leaning towards the Confederates. He supported the Earl of Beaconsfield's policy during the Eastern crisis in 1877–78, and in 1879 was made a member of the Privy-council. He was the author of a work on the *Colonies of England* (1849), and *History of the Whig Ministry of 1830* (1852).

Roermond, an old town in the Dutch province of Limburg, at the junction of the Roer and the Maas (Meuse), 29 miles by rail N. by E. of Maestricht. The cathedral (1218) is one of the finest Romanesque churches in the Netherlands. The church of St Christopher contains good paintings by Dutch masters. Principal industries are weaving woollen cloths and cottons and making paper. During the middle ages Roermond was on several occasions besieged and taken; its walls were demolished in 1819. Pop. (1890) 12,039.

Roeskilde, a city on the Danish island of Zealand, is situated at the southern end of the Roeskilde Fjord, about 20 miles by rail W. by S. of Copenhagen. In the middle ages this city, founded in 980, was the capital of the Danish kings and the seat of powerful bishops. The cathedral, built in the middle of the 13th century, contains the tombs of most of the kings of Denmark. Here peace was signed between Sweden and Denmark on 8th March 1658. Pop. (1890) 6974.

Roe-stone, a name locally given to those limestones which are formed of small globules like the roe of fishes. It has been translated into the scientific term *Oolite* (q.v.).

Rogation Days, the Monday, Tuesday, and Wednesday before Ascension-day, so called because on these days the Litany (q.v.) is appointed to be sung or recited by the clergy and people in public procession. The practice of public supplications on occasion of public danger or calamity is traceable very early in Christian use; but the fixing of the days before Ascension for the purpose is ascribed to Mamertus, Bishop of Vienne, in the middle of the 5th century. In England the usage dates from perhaps the 7th century; after the Reformation the recitation of the Litany upon these days was discontinued; but a memorial of the old processions long survived in the so-called Perambulation of Parishes (see Bounds, Beating of the).

Roger I., count of Sicily, the youngest of the twelve sons of Tancred de Hauteville of Normandy, was born in that duchy in 1031. When twenty-seven years of age he joined his famous brother Robert Guiscard (q.v.) in South Italy; but at first he seems to have fought against Robert more than he helped him. At length they became reconciled, and Roger helped Robert to complete the conquest of Calabria. In 1060 Roger was invited to Sicily to fight against the Saracens: he took Messina, and settled a garrison there. Everywhere the Normans were welcomed by the Christians of Sicily as their deliverers from the Moslem yoke, and they won town after town, until in 1071 the Saracen capital, Palermo, was captured. Robert then invested Roger with the countship of Sicily. Count Roger spent the rest of his life, apart from his numerous expeditions undertaken for the support of his brother, in completing the conquest of Sicily, which was finally effected in 1090. Already as early as 1060 Duke Robert had given his brother the half of Calabria, with the title of count. After Robert's death (1085) Roger succeeded to his Italian possessions, and became the head of the Norman power in southern Europe. Pope Urban II. granted him special ecclesiastical privileges, such as the power to appoint the bishops, and made him papal legate of Sicily (1098). Roger died at Mileto, in Calabria, in June 1101. See SICILY.

Roger II., king of Sicily, the second son of Count Roger I., was born in 1097, and by the death of his elder brother Simon in 1105 became count of Sicily. On the death (1127) of Duke William of Apulia, grandson of Robert Guiscard, his duchy passed to Roger, who thereupon proceeded to weld together a strong Norman kingdom in Sicily and South Italy; the Antipope Anacletus crowned him king of Sicily and Italy in 1130. He next added to his dominions the Norman principality of Capua (1136), the duchy of Naples, and the territories of the Abruzzi (1140). In the year prior to this last acquisition he managed to take prisoner Pope Innocent II., with whom he concluded an advantageous bargain: Innocent recognised him as king of Sicily, whilst Roger acknowledged Innocent as pope, gave him his liberty, and held his kingdom as a fief of the holy see. The Byzantine emperor Manuel having insulted Roger's ambassador, Roger's admiral, George of Antioch, ravaged the coasts of Dalmatia and Epirus, took Corfu, and plundered Corinth and Athens (1146). He carried off silk-workers from the Peloponnesus to Sicily, and so introduced that industry into the kingdom. Roger then crossed the Mediterranean (1147) and won a large province from the Saracens in North Africa—Tripolis, Tunis, and Algeria. His court was one of the most magnificent in Europe; he was tolerant to all the creeds of the various peoples under his rule; his government was firm and enlightened; his name a terror to both Greeks and Moslems. Roger died in February 1154, leaving his throne to his incapable son William. See SICILY.

Roger of Wendover. See WENDOVER.

Rogers, HENRY, a brilliant English essayist, was born October 18, 1806, and educated at Highbury College. He became a Congregationalist preacher, and was afterwards professor of English at University College, London, and of Philosophy at Spring-Hill Independent College, Birmingham, and principal of the Lancashire Independent College, Manchester. He was awarded, with Isaac Taylor, the Burnett prizes in 1854, and contributed a long series of admirable critical and biographical articles to the *Edinburgh Review*. He died in North Wales, August 20, 1877. A selection of these articles was republished (3 vols. 1850–55).

Other books were a Life of John Howe (1836); *The Eclipse of Faith* (1852), an admirable piece of argument, and its *Defence* (1854), in reply to F. W. Newman; *Essay on Thomas Fuller* (1856); *Selections from the Correspondence of R. E. H. Greyson* [anagram of his name] (2 vols. 1857); and *The Superhuman Origin of the Bible*, Congregationalist Lectures (1873).

Rogers, JAMES EDWIN THOROLD, economist, was born at the village of West Meon, Hampshire, in 1823, and educated at King's College, London, and Magdalen Hall, Oxford, graduating with a first-class in 1846. At first an ardent Puseyite, he took orders, but soon returned to Oxford and became a successful 'coach,' and renounced his orders formally, together with Dr Congreve and Leslie Stephen, after the Clerical Disabilities Act of 1870. In 1862 he was elected professor of Political Economy, but made so many enemies by his outspoken zeal for reforms that he was not re-elected in 1868, nor until the death of Bonamy Price in 1888. An advanced Liberal in politics, he represented Southwark, 1880–85, and Bermondsey, 1885–86. He died October 12, 1890. His greatest work is his painful and laborious *History of Agriculture and Prices in England* (6 vols. 1866–88), and its abridgment, *Six Centuries of Work and Wages* (1885). Besides these he wrote a study on Cobden (1873), edited the *Speeches* (1868) and *Public Addresses* of Bright (1879), the *Wealth of Nations* (2 vols. 1880), and the *Collection of Protests of the Lords* [1624–1874] (3 vols. 1875).

Other books are *Education in Oxford* (1861); *Historical Gleanings* (2 series, 1869–70); *The First Nine Years of the Bank of England* (1887); *The Economic Interpretation of History* (1888); and, ed. by his son, *The Industrial and Commercial History of England* (1892).

Rogers, JOHN, the first of the Marian martyrs, was born near Birmingham in 1505, graduated in 1525 from Pembroke Hall, Cambridge, was a London rector (1532–34), and then lived for some years abroad, at Antwerp and Wittenberg, where he embraced the Reformed doctrines. He prepared a revised translation of the Bible (q.v., p. 127), which was published as 'Matthew's Bible' in 1537, and, returning to England in 1548, preached at St Paul's Cross in 1553, just after Queen Mary's accession, against Romanism. After a long imprisonment he was tried as a heretic, and burned at Smithfield on 4th February 1555. See his Life by Colonel J. L. Chester (1861).

Rogers, SAMUEL, the poet, was born at the suburban village of Stoke-Newington on 30th July 1763, the third son in a family of nine. His father, a City banker, was a Whig and dissenter, a member of the congregation of Dr Price (q.v.); his mother, Mary Radford, was the great-granddaughter of Philip Henry. After a private education, at sixteen or seventeen he entered the bank, in 1784 was taken into partnership, and on his father's death in 1793 became head of the firm. His taste for literature and for the company of literary men awoke at an early period, and one day with a friend he had gone to call upon Dr Johnson at his house in Bolt Court, but his courage failed him when his hand was on the knocker. In 1781 he contributed eight short essays to the *Gentleman's Magazine*; next year wrote a comic opera, containing a score of songs; and in 1786 (the year of Burns's first volume) published *An Ode to Superstition, with some other Poems*. In 1792 appeared *The Pleasures of Memory*, on which his poetical fame was chiefly based, and which in 1816 reached a nineteenth edition (more than 23,000 copies). There followed, 'written with laborious slowness,' *An Epistle to a Friend* (Richard Sharp, 1798), the fragmentary *Voyage of Columbus* (1812), *Jacqueline* (1814, bound up with Byron's *Lara*), and the 'inimitable' *Italy* (1822–28). The last, in blank verse, proved a monetary failure; but the loss was recouped by the splendid edition of it and his earlier poems, brought out at a cost of £15,000 (2 vols. 1830–34), with 114 illustrations by Turner and Stothard.

Meanwhile he had left the old home on Newington Green, and in 1803 (in which year, with £5000 a year, he withdrew from the bank as a sleeping partner) had given up the chambers in the Temple, and settled down finally to bachelor life in his exquisite house, 22 St James's Place, looking into the Green Park. He had had his affairs of the heart, had proposed, indeed, to a daughter of Banks the sculptor. She refused him, and left him free to cultivate his muse and caustic wit, to raise breakfast-giving to a fine art, to make little tours at home and on the Continent, and to gather an art-collection which sold at his death for £50,000. With Rogers one cannot help harping upon money, for he was rich as no poet perhaps before or after him. At least he made a good use of his riches, for he was quietly generous to Moore and Campbell, and others, unknown ones, whom it was no such credit to have aided. But with the kindest heart he had the unkindest tongue. 'I have a very weak voice,' he explained once to Sir Henry Taylor; 'if I did not say ill-natured things no one would hear me.' With which, however, Campbell's saying should be coupled: 'Borrow five hundred pounds of Rogers, and he will never say a word against you till you want to repay him.' Anyhow it has come to pass that 'melodious Rogers,' whom Byron ranked above Wordsworth and Coleridge, as we too might rank him if only his works had perished, is better remembered to-day by a few of those ill-natured things (e.g. by his witty couplet upon Ward; see Epigram) than by his poetry, which, chaste though it be, and elegant and cultured, with 'no such thing as a vulgar line in it,' is dead and mummified. It is no more a pleasure of memory, but unread, not even forgotten. One is reconciled somewhat to such oblivion by remembering how, when in his old age Fanny Kemble used to go and sit with Rogers, she never asked what she should read to him without his putting into her hands his own poems, which always lay by him on his table. For this was the Rogers who had announced his intention of being 'read to, when old and bedridden, by young people—Scott's novels perhaps.' There is not much more to tell of him—the bank-robbery (£47,000, 1844); the proffer by Prince Albert of the laureateship (1850); the street accident—knocking down by a carriage (1850)—which crippled him for the rest of his life; and the peaceful ending of that life (*æt.* ninety-two) on 18th December 1855. He is buried at Hornsey.

See Alexander Dyce's *Recollections of the Table-talk of Samuel Rogers* (1856); *Recollections by Rogers*, edited by his nephew William Sharpe (1859); Hayward's article in the *Edinburgh Review* for July 1856 (reprinted in his *Essays*, 1879); and, especially, P. W. Clayden's *Early Life of Rogers* (1887), and *Rogers and his Contemporaries* (2 vols. 1889).

Roget, Peter Mark, was born in London in 1779, the only son of a Genevan who had settled as minister of a French church in London and married the sister of Sir Samuel Romilly. He was educated at Edinburgh, became physician to the Manchester Infirmary in 1804, and in 1808 settled in London, where he became physician to the Northern Dispensary; F.R.S. (1815), and afterwards for nearly twenty years its secretary; Fullerian professor of Physiology at the Royal Institution; and an original member of senate of the University of London, surviving till September 17, 1869. He wrote one of the 'Bridgewater Treatises,' *On Animal and Vegetable Physiology considered with Reference to Natural Theology* (1834), and the more famous *Thesaurus of English Words and Phrases* (1852; 12th ed. 1881).

Rogue-money, an assessment formerly levied on every county in Scotland 'for defraying the charges of apprehending criminals, or subsisting them when apprehended, and of carrying on prosecutions against them.' This tax was first imposed by statute, 11 Geo. I. chap. 26, on the narrative that criminals were in the habit of escaping punishment for lack of the funds necessary to bring them to justice. The freeholders in each shire were directed to fix the assessment at any of the head courts yearly, and to appoint collectors. By 31 and 32 Vict. chap. 82 rogue-money in the shires was abolished, and in lieu thereof power was conferred on the Commissioners of Supply to levy by rate a 'County General Assessment.' By the Local Government (Scotland) Act, 52 and 53 Vict. chap. 50, sect. 11, this power of the Commissioners of Supply is now vested in the locally elected county councils. It is to be observed, however, that the repealed portions of 31 and 32 Vict. chap. 82 do not include sect. 10, which reserves the existing right of any burgh to levy rogue-money.

Rohan, an ancient Breton family of princely rank, descended in the male line from the dukes of Brittany, the name taken from the village of Rohan in the department of Morbihan. Its motto was characteristic of its pride: 'Roy ne puys, Duc ne daygne, Rohan suys.' The family still flourishes in the line of Rohan-Guémenée-Rochefort, naturalised with princely rank in Austria. The line of Rohan-Soubise became extinct in 1787, that of Rohan-Gié in 1638. The founder of the family was Alain I., fourth son of the Vicomte Eudon de Porhoët, who became Vicomte de Rohan in 1128. Under Charles IX. in 1570 the domain of Guémenée was formed into a principality for Louis Rohan VI., whose son Louis de Rohan-Guémenée was made in 1588 by Henry III. Duc de Montbazon. Both the latter and his son Hercule (died 1654) bore arms against the League. The famous beauty, wit, and political intriguer, the Duchesse de Chevreuse (died 1679), was a daughter of Hercule. Louis, Prince de Rohan-Guémenée (born 1635), lost the favour of Louis XIV. by his dissolute life, and died on the scaffold in 1674 for treasonable dealings with the Dutch.

Louis René Edouard, Prince de Rohan-Guémenée, born 25th September 1735, embraced the clerical life in spite of dissolute morals and an extravagant love of luxury, and at an early age became coadjutor to his uncle the Bishop of Strasburg. In 1772 he was sent as a special minister to Vienna. His habits were displeasing to Maria Theresa, and he ruined himself at the French court by slanderous gossip about Marie Antoinette. He was recalled in 1774, and, although with grudging, made grand-almoner in 1777. Next year came a cardinal's hat, through the influence of Stanislaus Poniatowski, king of Poland; and a year later the succession to the bishopric of Strasburg, held by three members of his family before him. His eagerness to recover his footing at court made him an easy victim to the schemes of Cagliostro and the adventuress Lamotte, and their clumsy forgeries and personations were enough to make him purchase the famous Diamond Necklace for the queen. As soon as the plot was discovered the cardinal was sent to the Bastille, but was acquitted by the Parlement of Paris, 31st May 1786. He found himself for the moment a hero of the mob, was elected to the States-general in 1789, but refused to take the new oath to the constitution in January 1791, and retired to Ettenheim in the German part of his diocese, where he died, 17th February 1803.

See Diamond Necklace, and books enumerated thereat; also the far from trustworthy *Mémoires inédites du Comte de Lamotte-Valois* (edited by Louis Lacour, 1858), and G. C. D'est Ange, *Marie Antoinette et le*

Procès du Collier (1889); the *Mémoires* of Rohan's secretary, the Abbé Georgel, as well as the books by Beugnot and Madame Campan.

With Victor Louis Mériadec, Prince de Rohan-Guémenée, Duc de Montbazon and Bouillon, who died in 1846, ended the direct main line. He was succeeded by his two nephews, scions of a younger branch of the line Guémenée, that of Rohan-Rochefort, who had been adopted in 1833 by his brother Jules Armand Louis (died 1836).

The line Rohan-Gié, which sprang from that of Guémenée, was founded by Pierre de Rohan de Gié (1453–1513), marshal and tutor of Francis I. His son fell at Pavia in 1525; his grandson, René I., at Metz in 1552. The latter was married to Isabella d'Albret, great-aunt of King Henri IV., whence the Calvinism of the family. René II. (1550–86) married in 1575 the celebrated poetess, Catherine de Parthenay, heiress of the house of Soubise.—Their son Henri, Duc de Rohan-Gié, Prince of Leon, was born 21st August 1579 at the castle of Blain in Brittany, and at sixteen came to the court of Henry IV., with whom he was ever an especial favourite. He was made in 1603 Duc de Rohan and a peer of France, and in 1605 he married the daughter of Sully. After the king's murder—a fatal blow to his hopes—he became one of the chief leaders of the Huguenot party in France, and, when all endeavours to bring about a peaceable settlement had come to nothing, took up the sword, fortified the places in Guienne, held Montauban against the king, and at last forced him in the peace of 1622 into a confirmation of the Edict of Nantes. Thereafter he took his share in all the tortuous intrigues of the time, fighting now for his king, now against him, ever holding up the religious cause, alike in times of open warfare and hollow peace. After the surrender of La Rochelle (1628) a price was set on his head, and he made his way to Venice, but soon after was called on by Richelieu to serve his king in the Valtelline, out of which he speedily cleared both the Imperialists and the Spaniards. He next carried his sword to Bernhard of Saxe-Weimar, but received a wound at Rheinfelden on the 28th February 1638, of which he died at Köningsfeld on the 13th April. But his name survives best in his admirable *Mémoires*, three books of which (1644) embrace the civil wars, the fourth (not published till 1758) the Valtelline campaign. They may be found in Michaud and Poujoulat's collection.

See the works by Fauvelet du Toc (Paris, 1667), Schybergson (*ib.* 1880), H. De La Garde (*ib.* 1884); Bühring, *Venedig, Gustav Adolf, und Rohan* (Halle, 1885); Laugel, *Henri de Rohan, son rôle politique et militaire sous Louis XIII.* (Paris, 1889); and the *Edinburgh Review* for April 1890.

His daughter, Marguerite de Rohan, brought the great possessions of the house in 1645 to her husband, Henri de Chabot, Marquis de Saint-Aulaye, who thereupon assumed the name of Rohan. From this line have sprung Charles Louis Josselin de Rohan-Chabot, Duc de Rohan, Prince de Léon (born 1819), and his son, Alain, Prince de Léon (born 1844).

See Soubise; also De la Chenaye-Desbois, *Genealogie des Hauses Rohan* (Prague, 1872).

Rohilkhand, a division of the North-western Provinces of India, lying west of Oudh, has an area of 10,908 sq. m. and a pop. (1891) of 5,343,674.

Rohillas were Afghan Pathans who rose to power in Rohilkhand, India, about the middle of the 18th century. The Mahrattas on one side and Shuja ud-Daula of Oudh on the other pressed them hard; at last Shuja, with the help of British soldiers lent to him by Warren Hastings, succeeded (1773–74) in subduing them. See Sir John Strachey's *Hastings and the Rohilla War* (Oxford, 1892).

Rohlfs, Gerhard, German traveller in Africa, was born at Vegesack near Bremen on 14th April 1832, studied medicine at Heidelberg, Würzburg, and Göttingen, and joined (1855) the Foreign Legion serving in Algeria. Having learned Arabic and made himself thoroughly familiar with Mohammedan customs, he set off (1861) for Morocco, travelled through that country under the protection of the Grand Sherif, and was exploring the Wady Draa in the Sahara (1862) when he was attacked by his own guides, plundered, and left for dead in the desert. Two marabouts found him and carried him back to Algeria. In 1864 he again visited the Sahara, getting to Tuat and Ghadames; in 1865 he was in Fezzan and Tibesti; in 1866 in Bornu, whence he made for the Benue, and so reached the Niger. He accompanied the British expedition to Abyssinia in 1868; and was then sent to carry presents from the king of Prussia to the sultan of Bornu. In 1873–74 he was commissioned by the khedive of Egypt to lead an expedition to the oasis of Sivah (Jupiter Ammon) in the Libyan Desert. The German government in 1878 sent him to carry presents from the emperor to the sultan of Wadai; but the expedition was attacked and driven back by Arabs in the oasis of Kufra. The last public mission of Rohlfs was to take a letter from the German emperor to the negus of Abyssinia in 1885. Nearly every one of his journeys is described in a separate book—e.g. *Reise durch Marokko* (4th ed. 1884); *Reise durch Nord-Africa in 1865–67* (1868 and 1873, in *Petermanns Mitteilungen*); *Land und Volk in Afrika* (1870); *Quer durch Afrika* (1874); and some others.

Rohtak, a town of British India, in the Punjab, 42 miles NW. of Delhi. Turbans are manufactured. Pop. 15,699.—The *district* has an area of 1797 sq. m. and a pop. (1891) of 590,475.

Rokitansky, Karl, Baron von, founder of the school of pathological anatomy at Vienna, was born at Königgrätz in Bohemia on 19th February 1804, studied medicine at Prague and Vienna, in 1828 was appointed assistant to the professor of Pathological Anatomy in the university of the latter city, and in 1834 succeeded him. He likewise held the offices of prosector at the city infirmary, legal anatomist to the city, and medical adviser to the ministry of education and public worship. In 1869 he was made president of the Austrian Academy of Sciences. He retired from work in 1875, and died on 23d July 1878. Although Rokitansky agreed with the old humoral pathologists in so far that he regarded the changes of the blood as the chief immediate causes of disease, he laid the principal stress of medical study upon morbid anatomy, post-mortem dissection, and observation. He stands pre-eminent amongst German medical teachers as the one who established pathological anatomy as the basis of all original scientific inquiry in the domain of medicine. His teachings were published in the great work *Handbuch der pathologischen Anatomie* (5 vols. 1842–46; 3d ed. 1855–61; Eng. trans. of Sydenham Society, 4 vols. 1849–52), and in *Memorials* of the Vienna Academy of Sciences. See an anonymous Biography (Vienna, 1874).

Rokitno, a vast swampy region, now being gradually drained, between the rivers Pripet, Dnieper, and Beresina in West Russia. This region is regarded by Pösche as the original home of the Aryans, whence proceeded the lake-dwellers of Switzerland and the Po valley. See Aryan Race.

Roland (Ital. *Orlando*, Span. *Roldan*), the name of the most prominent hero in the Charlemagne legend. Unlike most legendary heroes, Roland is a figure in history as well as in poetry and fable, though it cannot be said that the place he occupies as a historical personage is an imposing one. All that we know of him is contained in one line of Eginhard's *Vita Karoli*, chap. ix., and that simply records his name, Hruodlandus, his rank of prefect or warden of the march of Brittany, and his death at the hands of the Gascons in a valley of the Pyrenees. Such is the acorn from which a whole forest of romance has sprung up. According to the *Annals* (commonly attributed to Eginhard, but by some to Angilbert, who died fifteen years before they end), Charlemagne was invited in 777 to take possession of Saragossa and other cities in Spain by Ibn al Arabi, leader of the revolt against the Khalif Abd-er-Rahman, and in 778 crossed the Pyrenees into the territory of the Gascons, attacked and took Pamplona, the stronghold of the Navarrese, and advanced to Saragossa, and having received the submission of Ibn al Arabi and his friends, and taken hostages of them, returned the way he came. According to other accounts the Saracens played him false, and a rising of the Saxons compelled him to hasten home. Al Makkari merely says that after warring for some time with Abd-er-Rahman he sent him an embassy proposing an alliance and friendship, and that peace was concluded between them. At any rate it is certain that Charles made but a short stay in Spain, that on his way back he levelled the walls of Pamplona to the ground, and that about 25 miles north-east of it the rearguard of his army was annihilated by the Gascons. 'Roscida Vallis,' the common etymology of Roncesvalles, the scene of the disaster, is, of course, like all such etymologies, nonsense. In its oldest known form the name is Rencesvals, and there can be no doubt that it is Basque. Whatever may be the true reading of the first syllable, the last two are clearly a corruption of *zabal* or *zaval*, a word which enters into the composition of perhaps a hundred place-names in Navarre and the Basque provinces, always indicating a flat, level space, which exactly describes the battlefield. It is a small oval plain, evidently an old lake-bed, shut in all round, except on the south where the waters escaped, by steep mountain-ridges clothed from base to summit with thick beech woods. To the north there is a slight depression where, by the Col of Ibañeta, a path crosses the crest of the Pyrenees and descends the Val Carlos to St Jean-Pied-de-Port. The features of the spot, and the facts of the catastrophe, no doubt, also, are faithfully given in a few words by Eginhard, who in his youth must have often heard them spoken of by Charlemagne's old soldiers. As the army, by reason of the narrowness of the place, was marching in extended order, the Gascons, who, profiting by the deneseness of the woods that abound there, had posted themselves in ambush on the heights, rushing upon those guarding the rear, hurled them into the valley beneath, and there slew them to a man; and having seized the baggage, dispersed under cover of the night in all directions, so that there was no finding them to take vengeance upon them. Roncesvalles is in fact a natural trap, and it says little for Charles as a general that he should have ventured into it without first securing the heights and scouring the woods; for when Roland, in the *Chanson*, thinks of it, it is too late. He was in a hostile country, made so by his own acts. It may be—to put him in the most favourable light—that he was compelled by military necessity to invade Navarre, that resistance forced him to take Pamplona, that levelling its walls, though it looks awkwardly like spite, was a precaution in view of a future campaign, and that, in short, he 'simply used military license upon the country.' But this, as Major Dalgetty observes, 'excites no benevolence in those who sustain injury,' and the Basques of Navarre had good reason to resent their treatment at his hands. They were not semi-savage mountaineers, as most French writers try to make them out, but a gallant little Christian state holding their own stoutly, after the fashion of Pelayo, against the common foe; and yet this pillar of the church, this pious champion of Christianity, hot from the conversion of the Saxons, comes down upon them, for his own ends treats them as if they were Saracens, or worse, takes away from them their armour wherein they trusted, their walls, next to their mountains their best reliance, and leaves them naked to their enemies. Eginhard may talk of the perfidy of the Gascons, and poets sentimentalise over the *dolorosa rotta*, but history and justice will call it a merited retribution for overbearing militarism, and the proper punishment of insolent contempt for a weak adversary.

Naturally, the tragic character of the disaster, and the reverse to the mighty king of the Franks at the close of what was looked upon as a holy war, made a deep and wide-spread impression. Upon himself the effect, the *Annals* say, was that it clouded the success of his expedition, and there can be no doubt that already in his lifetime it was a theme with the popular minstrels far and wide. In the middle of the 9th century the biographer of Louis held it needless to mention the names of those who fell, *quia vulgata sunt*. In course of time the story underwent modifications in the hands of the poets. Everything in it was magnified. The expedition became a campaign lasting twice as many years as it had occupied months; the disaster was made a defeat of vast proportions, which, as a matter of course, was accounted for by treachery, the traitor Ganelon being invented for that purpose; the Basques were turned into Saracens; and for further dramatic effect Charlemagne, who was but thirty-six, was represented as a venerable old man with a snow-white beard, and Roland as his nephew. And here it may be asked, how came Roland to be set up as hero? Eginhard mentions two others as having fallen, Anselm and Eggihard, both of them persons of at least equal rank, and more immediately connected with the sovereign; but nothing more is heard of either. The only explanation is that, if they were left unwept, unhonoured, and unsung, it was because the jongleurs could not conveniently sing their names, while Rodland, Rotland, Rollanz, Roland lent itself to song as if made on purpose. 'An old song' is held to mark the zero of importance, but it is one of the most potent of agencies. It lurks among the roots of history, dispensing immortality at will, and conferring renown irrespective of deeds or merits. Roland, for aught we know, was only an ordinary Breton country-gentleman, but old songs have made him the equal of Achilles, Hector, Alexander the Great, and Arthur of Britain. Of these old songs we know little or nothing beyond the fact of their existence. If the *barbara carmina* taken down by Charlemagne's orders were of the same sort, they were probably the only ones of the kind ever committed to writing. Nor do we know much more of their relation to the earliest written lays. M. Léon Gautier, who has made the subject the study of his life, at first held that the *chansons de geste* were little more than the primitive songs strung together, but he now thinks that they were merely inspired by them, and borrowed only their legendary and traditional elements. The truth probably lies between the two views. It is more likely that there is no hard and fast line to be drawn between the songs and the *chansons de geste*, and that the latter were of very gradual growth. The jongleurs in singing the songs, cantilenæ, or ballads, as we should call them, relating to an event like the Roncesvalles disaster, would naturally from time to time introduce new ones for the sake of novelty or as connecting links, and thus a recognised sequence would be established, which, as minstrelsy became more and more of an art, the jongleurs more like trouvères, and their hearers more cultured and critical, would in course of time grow into a continuous lay. By some such process as this, in all probability, the *Chanson de Roland*, unquestionably the oldest and best of the *chansons de geste*, was produced.

The oldest form in which we have it is that of the MS. in the Bodleian Library, Oxford, written presumably towards the end of the 12th century; but this is evidently by no means its oldest form as a consecutive poem. M. Gautier, who loves precision, places its composition between the Norman Conquest and the first Crusade, but it is impossible to fix precisely the date at which it ceased to be a mere congeries of songs and became a *chanson de geste;* at any rate the two references to England as one of Charlemagne's many conquests cannot be relied upon. Nor do the allusions to Mont Saint-Michel justify the assertion that it is *certainly* the work of a Norman. It is of course in the language of the northern half of France, the language of the trouvères, but there is no good reason for assigning it to any one province. An interesting reference to the country of the poem is spoiled by M. Gautier. The death of Roland, we are told, was presaged in France by storms and earthquakes 'from Saint-Michel to Seinz, from Besançon to Wissant.' It is not certain here what place is meant by Seinz. M. Francisque-Michel suggests Sens; a 13th-century MS. reads Rains (Reims); M. Gautier boldly proposes the 'saints of Cologne'—i.e. the relics preserved there. Far more probably, as a glance at the map will show, the place intended is Saintes on the Charente, the old capital of the Santones and of Saintonge, a town that makes a considerable figure in the middle ages and in the Charlemagne legend. With the other three places mentioned it forms a quadrangle which exactly represents the region within which the *langue d'oïl* was dominant. South of the line from Saintes to Besançon was the country of the *langue d'oc*, the Provençal; west of the line from Mont Saint-Michel to Saintes was the Breton; east of the line from Besançon to Wissant, near Calais, the language was Teutonic. The old minstrel was not thinking of a Rhine frontier, as M. Gautier imagines, but of the habitat of his hearers, the country where his words would be understood. The best, and most likely the oldest, part of the poem is that which deals with the combat at Roncesvalles, Roland's refusal, until too late, to sound his horn, the deeds and deaths of the peers one by one, and of Roland last of all. The opening portion, the despatch of Ganelon at Roland's suggestion as envoy to the Saracens, his anger and betrayal of Roland in revenge, and the concluding part, the vengeance of Charlemagne, and the trial and death of Ganelon, probably came later. There can be little doubt that the episode of the Emir Baligant was a comparatively late addition.

Besides the Oxford MS. there are half-a-dozen others ranging from the 13th to the 16th century. The differences between the earlier and later are significant. In the Oxford MS., which is one of the little pocket copies carried by the jongleurs, the assonant rhyme (that which disregards the consonants and depends on the accented vowel) is maintained throughout, the same assonance being kept up to the end of each break or paragraph. In the later MSS. the assonant is turned into the full consonant rhyme, and the poem expanded to twice or thrice its former length. The first shape is the poem as *sung;* the second as adapted for readers when the minstrel was no longer the sole vehicle for poetry and reading was becoming a common accomplishment. A very close German version, the *Ruolandes Liet*, shows that early in the 12th century the chanson had passed out of its native country and language; and it is almost as closely followed in the Icelandic *Karlamagnus Saga* of the 13th. The *Chanson de Roland* is the foundation of the Charlemagne legend. Charles's wars and quarrels with his vassals would no doubt of themselves have furnished themes for the jongleurs, but the legend, culminating in the Morgante of Pulci and the Orlandos of Boiardo and Ariosto, is the outcome of the story of Roland and Roncesvalles.

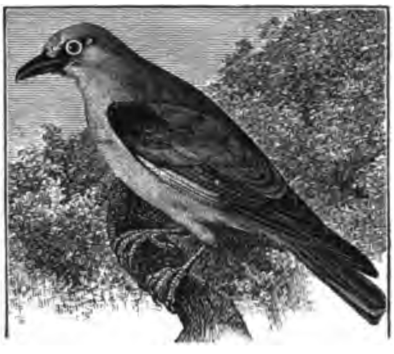
The following are the printed editions of the *Chanson de Roland:* From the Oxford MS., by Francisque Michel (Paris, 1837); Text, with translation, by F. Genin (Paris, 1850); the Oxford text, ed. by Professor Müller (Gött. 1851; reprinted with additions, 1863, 1878); 2d ed. of F. Michel's, with text of 13th-century MS. in the Bib. Nat. added (Paris, 1867): *Rencesval*, Oxford text, E. Boehmer (Halle, 1872); MS. of Lib. of St Mark, Venice, fac-simile by E. Kolbing (Heilbronn, 1877); Oxford MS., ed. by E. Stengel, with a photograph fac-simile (Heilbronn, 1878); Text, with translation in assonant rhyme, Petit de Julleville (Paris, 1878); Text, with translation, commentary, notes, &c., by Léon Gautier (16th ed. 1887). There are other translations by Jonain, Lehugeur, St Albin, and Jubert. By far the best is by the Baron d'Avril (Paris, 1865, 1866, 1877). The *Ruolandes Liet* was printed in 1727, and again by W. Grimm in 1838, and by Karl Bartsch (1874); and there is a translation by W. Hertz (1861). Mrs Marsh in 1854 translated Vitet's epitome of the poem, and Mr John O'Hagan has given an accurate, scholarly, and spirited version from the original (2d ed. 1883). There is also an English translation by L. Rabillon (New York, 1885).

Roland de la Platière, JEAN MARIE, and his greater wife, MADAME ROLAND (*née* Marie-Jeanne, or Manon, Phlipon), are among the most memorable martyrs of the French Revolution. Roland was born of a decayed legal family at Villefranche near Lyons in 1734. He made his way unaided, and had risen to be inspector of manufactures at Amiens, when about the close of 1775 he made the acquaintance of his gifted wife. She was twenty years his junior, having been born at Paris, 18th March 1754, daughter of an engraver, who had ruined himself by unlucky speculations. From the first an eager and imaginative child, she read everything, even heraldry, and Plutarch made the young idealist a republican for life. At eleven she went for a year into a convent to prepare for her first communion, next passed a year with her grandmother, and then returned to her father's house, where she read Buffon, Bossuet, and Helvétius, and at length found her gospel in the writings of Rousseau. Her admirable mother died in 1775, and the girl, solitary and poor, untouched in heart by her many admirers, and soured to her father by his misconduct, at length in February 1780 married the estimable Roland. He was over forty, thin, yellowish, careless in dress, abrupt and austere in manners, solid and well-informed indeed, but dry, unsympathetic, and addicted to talking about himself. But she buried the latent passions of her heart, and for ten years made herself an admirable wife and mother, with perfect domestic simplicity. They lived at Amiens, where her only child, a daughter, was born (October 1781); and next at Lyons, and travelled in England and Switzerland. The Agricultural Society of Lyons charged Roland to draw up its *cahier* for the States-general, and in February 1791 he went to Paris to watch the interests of its municipality, returned to Lyons in September, but came back to Paris before the close of the year. It was now that Madame Roland's masculine intellect and woman's heart made her the queen of a coterie of young and eloquent enthusiasts that included all the famous and ill-fated leaders of the Gironde, Brissot, Buzot, Pétion, and at first even Robespierre and Danton. Her noble beauty, dark expressive eyes, sweet voice, and eloquent words added a charm to patriotism that was irresistible. In March 1792 Roland became minister of the Interior, and his stiff manners, round hat, and unbuckled shoes struck dismay into the court. Three months later he was dismissed for his disloyal remonstrance to the king, who had refused to sanction the decree for the banishment of the priests. It was Madame Roland's vigorous pen that wrote this letter, as indeed she wrote most of the papers that her husband signed. He was recalled after the king's removal to the Temple, made himself hateful to the Jacobins by his protests against the September massacres, and took his part in the last ineffectual struggle of the Girondists to form a moderate party. It was in the last days of the Gironde that the reciprocal affection between Madame Roland and Buzot crossed the indefinite bounds that separate friendship from love. It was the one touch of softness that her nature needed, says Sainte-Beuve, to make it wholly feminine and French. But her Spartan soul sacrificed its passion to duty, and strong in the purity of her heart she made a confidant of her husband, partly perhaps because she sought in this a strange safeguard against herself, but doubtless still more because the ideal love to that exalted virginal heart was a love nourished upon sacrifices, that encircles its object with an aureole of respect, and dreads to find in possession the end of its enchantment. The struggle brought on six days of physical exhaustion, and on the seventh the sound of the tocsin announced the proscription of the Twenty-two (31st May). Roland had been arrested, but escaped and fled to Rouen; Buzot and some of the others fled to Caen to organise insurrection, but in vain; next day she herself was seized and carried to the Abbaye. Set at liberty two days later, she was arrested anew and taken to Sainte-Pélagie. She had five more months of prison before death closed her tragedy of life, and during this time she wrote her unfinished *Mémoires*, furtively, with a swiftly flowing pen, on sheets of coarse gray paper given her by a kindly turnkey, often blotted by the falling tears. The stern joy with which she had hailed the dawn of revolution, her hatred of the throne, the high hope and heroic disinterestedness of her dreams—all her sincere illusions were now dissipated, and at length she saw into the heart of that declamatory tragedy called the Revolution. Her character, made perfect through suffering, took on a new refinement; she carried with her into death something of the sanctity of the martyr, and still, in Carlyle's phrase, like a white Grecian statue, serenely complete, she shines in that black wreck of things. She bore herself in prison with a gracious and queenly dignity, buried in her Thomson, Shaftesbury, Plutarch, and Tacitus. The approach of death unsealed her lips, and (22d June to 7th July) in four letters to Buzot, strangely discovered in 1863, she spoke out a love that could never now come into conflict with duty. On the 1st November, the morning of the execution of the Twenty-two, she was transferred to the Conciergerie, and there lay for eight days. She went to the Tribunal dressed all in white, her long black hair hanging down to the girdle, and in the dusk of the 8th November 1793 she was carried to the guillotine along with a trembling printer of assignats, whom she asked Samson to take first to save him the horror of seeing her head fall.—'You cannot,' said she, 'refuse the last request of a woman.' It is usually told how, on the point of entering the awful shadows of eternity, she asked for pen and paper to write down the strange thoughts that were rising within her, but Sainte-Beuve thinks it impossible, puerile, untrue to the nature of the heroine, as well as unauthenticated by good contemporary evidence. As she looked up at the statue of Liberty, she exclaimed, 'O Liberté, comme on t'a jouée!' or as it is still more commonly given, 'O Liberté, que de crimes on commet en ton nom!' She had often said her husband would not long survive her; a week later he ran himself through with his sword-stick near Rouen, November 15, 1793.

Madame Roland's *Mémoires* reflects little of the horrors amid which it was written, but is a serene and delightful revelation of her youth in a series of charming glimpses. But in writing she is best and most natural in her letters, as in the series to Bosc, those to Bancal des Issarts, the four to Buzot, and the exquisitely simple letters to her two school friends, Henriette and Sophie Cannet. The best editions of the *Mémoires*, for the first time printed in their entirety, are those of Dauban (1864) and Faugère (1864). Her *Letters* were collected by Dauban (2 vols. 1867). See the histories of the Revolution by Michelet, Carlyle, Von Sybel, &c.; the studies of Dauban (1864); Mathilde Blind (1886); V. Lamy, *Deux Femmes Célèbres* (1884); and Austin Dobson, *Four Frenchwomen* (1890); Sainte-Beuve, in *Nouveaux Lundis*, vol. viii., and in *Portraits de Femmes*; and E. Scherer, in *Études sur la Littérature Contemporaine*, vol. ii.

Rolf. See NORTHMEN, NORMANDY.

Roller (*Coraciidæ*), a family of Picarian birds characteristic of the Ethiopian and Oriental regions, although the common Roller is extensively distributed in the Palæarctic region and a few species enter the Australian region. None are found in the New World. Madagascar possesses three species peculiar to itself, and so different from one another that they are regarded as types of different genera, and so different from other rollers that they are grouped into a separate sub-family, Brachypteracianæ: they are named ground-rollers, and are nocturnal in habit. An Indian species, *Eurystomus orientalis*, is also nocturnal. The Common Roller (*Coracias garrula*) is an autumn or more rarely a spring visitor to the British Isles; and about one hundred have been recorded since the first one was noticed by Sir Thomas Browne in 1644. Some have visited the Orkneys and Shetlands, one has been found as far west as St Kilda, and about half a dozen have been recorded from Ireland. It is a straggler to northern Europe; in central Europe it is common; in countries bordering on the Mediterranean it is very abundant. It ranges through Asia to Omsk in Siberia and to North-west India. In winter it extends its migrations to Natal and Cape Colony. In size it is about a foot long. The general colour is light bluish green; the mantle is chestnut-brown; the wings and rump are adorned with beautiful azure blue. The female resembles the male in plumage. Nesting takes place in the



The Common Roller (*Coracias garrula*).

woody haunts in May. The nest, which is made in a hollow tree or wall, is built of a few chips, or of roots, grass, feathers, and hair, according to circumstances. The eggs are five or six in number and are of a glossy white colour. The food consists of beetles and other insects captured on the ground. The name 'Roller' is given to the bird on account of its varied and unsteady flight and the habit the male has, during the breeding season, of indulging in extraordinary tumbling antics, and turning somersaults in the air.

Rolleston, GEORGE, was born at Maltby in Yorkshire, July 30, 1829. He had his schooling at Gainsborough and Sheffield, next entered Pembroke College, Oxford, took a classical first-class in 1850, and was elected Fellow of his college the next year. He studied at St Bartholomew's Hospital, and was appointed in 1855 a physician to the British Civil Hospital at Smyrna. Returning to England in 1857, he was made physician to the Radcliffe Infirmary at Oxford, and somewhat later Lee's reader in Anatomy. In 1860 he was appointed Linacre professor of Anatomy and Physiology, became F.R.S. in 1862, Fellow of Merton College in 1872, and died June 9, 1881. Professor Rolleston was an admirable lecturer, and his *Forms of Animal Life* (1870) gave him high rank among the scientists of his day. Another piece of work was the dissertation on craniology in Greenwell's *British Barrows* (1877). His *Scientific Papers and Addresses* were collected by Professor Turner and Mr E. B. Tylor, with a sketch of his life (2 vols. 1884).

Rollin, CHARLES, a French historian who long enjoyed a popularity beyond his merits, was born a cutler's son at Paris, January 30, 1661. He studied at the Collége du Plessis, and became professor there, next at Paris, and was chosen rector of the university of Paris in 1694. In 1699 he was appointed coadjutor to the principal of the College of Beauvais, but was ejected from this situation twelve years later owing to his Jansenistic sympathies. He was re-elected rector of the university in 1720, and died September 14, 1741. His *Traité des Études* (4 vols. 1726–31) has been pronounced by Villemain 'a monument of good sense and taste;' his *Histoire Ancienne* (13 vols. 1730–38), long popular and much translated, is feeble in its philosophy, jejune in its criticism, and often inaccurate in its facts. Yet it has opened the study of ancient history to many men since the young prince Frederick the Great. His *Histoire Romaine* (16 vols. 1738–48) was a much inferior work, long since deservedly forgotten.

Rollin, LEDRU. See LEDRU-ROLLIN.

Rollo. See NORTHMEN, NORMANDY.

Rolls, MASTER OF THE, was formerly the chief of the twelve Masters in Chancery, entrusted with the care of grants passed under the great seal, and of all the records of the Chancery; he also sat on the equity side of the court as an independent though subordinate judge; doubts having been raised as to his jurisdiction, his powers were confirmed by act of parliament in 1730. The official residence of the Master of the Rolls in Chancery Lane, with the chapel, &c. thereto attached, form the Liberty of the Rolls. The Master of the Rolls was formerly permitted to sit in the House of Commons, and this usage was defended in a well-known speech by Macaulay. By the Judicature Act of 1873 the Master of the Rolls was excluded from the House of Commons; he has since been transferred, by an act passed in 1881, to the Court of Appeal, but he continues to perform administrative duties as head of the Record Office. For the Rolls Series, see RECORDS.

Romagna, formerly the name of a region of Italy, forming the northern portion of the states of the Church (q.v.), and comprising the *delegations* of Bologna, Ravenna, Ferrara, and Forli. These delegations became in 1861 distinct provinces of the kingdom of Italy.

Romaic, a term for the popular Greek dialect developed before the fall of the Byzantine empire, essentially similar to the modern Greek tongue as now spoken. The first who wrote in this popular tongue is believed to have been a monk Prodromus in the 12th century. Those who clung to the old Attic which still maintained an artificial existence called themselves *Hellenes;* the party of the popular speech were called *Romaioi*, from *Nea Rōmē* ('new Rome'), the new name for the capital of the eastern empire. See GREECE, Vol. V. p. 392.

Romaine, WILLIAM, evangelical divine, was born at Hartlepool, Durham, September 25, 1714, and was educated at Hertford College and Christ Church, Oxford. He held curacies at Lew Trenchard, Devon; Banstead and Horton, Middlesex; was lecturer of St George's, Botolph Lane, and St Botolph's, Billingsgate, and of St Dunstan's-in-the-West from 1749 till his death. He was also assistant morning preacher at St George's, Hanover Square, 1750–55; curate and morning preacher at St Olave's, Southwark, 1756–59; and morning preacher at St Bartholomew the Great, Smithfield, 1759. In 1764 he was chosen rector of St Andrew Wardrobe and St Ann's, Blackfriars, and though the election was disputed it was confirmed by the Court of Chancery in 1766, and he held the living till his death, July 26, 1795. Romaine was a bulwark of Evangelicalism in his day, though himself infected with the taint of Hutchinsonianism. He assailed, not without credit, Warburton's *Divine Legation of Moses;* published commentaries, many sermons, and three books of edification that enjoyed for three generations a remarkable popularity: *The Life of Faith* (1763), *The Walk of Faith* (1771), and *The Triumph of Faith* (1794). There is a complete edition of his works, with a Life by the Hon. and Rev. W. B. Cadogan (8 vols. 1796).

Roman Architecture. Of the early architecture of Rome and the other Latin cities comparatively little is known; the remains of early Italian architecture consist of a few arches and sepulchral monuments. With the conquest of Carthage, Greece, and Egypt the Romans became acquainted with the arts of those countries, and by degrees endeavoured to use them for the embellishment of the imperial city. Besides, Rome under the empire was the capital of the world, and attracted artists from every country. The result was that the architecture of Rome became a mixed style. It was largely imported, and partook of the character of the importers. The great interest of Roman architecture is that it is a mixture and amalgamation of ancient styles, and the starting-point for modern styles. It is thus the connecting-link between ancient and modern art; the whole history of Roman architecture being that of a transition, slow but steady, from the external architecture of the Greek temple to the internal architecture of the basilica. Rome borrowed from Greece the oblong peristylar temple, with its horizontal construction and decoration, and the various 'orders.' See COLUMN, GREEK ARCHITECTURE. From the Etruscans probably were derived the circular form of temple and the circular arch, which became leading features in the development of the future Roman style. The peripteral form of the Greek temple, however, was seldom followed by the Romans, who preferred to adhere to the early Italian form of columns attached to the walls of the cella.

The *Orders* imported from Greece were the Doric, Ionic, and Corinthian. These were all used in Rome, but with some modifications; the Doric, for example, being never employed as in Greece, being without fluting, and having the capital and entablature altered, and a base added, so as to make the style more similar to the others, with which it was often associated. The Ionic had the volutes turned out angularwise, so as to present a similar face in each direction. The favourite 'order' of the Romans, however, was the Corinthian. It was invented in Greece, but more fully developed in Rome, where it suited the desire which existed for richness and luxuriance in architecture. Many fine examples of this style exist in Rome (as the Pantheon and the temple of Jupiter Stator) and in the provinces (as the Maison Carrée at Nîmes and the Great Temple at Baalbek), the capitals, wherever found, being designed in endless variety. The Composite order was an invention of the Romans, and is sometimes called *the Roman order*. It is a combination of the Ionic and Corinthian. All these orders were employed by the Romans, but in a manner peculiar to themselves; they combined with the Greek orders the arch. This feature, at first confined to substructures, was gradually introduced into the visible parts of the structure, and became finally an important element in the elevations. The columns were placed (fig. 1) at wide intervals, and set on pedestals to give them and the entablature a proper proportion; whilst behind the columns square piers were introduced, and from them arches were thrown which supported the wall. This was the favourite style of the Romans, and may be seen in all their important works (amphitheatres, arches, baths, &c.). They piled one order above another, marking each story with the entablature. As the style proceeded vaulting and arching became more common, especially in internal construction, but the horizontal ornamentation was never entirely abandoned. Arches of the above construction were thrown from pillar to pillar behind the entablature, but gradually the pier was omitted, and the arch openly constructed from column to column, the architrave bent round it, and the cornice continued horizontally above, as at Diocletian's palace at Spalato.

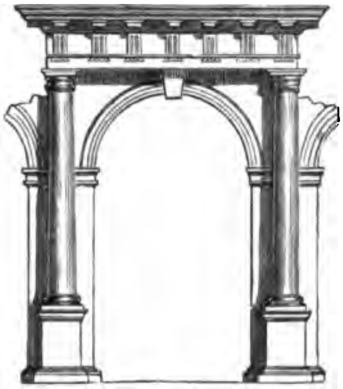


Fig. 1.—Doric Arcade.

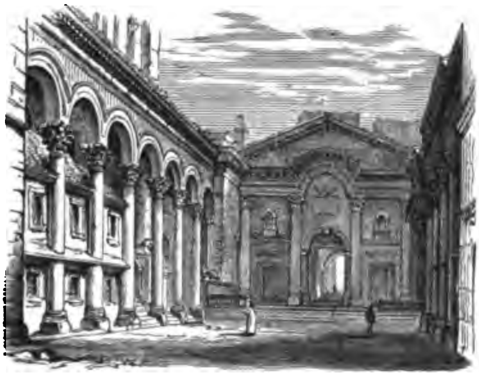


Fig. 2.—Courtyard at Spalato.

The buildings executed by the Romans are very varied in their character, but the same style was used for temples, baths, amphitheatres, triumphal arches, tombs, &c. The earliest temples of which remains now exist are those of Jupiter Stator in the Forum, Jupiter Tonans, and Mars Ultor, all of the Augustan epoch, and each with only three columns left. These are supposed to have been nearly peripteral, and it is worthy of notice that the cells are all large, and one of them has an apse.

One of the most interesting temples of Rome is the Pantheon. The portico is of the age of Augustus, but the rotunda is probably considerably later. The dome of the interior is a splendid example of the progress of Roman architecture in developing the use of the arch, and transferring the decoration from the exterior to the interior. The former is in this case totally sacrificed to the latter; but the interior has not yet been surpassed for boldness of construction or simplicity and sublimity of effect (see **PANTHEON**). Other examples of circular temples, on a small scale, are found at Tivoli and in Rome, both dedicated to Vesta.

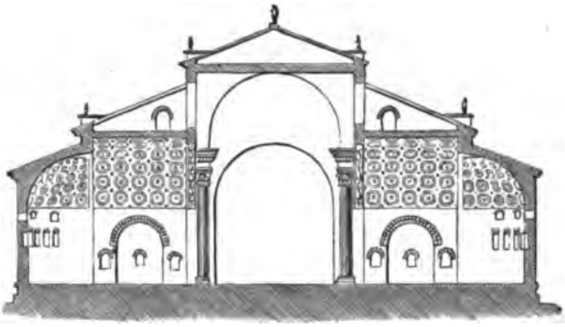


Fig. 3.—Transverse Section of Basilica of Maxentius.

The greatest works of the Romans, however, were not their temples. The Basilicas (q.v.), Amphitheatres (q.v.), and Baths (q.v.) are far more numerous and more stupendous as works of art, and all show how well the Romans had succeeded in producing an internal architecture, which at a later period became so useful as a model for Christian buildings. The Basilica of Trajan is a type of the Christian wooden-roofed churches; while that of Maxentius (fig. 3), with its great intersecting vaults, and its vaulted aisles and buttresses, contains the germs of the greatest Christian cathedrals. The Roman amphitheatres have never been surpassed for size and grandeur, or for suitability to their purpose. And of the baths sufficient remains still exist, although much decayed, from the perishable nature of the brick and stucco employed in their construction, to prove that the scarcely credible descriptions of contemporaries were surpassed by the grandeur of the buildings themselves. Other varied public works are their many aqueducts and bridges, triumphal arches, pillars of victory, and tombs. See AQUEDUCT, and ARCH (TRIUMPHAL). Of the tombs of the Romans the earliest and best specimen is that of Cæcilia Metella (wife of Crassus) on the Appian Way (fig. 4). It consists (like most Roman tombs) of a round drum placed on a square basement, and was probably surmounted by a conical roof. The tomb of Augustus was similar, on a very large scale, and the sloping roof was broken into terraces planted with trees. That of Adrian (now the castle of St Angelo in Rome) is another enormous example. The tombs were generally ranged along the ways leading to the gates of cities.

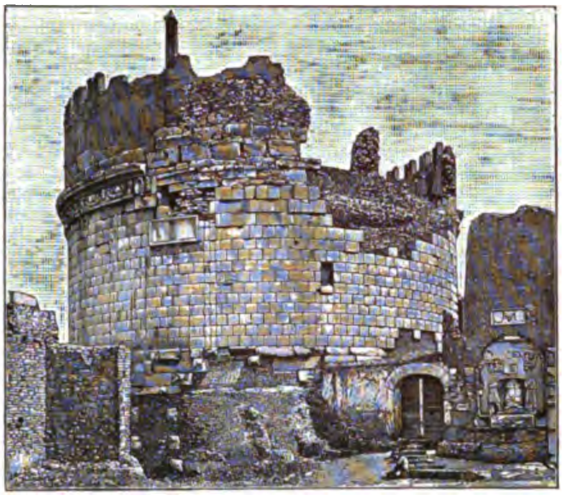


Fig. 4.—Tomb of Cæcilia Metella.

The later tombs of Rome are well worthy of study, as they contain many specimens of the transition towards the Christian style. They are generally vaulted, frequently with domes, as, for instance, the tombs of St Helena and Sta Costanza. Fergusson also places the so-called 'Temple of Minerva Medica' (fig. 5) amongst the tombs. It is a beautifully arranged building with ten sides, all containing deep niches (except the side with the door), surmounted by a clerestory, with ten well-proportioned windows. The vault is polygonal inside and outside; and the pendentives, ribs, buttresses, &c., which played so important a part in the Christian architecture both of the East and West, are distinctly used in its construction.

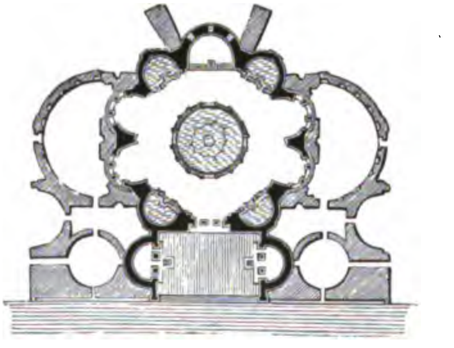


Fig. 5.—Plan of the Temple of Minerva Medica at Rome.

Of the domestic architecture of the Romans we have many wonderfully preserved specimens in Herculaneum and Pompeii, showing both the arrangements and decorations of the dwellings of all classes. Of the great palaces and villas, however, none remain except the palace of Diocletian, at Spalato, in Dalmatia—an important building, which shows many steps in the progress of the style.

See, besides the Handbooks of architecture, R. Adam, *Ruins of the Palace of Diocletian* (1764); Taylor and Cressy, *Architectural Antiquities of Rome* (1821; new ed. 1874); Freeman, *Historical and Architectural Sketches* (1876); T. G. Jackson, *Dalmatia, the Quarnero, and Istria* (3 vols. 1887).

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Roman Catholic Church. Cardinal Bellarmine, in his treatise *De Eccl. milit.*, chap 2, defines the 'church militant' as follows: 'An assembly of men united by the profession of the same Christian faith, and by the communion of the same sacraments, under the rule of legitimate pastors, and especially of the one vicar of Christ on earth, the Roman pontiff.' It is evident that this is really a definition of the Roman Catholic Church. The truth is that the Roman Catholic Church claims exclusive right to the title of Church of Christ on earth, and declares that 'outside of her fold there is no salvation.' This claim of the Church of Rome to be the exclusive means of salvation has been much misunderstood, and calls for some words of explanation.

As we intend to remove a misconception, we explain first what the claim does not mean. It does not mean that none but Roman Catholics are in the way of salvation. This is sufficiently clear from the Encyclical letters ('Quanto conficiamur') of Pope Pius IX., dated August 10, 1863. 'It is well known,' writes His Holiness, 'that those who labour under an invincible ignorance concerning our most holy religion, and who at the same time sedulously observing the natural law and the precepts thereof, which are inscribed by God on the hearts of all, are ready to obey God, can, the virtue of divine light and grace working within them, attain to eternal life.' It is not then the teaching of the Roman Church that none but Roman Catholics are saved. The sense of the axiom 'outside the Church of Rome there is no salvation,' as understood by Roman Catholic theologians, is that, whereas Christ came on earth to establish a church which was to be the divinely appointed means for the salvation of all men, the Roman Catholic Church is that church. Further light may be cast on the sense of this axiom by considering the distinction made by Roman Catholic theologians between the body of the church and the soul of the church. By the body of the church they understand the church considered as a visible and external society. By the soul of the church they understand the supernatural life of the members of the church—that is to say, sanctifying grace. Whoever, then, is in the state of grace belongs to the soul of the church. Whoever is not in the state of grace, even though he belong to the visible and external organisation or body of the church, does not belong to the soul of the church. Now the axiom 'outside the church there is no salvation' has reference primarily to the soul of the church. Thus, then, according to Roman Catholic doctrine, the non-Catholic who dies in the state of grace is saved. The Catholic who dies out of the state of grace is lost.

In the symbol commonly known as the Nicene Creed, faith is expressed in 'one, holy, Catholic, and Apostolic Church.' Christian antiquity then regarded unity, sanctity, catholicity, and apostolicity as properties of the true church. The Church of Rome claims to possess these properties, and to possess them manifestly, and in consequence claims to be clearly recognisable as the true church of Christ.—The Church of Rome claims to be *one*, with the completest and most perfect unity, with unity of doctrine, unity of liturgy, and unity of government. (1) With unity of doctrine. Roman Catholics all the world over have precisely the same faith: the learned, indeed, may have a larger acquaintance with the doctrines of faith than the illiterate; but there is nothing believed by the most learned theologian which is not believed, at least implicitly, by the most simple member of the faithful. Every Roman Catholic says, 'I believe whatever the holy Catholic Church proposes for my belief.' (2) With unity of liturgy. In every part of the world the Roman Catholic Church offers the same unbloody sacrifice of the mass, everywhere administers the same sacraments, everywhere observes the same great festival days, &c. (3) With unity of government. Roman Catholics, whether living under monarchical or republican governments, whether united to each other or divided from each other by their various national interests, are everywhere in subjection to their pastors and bishops, and above all to the Holy See. Indeed, it has perhaps never been denied that with respect to unity the Roman Catholic Church excels all other churches.—The Roman Catholic Church claims to possess visibly the second property of the true church—viz. *sanctity*. She claims to be holy (1) by reason of the holy doctrines which she teaches. Thus, she insists upon the great truth of moral responsibility. She declares that, though man's freedom of will was impaired by the Fall, it was not destroyed; that freedom of will remains, and that no adult can be saved without the due exercise of it. She proclaims that 'faith without works is dead.' She calls upon her children to confront their evil passions with the weapons of fasting and mortification in their hands; holds in high honour the 'life of counsels,' the life of voluntary poverty, chastity, and obedience; and declares that such was the life of the Lord and of the precursor of the Lord. (2) By reason of the means of holiness which she provides. Prominent amongst these a Roman Catholic would place the sacrament of penance. (3) By reason of the fruit of holiness which she produces. Professing that she has existed from the first, the Roman Catholic Church claims as her own all the saints of past times. She declares that her power of producing saints is strong to this day, and points to a St Francis Xavier, a St Charles Borromeo, a St Philip Neri, a St Francis de Sales, a St Vincent de Paul, and many other saints of more recent times. And whoever is acquainted with the rigorous inquiry which precedes the process of canonisation, whatever he may think of the faith of those canonised by Rome, will admit that the saints of the Roman Church were men of even heroic virtue.—The Roman Catholic Church claims to visibly possess the third property of the true church—viz. *catholicity*. She claims to be Catholic *de jure*, inasmuch as she was commissioned to 'teach all nations;' and also *de facto*, and this in three ways. (1) With respect to persons. This means that Roman Catholics constitute by far the most numerous body of Christians. (2) With respect to place. This means that the Roman Catholic religion is more or less diffused wherever Christianity prevails. (3) With respect to time. This means that she has existed visibly since the days of the apostles, and that she will exist visibly till the end. The claim of continued existence from the first really merges into the claim of apostolicity, which we shall next explain. Her belief in her continuance of existence till the end she bases on Christ's promise of constant assistance, which she declares was made to herself.—Finally, the Church of Rome claims to possess visibly the fourth property of the true church—*apostolicity*. She claims to be apostolic (1) as founded by Christ through the apostles, and because her pastors descend from the apostles by a succession which has never been broken. Under this head we may remark that, while many Protestant writers have denied that St Peter the apostle ever resided in Rome, on the other hand many well-known Protestant authorities, such as Barrow, Cave, Chamier, Vossius, Baratier, Bishop Pearson, and Whiston, have freely conceded this to the Catholics. Whiston states that the fact of St Peter's residence at Rome 'is so clear in Christian antiquity that it is a shame for any Protestant to confess that any Protestant ever denied it.' Bishop Pearson declares that 'it is wonderful that those can be found who deny that Peter ever was at Rome.' Baratier is still more emphatic: 'All the ancients,' he writes, 'and the great majority of the moderns have undertaken to derive the succession of the bishops of Rome from the apostle Peter. So great in this matter has been the agreement of all that in truth it ought to be deemed a miracle that certain persons born in our day have presumed to deny a fact so manifest.' Besides claiming connection with the apostles, by a line of pastors descending from them in uninterrupted succession, the Church of Rome claims to be apostolical (2) by reason of her doctrines. She denies that she has ever surrendered any doctrine taught by the apostles, and she denies that she has ever professed any doctrine which is not contained in divine apostolical tradition. Here it must be remembered that, while the Church of Rome accepts the Word of God alone and exclusively as the Rule of Faith, besides the Sacred Scriptures or written Word of God it admits an unwritten Word of God, which possesses an authority equal to that of the written Word. By the unwritten Word of God Roman Catholics understand a body of truths delivered by Christ to the apostles, and by the apostles to their successors, and which were not in the first instance committed to writing. It is certainly worthy of note that Christ did not write, but preach; that he did not command his apostles to write, but to preach; that only five out of the twelve apostles—reckoning St Mathias in the place of Judas—are recorded to have written anything at all; that three out of these five—St Peter, St James, and St Jude—have left us nothing more than brief epistles, written under particular circumstances, and for special reasons; that more than half of the New Testament was written by inspired men who were not among the apostles to whom the commission was addressed by our Saviour. The church is the depositary, guardian, and living and infallible interpreter of both the written and the unwritten Word of God. It may be remarked, in passing, that there would seem to be some analogy between the Roman Catholic rule of faith and the civil constitution of England. According to Judge Blackstone's Commentary, the municipal laws of England are divided into *lex non scripta*, the unwritten or common law, and the *lex scripta*, or statute law; and the common law is the 'first ground and chief corner-stone of the laws of England.' If the question arises as to how these customs or maxims are to be known, and by whom their validity is to be determined, Blackstone decides that the question must be settled by the judges in the several courts of justice, for these judges are 'the depositaries of the law, the living oracles, who must decide in all cases of doubt.'

The Church of Rome teaches that no addition has ever been made to the deposit of faith left by the apostles to the church, and that no objective increase of revelation is to be expected. She does not deny that divine revelations have been made to individuals since the days of the apostles, but she holds that such revelations do not increase the deposit of Christian revelation, and do not constitute an article of Catholic faith to be professed by all the faithful. The faithful are not bound to accept revelations made to private persons, even though the church should express approval of these revelations; for it is understood that the church does not intend by her approval to guarantee their genuineness. The approval of the church amounts to no more than a declaration that there is nothing in the supposed revelations at variance with sound faith and morality. But though the entire deposit of faith was received by the church from the apostles, it does not follow that all the truths contained in this deposit were revealed *explicitly*, and have been at all times *explicitly* taught by the church. There has, indeed, never been any difference with respect to the *formal* object, as it is called, or motive of faith. Whatever truth has been believed has always been accepted on the authority of God who revealed it. But with respect to the *material* object of faith—i.e. the truths of revelation—there has been this difference, that, while some have been from the first explicitly believed, others were at one time believed implicitly only. The distinct proposition and promulgation of these latter doctrines belongs to the *magisterium*, or teaching office, which the church exercises under the guidance of the Holy Spirit.

The church fulfils this teaching office in many ways: (1) By indicating in detail the various truths contained in some complex article of explicit faith. Thus, it was always expressly believed by the church that our Saviour was a true and perfect man. But if our Saviour was truly man it follows that he possessed a human body, a rational soul, a human will, and a human energy. And these various consequences the church distinctly proposed for explicit belief, on the emergence of the Gnostic, Apollinarian, Monothelite, and other heresies at variance with these consequences. Or, to take an instance from Roman Catholic theology, the plenitude of the primacy of the Bishop of Rome has always been a principle of faith explicitly believed. But, as occasion and circumstances required, the church has proposed for explicit faith one or other of the prerogatives involved in this primacy. (2) By enunciating in particular truths already comprehended in some universal proposition of explicit faith. Thus, while the church had already taught that grace was necessary for all salutary actions and states, on occasion of the Semipelagian heresy it distinctly decreed that grace was necessary for entrance into the way of salvation and for perseverance in the same. (3) By proposing distinctly and articulately what was already believed, though with less distinctness. Thus, according to Roman Catholics, it has always been the belief of the church that it was due to the honour of the Son of God that His mother should be free from the least stain of sin. The proclamation, then, in recent years of the doctrine of the Immaculate Conception was no more than the distinct and articulate declaration of a truth which had been an object of implicit belief from the first. (4) By expressly declaring some truths which had been already indicated by the practice of the church. Thus, the church, by not rebaptising those converted to her fold from heresy, had practically manifested her belief in the validity of baptism conferred by heretics; but when the validity of heretical baptism was impugned she expressly declared that where the proper matter, form, and intention were employed such baptism was valid. Thus, then, according to the Roman Catholic teaching, there may be truths objectively contained in the deposit of revelation, or the remote rule of faith, which have not been always clearly proposed and promulgated by the proximate rule of faith—i.e. the *magisterium* of the church. Until they are thus proposed and promulgated they may be called in question without loss of faith; for the unity of faith is maintained so long as there is due subjection to the *magisterium* of the church. In the history of many doctrines we may distinguish three distinct phases: (1) In the first instance, they are implicitly contained in revelation indeed, but not yet proposed by the church; and by the faithful they are not explicitly believed, neither are they called in question. (2) Then arises a controversy concerning these doctrines; some are for accepting, others for rejecting them. (3) Finally, the church, either by solemn judgment or by her common teaching, declares that these doctrines belong to the deposit of revelation; and thenceforward they are an object of explicit faith.

For the teaching of the Roman Catholic Church concerning the Holy See we must refer our readers to the articles POPE, INFALLIBILITY, &c. We may, however, mention here that the very name Roman Catholic is intended as an expression of the belief that there can be no true Catholicity without union with Rome. Roman Catholics assert that there can be no catholicity without unity; and they contend that the See of Rome has always been regarded as the source of unity, and that communion with Rome was regarded by the early church as the ultimate proof of orthodoxy. In support of this contention they quote many striking declarations of the Fathers and of the early councils. The name 'Roman Catholic' is not new. Cardinal Newman, writing of the 5th and 6th centuries, says: 'It is more than remarkable that Catholics of this period were denoted by the additional title of "Romans." Nor was this association of Catholicism with the See of Rome an introduction of that age' (*Essay on Development*, chap. v.).

The hierarchy of the Roman Catholic Church consists of the sovereign pontiff, who is assisted by the Sacred College of Cardinals, and by several sacred congregations, or permanent ecclesiastical committees; of the patriarchs, archbishops, and bishops; of the apostolic delegates, vicars, and prefects; and of certain abbots and prelates. The cardinals, who are the advisers and assistants of the sovereign pontiff, constitute the supreme council or senate of the church; and on the death of the pontiff they elect his successor. The College of Cardinals when complete consists of 70 members: 6 cardinal bishops, whose dioceses are the 6 'Suburban Sees' of Ostia and Velletri, Porto and Santa Rufina, Albano, Frascati, Palestrina, and Sabina, 50 cardinal priests, and 14 cardinal deacons. In January 1891 there were 64 cardinals, of whom 36 were Italian; 9 Austrian, German, or Polish; 6 French; 4 British subjects; 4 Spanish; 2 Portuguese; 1 of the United States; 1 Belgian; and 1 Swiss. The sacred congregations, about 20 in number, consist of cardinals, consultors, and officials, and carry on the central administration of the Roman Catholic Church. The following are the principal congregations. (1) The Congregation of the Council, for the interpretation and execution of the decrees of the Council of Trent, and for receiving from bishops reports on the state of their dioceses. Attached to this there is a special Congregation for the Revision of Provincial Synods. (2) The Congregation of Bishops and Regulars, for judging appeals against episcopal sentences, for the hearing of causes between bishops and regulars, and for the revision and approbation of rules of religious bodies. (3) The Congregation of Propaganda, for the propagation of the faith and the government of the church in non-Catholic countries. Attached to this there is a Congregation for Affairs of the Oriental Rite, with a commission for the revision and correction of Oriental books. (4) The Congregation of Sacred Rites, for the decision of all questions relative to the liturgy, rites, and ceremonies, and for the conduct of the processes of the beatification and canonisation of saints. (5) The Congregation of the Index, for the condemnation of writings prejudicial to faith or morality. (6) The Congregation of the Holy Office, sometimes known as the Congregation of the Inquisition, for the examination and repression of heretical doctrines. (7) The Congregation of Indulgences and Sacred Relics, for the proclamation of indulgences and the decision of questions relating to them, and for the authentication and distribution of relics. (8) The Congregation of Ecclesiastical Immunity, for maintaining ecclesiastical privileges and exemptions, as to persons, places, and things. The jurisdiction of the congregations does not cease on the death of the sovereign pontiff; nevertheless all important business is suspended during the vacancy of the Holy See.

There are 10 patriarchates, with 13 patriarchal sees—8 of the Latin rite, and 5 of Oriental rite. The greater or more ancient patriarchates are those of Alexandria, *Latin;* Antioch, with 4 patriarchal sees, *Latin, Maronite, Melchite,* and *Syriac;* Constantinople, *Latin;* and Jerusalem, *Latin.* The less are those of Babylon, *Chaldaic;* Cilicia, *Armenian;* East Indies, *Latin;* Lisbon, *Latin;* Venice, *Latin;* and West Indies, *Latin.* There are in the communion of Rome, besides the 13 patriarchal sees, 871 archiepiscopal and episcopal *residential* sees of the Latin rite, and 76 archiepiscopal and episcopal residential sees of Oriental rite. Besides the archbishops and bishops of these residential sees, there were in January 1891 308 archbishops and bishops of *titular* sees. In the British empire there are 123 Roman Catholic residential archiepiscopal and episcopal sees, 23 vicariates-apostolic, and 8 prefectures-apostolic, with a Roman Catholic population of about 10 millions. Nineteen of the 23 vicariates-apostolic in the British empire are held or administered by bishops of titular sees. Titular sees, or, as they were styled till 1882, sees *in partibus infidelium*—i.e. sees which in ancient times existed in those eastern regions which have now lost the faith and fallen into barbarism—are, for the most part, assigned to archbishops and bishops who are appointed to apostolic delegations, of which there are 7, or to vicariates-apostolic, of which there are 118, or to prefectures-apostolic, of which there are 37, or to the office of coadjutor, auxiliary, or administrator of a diocese. Delegates-apostolic and vicars-apostolic enjoy episcopal jurisdiction, and exercise episcopal powers, in countries where a hierarchy proper has never been established, or having once existed has been suppressed. When the ancient hierarchy of England came to an end in 1585 with the death of Thomas Goldwell, Bishop of St Asaph, the English Catholics were at first placed under the jurisdiction of archpriests or prefects-apostolic. But in the year 1623 Pope Gregory XV. appointed a vicar-apostolic with jurisdiction over all the Catholics of England. About sixty years later, in 1688, Pope Innocent XI. created four districts or vicariates, the London, Midland, Northern, and Western, appointing to each district its own vicar-apostolic. In 1840 Pope Gregory XVI. created eight districts or vicariates, the London, Western, Eastern, Central, Welsh, Lancashire, Yorkshire, and Northern, each district having, of course, its own vicar-apostolic. In 1850 Pope Pius IX. re-established the Roman Catholic hierarchy in England. The vicars-apostolic were all bishops of titular sees. Thus, Cardinal Wiseman, who before the restoration of the hierarchy was vicar-apostolic for the London district, was entitled while vicar-apostolic Bishop of Melipotamus. Prefects-apostolic are as a rule not bishops, but simple priests, who receive from the Holy See authority to exercise *quasi*-episcopal jurisdiction in missionary countries.

As is well known, the Latin rite prevails with few exceptions in the West, and also in some regions of the East; nevertheless various other rites are also followed within the communion of Rome. These are (1) the Greek rite, of which there are the following forms. (*a*) The Greco-Roumanian. There are 3 bishops and 1 archbishop of this rite, whose sees are situated in Austria-Hungary. The language of the liturgy is Roumanian, excepting in the parish of Scaiusiu, in the diocese of Lugos, where the language employed is the ancient Slav. (*b*) The Greco-Ruthenian. There are 8 bishops and 1 archbishop of this rite, with sees in Austria-Hungary and Russian Poland. The liturgical language is the ancient Slav. (*c*) The Greco-Bulgarian. Of this rite there is an archbishop, vicar-apostolic, for Constantinople and its neighbourhood, with 2 bishops, vicars-apostolic, for Macedonia and Thrace. The liturgical language is ancient Slav. (*d*) The Greco-Melchite. Of this rite is the Melchite patriarch of Antioch, with 4 archbishops and 9 bishops, whose sees are situated in Syria. The liturgical language is the Arabic. There are missions at Cæsarea in Cappadocia, Constantinople, and Malgara in Thrace of the pure Greek rite, which are also in communion with Rome. (2) The Syriac rite, of which there are the following forms. (*a*) The pure Syriac. Of this rite is the Syriac patriarch of Antioch, with 4 archbishops and 8 bishops, whose sees are situated in Egypt, Syria, and Turkish Armenia. The liturgical language is the ancient Syriac. (*b*) The Syro-Chaldaic. Of this rite is the patriarchate of Babylon, with 4 archiepiscopal and 7 episcopal sees situated in Kurdistan, Turkish Armenia, Mesopotamia, and Persia. The liturgical language is the ancient Chaldaic. (*c*) The Syro-Maronite. Of this rite is the Maronite patriarch of Antioch, and 7 archbishops and 2 bishops, whose sees are situated in Syria, in various other provinces of Asiatic Turkey, and in the island of Cyprus. The liturgical language is the ancient Syriac. (*d*) The Syro-Malabaric. This rite is followed in the vicariates-apostolic of Kottayam and Trichur in the East Indies. The liturgical language is the Syro-Malabaric. (3) The Armenian rite. To this rite belong the Armenian patriarchate of Cilicia, the archiepiscopal see of Lemberg in Austria-Hungary, the episcopal see of Artuin in the Russian empire, and 17 episcopal sees situated in Turkish Asia, Egypt, and Persia. The language of the liturgy is the ancient Armenian. (4) The Coptic rite. Of this rite there are two forms: (*a*) the form followed in the vicariate-apostolic situated in Egypt, where the Coptic or ancient Egyptian is the language of the liturgy; (*b*) the form observed in the vicariate-apostolic in Abyssinia, where the liturgical language is the ancient Ethiopic or Geez.

The Roman Catholic populations of the various countries of Europe are, according to *The Statesman's Year-book* (1891), as follows: Great Britain and Ireland, 5,640,891; Austria-Hungary, 25,591,000; Belgium, 6,079,798; Denmark, 2985; France, 29,201,703; German Empire, 16,785,734; Greece, about 12,000; Italy, 28,853,480; the Netherlands, 1,439,137; Portugal, 4,707,678; European Russia, 8,300,000; Spain, 17,529,860; Sweden and Norway, 1329; Switzerland, 1,190,008. For European Turkey accurate statistics are not given, but the number of Roman Catholics has been estimated at 1,000,000. Thus the total Roman Catholic population in Europe amounts to 146,335,603. According to Werner's *Atlas des Missions Catholiques* (Freiburg, 1886), the Roman Catholic populations of the other continents are as follows: Asia, 9,234,000; Africa, 2,656,000; America, 51,033,790; Australia and Polynesia, 672,000. Thus the total Roman Catholic population of the world amounts to nearly 210,000,000.

See Cardinal Manning's *Temporal Mission of the Holy Ghost;* Newman's *Essay on Development of Doctrine;* Wiseman's *Lectures on the Catholic Church;* Ward's *Essays on the Church's Doctrinal Authority;* Murphy's *Chair of Peter* (1888); Leibnitz's *System of Theology*, translated by Russell (1850); *Catholic Directory* (Burns and Oates); *Missiones Catholicæ* (Propaganda Press, Rome). The organisation and statistics of the Catholic Church will be found in the relevant paragraphs on the several Catholic countries. The more important Catholic doctrines and institutions are all dealt with in separate articles in this work; as are also the saints and thinkers. See especially the articles:

Absolution.
Altar.
Apostolic Succession.
Aquinas.
Archpriest.
Atonement.
Baptism.
Benedictines.
Bible.
Bishop.
Canonisation.
Canon Law.
Cardinal.
Casuistry.
Catechism.
Celibacy.
Church.
Confession.
Councils.
Creeds.
Dominicans.
Douay.
Excommunication.
Extreme Unction.
Fasting.
Festivals.
Franciscans.
Gallican Church.
Greek Church.
Hell.
Hymn.
Image Worship.
Immaculate Conception.
Indulgence.
Infallibility.
Inquisition.
Jansenism.
Jesuits.
Liturgy.
Lord's Supper.
Martyrs.
Mary.
Mass.
Monachism.
Newman.
Orders.
Penance.
Peter.
Pope.
Prayer.
Priest.
Purgatory.
Relics.
Reservation.
Rosary.
Sacraments.
Sacrifice.
Saints.
Supererogation.
Transubstantiation.
Trent.
Vulgate.

Roman Catholic Emancipation. See CATHOLIC EMANCIPATION.

Romance Languages, a general name for those modern languages that are the immediate descendants of the language of ancient Rome. In those parts of the empire in which the Roman dominion and civil institutions had been most completely established the native languages were speedily and completely supplanted by that of the conquerors—the Latin. This was the case in Italy itself, in the Spanish peninsula, in Gaul or France, including parts of Switzerland, and in Dacia. When the Roman empire was broken up by the irruptions of the northern nations (in the 5th and 6th centuries) the intruding tribes stood to the Romanised inhabitants in the relation of a ruling caste to a subject population. The dominant Germans continued, where established, for several centuries to use their native tongue among themselves; but from the first they seem to have acknowledged the supremacy of the Latin for civil and ecclesiastical purposes, and at last the language of the rulers was merged in that of their subjects; not, however, without leaving decided traces of the struggle—traces chiefly visible in the intrusion of numerous German words, and in the mutilation of the grammatical forms or inflections of the ancient Latin, and the substitution therefor of prepositions and auxiliary verbs. It is also to be borne in mind that the language which underwent this change was not the classical Latin of literature, but a popular Roman language (*lingua Romana rustica*) which had been used by the side of the classical, and differed from it—not to the extent of being radically and grammatically another tongue—but chiefly by slovenly pronunciation, the neglect or misuse of grammatical forms, and the use of 'low' and unusual words and idioms. As distinguished from the old *lingua Latina*, the language of the church, the school, and the law, this newly-formed language of ordinary intercourse, in its various dialects, was known from about the 8th century as the *lingua Romana;* and from this name, through the adverb *Romanicé*, came the term Romance, applied both to the language and to the popular poetry written in it, more especially to the dialect and poems of the troubadours. The Romance languages recognised by Diez are six—Italian, Spanish, Portuguese, Provençal, French, and Roumanian. Ascoli and newer investigators treat the Romansch of the Grisons as a seventh sister-tongue; and each of these have more or less numerous dialects.

According to the theory of Raynouard, the new language that sprang out of the corruption of the Latin was at first essentially the same over all the countries in which Latin had been spoken, and is preserved to us in a pure state in the Provençal, or language of the troubadours; and it was from this as a common ground, and not from the original Latin, that the several Neo-Latin tongues diverged into the different forms which they now present. This theory is not accepted by recent inquirers; its groundlessness was demonstrated by Cornewall Lewis. It is beyond doubt that the several daughters of the mother Latin had their characteristic differences from the very first, as, indeed, was inevitable. The original Latin spoken in the several provinces of the Roman empire must have had very different degrees of purity, and the corruptions in one region must have differed from those in another according to the nature of the superseded tongues. To these differences in the fundamental Latin must be added those of the superadded German element, consisting chiefly in the variety of dialects spoken by the invading nations and the different proportions of the conquering population to the conquered. French, as was to be expected, is richer in German words than any other member of the family, having 450 not found in the others. Italian is next to French in this respect, but on the whole is nearest to the mother Latin. Spanish and Portuguese have considerable Arabic elements; and Roumanian was much modified by Slavic. The Romance tongues further differ from the common parent in simplifying or dropping the inflections of nouns, substituting for these the use of prepositions, and simplifying the verbal forms by a free use of auxiliary verbs. The six great Romance tongues and their literatures are treated in the articles on Italy, Spain, Portugal, Provençal, France, and Roumania, to which may be added the Romansch.

See Cornewall Lewis, *On the Origin and Formation of the Romance Languages* (2d ed. 1862); Diez, *Grammatik der Romanischen Sprachen* (1836–38; 4th ed. 1877), and his dictionary, the great *Wörterbuch* (1853; Eng. trans. 1864); Paul Meyer, *Rapport sur le Progrès de la Philologie Romane* (1874); works on Romance philology by Körting (1884), Gröber (1886), and Neumann (1886); the magazine 'Romanische Studien' (1871 *et seq.*), and that of Gaston Paris, 'Romania' (1873 *et seq.*).

Romances. Romance has long since lost its original signification in every country except Spain, where it is still occasionally used in speaking of the vernacular, as it was in the middle ages when Latin was the language of the lettered classes and of documents and writings of all kinds. But even there its commoner application is, as elsewhere, not to a language, but to a form of composition. In English it has been almost invariably applied to a certain sort of prose fiction, and, in a secondary sense, to the style and tone prevailing therein. By 'the romances,' using the term specifically, we generally mean the prose fictions which, as reading became a more common accomplishment, took the place of the lays and *Chansons de gestes* (q.v.) of the minstrels and trouvères, and were in their turn replaced by the novel. Of these the most important in every way are the so-called romances of chivalry, which may be considered the legitimate descendants of the *chansons de gestes*. The chivalry romances divide naturally into three families or groups: the British (which, perhaps, would be more scientifically described as the Armorican or the Anglo-Norman), the French, and the Spanish; the first having for its centre the legend of Arthur and the Round Table; the second formed round the legend of Charlemagne and the Twelve Peers; and the third consisting mainly of Amadis of Gaul followed by a long series of sequels and imitations of one kind or another. In strict chronological order the Charlemagne cycle should stand first, for the Charlemagne legend was apparently of an earlier formation than the Arthurian; but on the other hand the materials out of which the Arthur legend shaped itself must of course have been the older, and the prose romances which either grew out of it or were grafted upon it are for the most part of an earlier date than those belonging to the Charlemagne story.

The first appearance of Arthur is in the history of Nennius, where he is presented in a quasi-historical shape, simply as the chosen leader of the Britons in twelve successful battles fought with the Saxons; but it is in the *Historia Regum Britanniæ* of Geoffrey of Monmouth (1140) that he first appears as the hero of a connected story. Geoffrey, in fact, may be fairly claimed as the founder of the Arthurian legend. Whatever his materials may have been or whatever the source from which he obtained them, he contrived to give them 'un caractère chevaleresque et courtois,' to use the words of M. Gaston Paris, which was altogether foreign to them when they came to his hands, and thus succeeded in presenting a picture of Arthur and his court which at once proved acceptable to the age in which he lived. It is this character, impressed upon the Arthur legend by Geoffrey, that led Cervantes to regard it as the fountain-head of chivalry and chivalry romance, as he does in *Don Quixote* (part 1, chap. xiii.). The story, however, as Geoffrey left it, is little more than the foundation of the structure raised by his successors a century later. Whether we accept in its entirety or in part only his account of the 'very ancient book' from Brittany which he professed to have translated, or hold that his authorities were simply Nennius, Welsh traditions, and Breton lays and tales, it is clear that his sources of information conveyed no hint of the Round Table or of the Grail, to say nothing of Lancelot and other personages who have come down to us as part and parcel of the Arthurian story. The first reference to the Round Table is in the *Brut* of Wace (1155), which is in fact an amplified metrical version of Geoffrey's history, and from the words used—'Fist Artus la roonde table, dont Breton dient mainte fable'—we are left to suppose that it was through Breton tradition that it found its way into the story. By some it has been conjectured that in the Round Table we have only an imitation of the Peers of the Charlemagne legend, but in truth the two institutions represented two totally distinct ideas. The peers were simply a fraternity, 'xii. cumpaignuns,' as the Chanson de Roland calls them, bound together by mutual affection alone, with no ulterior aim or object, and entirely uninfluenced by the sovereign. The Round Table, on the other hand, was a knightly fellowship in which the bond of union was the pursuit of chivalrous adventures and 'deeds of worship,' of which the king was the head, and by which he was 'upborne' and the quiet and rest of his realm insured. The distinction deserves notice, for it is characteristic of the difference between the two legends and the romances that represent them. The Arthurian stories were knightly and courtly, their authors were courtiers, sometimes knights—if we may trust the statements of early editors, they were written to order at the instance of magnates, among whom Henry II. and Henry III. of England are named, and at any rate were obviously addressed to what would now be called the aristocratic section of society. With the Carlovingian it was very different; the *chansons de gestes* from which they were derived were made for and sung to no one class in particular, and it is manifest that the selection for translation into prose was always governed by considerations of popular interest. Hence the phenomenon noticed by more than one observer, that the Arthurian stories have never become in the strict sense of the word popular in any age or country, while the Carlovingian have enjoyed a wide-spread popularity, and in some instances continued to hold their own as popular stories down to the present day. Mr J. A. Symonds observes that in Italy the Arthurian stories, though relished by the cultured classes, never took the fancy of the people at large in the same way as the Carlovingian; and in Spain the romances and ballads that treat of Arthur are few and meagre, while the Charlemagne literature is extensive and rich, and the *History of Charlemagne and the Twelve Peers* is still a current chap-book in high request. A more obscure question is how the Holy Grail came to be linked to the Arthurian story. There can be no doubt that Celtic tradition and mythology present sufficient analogies to justify a theory that the idea of the Grail is a purely Celtic one which may be traced back to pagan times. But none of these analogues, not Fionn's healing cup or the mystic basin which figures in *Peredur*, can be in any true sense called a Grail. The essence of the Arthurian Grail lies in its character of a Christian relic, and the very name suggests that the conception as it is there presented to us was an Anglo-Norman one. It is very possible, no doubt, that Celtic tradition may have had a share in shaping the conception, but that is all that can be safely said. Some little light, perhaps, is thrown on the question by the curious coincidence between the book presented in a vision in the year 717, which Robert de Borron (*circa* 1190) sets up as the prime authority for his Sainct Greal, and the vision in the same year in which the Grail itself was seen by a British hermit, as recorded by Helinand in 1204. The return of the first Crusaders stimulated that enthusiasm for relics of the Passion of which we have a proof in the Sacro Catino at Genoa and its rivals. A very natural consequence would be an eagerness to discover the hiding-place of the true catino, and this, when the Round Table idea had been once imported into the Arthurian story, would furnish the 'deed of worship' *par excellence* necessary to its constitution, while an equally natural consequence would be that the poets in working out the idea would avail themselves of any floating traditions of mystic vessels endowed with miraculous properties which could be pressed into their service. Arthur himself has, no doubt, been treated in the same fashion. Hero-worship is almost always accompanied by annexation. The Charlemagne legend is largely made up of fragments that properly belong to Charles Martel, Pepin, and Charles the Bald. Even in the comparatively modern case of the Cid, one of the most famous exploits, the unseating of the

French ambassador, is in reality the property of the 15th-century Conde de Cifuentes. It would be strange if so remote a figure as Arthur's did not show signs of some such process; but even if we find there, as Professor Rhys holds, traces of the culture hero, or of the solar myth, the question of his personality cannot be said to be thereby affected. It would be almost as unreasonable to treat him as a purely mythical being on such grounds, as to deny Sheridan's existence because jokes attributed to him are to be found in early editions of Joe Miller. There is very little certainty connected with the construction of the Arthurian story. It seems plain that the History of the Grail, which properly should precede the Quest, was in reality a later composition; and the respective shares of Chretien de Troyes and Robert de Borron in the Grail, Perceval, and Lancelot are pretty clearly defined. But in most other respects the Arthurian cycle deserves the title M. Gaston Paris applies to it of 'dédale inextricable.' In no case, as Mr Alfred Nutt says, do we possess a primary form; all the versions that have come down to us presuppose something earlier; all is uncertainty, the order in which the component parts were produced, the sources from which they were derived, the authors to whom they are attributable, the relationships of the various versions and forms one to another; and research seems ever to reveal new nebulæ and discover fresh clusters of difficulties. Even on the question as to whether the primary form was in verse, as analogy would lead us to expect, we are for the most part left to conjecture. That Breton popular poetry may have contained the germs of Tristram, Perceval, and Lancelot is no doubt a probability; but of one thing at least we may be certain, that veritable creations like the Lancelot of the Arthur story could have had no place in the simple naïve *lais* of which we have examples in the translated specimens of Marie de France. The stones may have come from a Celtic quarry, but the building was Anglo-Norman.

It was inevitable that the Arthur stories proper should be followed by romances claiming a supplementary or an introductory character, such as *Meliadus, Guiron le Courtois, Artus de Bretagne,* and *Perceforest,* but it would be an injustice to treat these, as Dunlop has done, as though they were legitimate members of the Arthurian cycle, nor have they been admitted into it by the compilers or arrangers who have now and then attempted to present it in a consecutive shape. *Facile princeps* of these is our own Sir Thomas Malory, whose work is, as Dr Sommer says in his masterly edition, 'by far the best guide to the Arthur romances in their entirety.' Malory's judgment may not be, perhaps, invariably impeccable. He has not always chosen the best or most poetical form, and he has left unculled many beauties of the old MSS. But this may not have been so much his fault as that of the materials with which he had to content himself. Of his general good taste and literary skill there can be as little question as of his English which has made his book one of the classics of his language. Malory, furthermore, as the exhaustive researches of Dr Sommer show, is the sole authority for portions of the series, in particular the story of Gareth in the seventh book. See ARTHUR, GRAIL.

In the romances of the Charlemagne cycle we stand on much firmer ground. It is true that we know even less of the authors than in the case of the Arthur stories, but on the other hand the whole process of production lies plain to view. The starting-point of the legend is undoubtedly the disaster of Roncesvalles, and the *Song of Roland*—not, of course, the *Chanson de Roland* that has come down to us, but some older form, the existence and nature of which are matters of inference—may be taken as the foundation of the whole Charlemagne cycle of romance (see ROLAND). Of this, apparently, we have a prose version at the end of the Latin history of Charlemagne, which pretends to be the work of his contemporary the Archbishop Turpin. Nothing was farther from the intention of the writers than to produce a romance; but among the romances, or at the head of them, their work must be placed. About its intention there can be no mistake. By Charlemagne's example it points out the advantages here and hereafter of serving the church liberally and zealously, endowing holy shrines, encouraging pilgrimages, converting the heathen or exterminating them when unconvertible. It records a military pilgrimage to Compostella made by Charles at the call of St James, and is plainly the work of different hands. M. Gaston Paris believes the first five chapters to have been written by a monk of Compostella about 1050; but it is not very obvious why a Spaniard who had his own national legend of Compostella should have gone out of his way to make a patron of a foreigner and an invader. The remainder, he thinks, was written by a monk of Vienne between 1109 and 1119. The book was soon translated into French, and became the chief source of the story of Roland and Roncesvalles, for which it was believed to be the prime authority until the discovery of the *chanson* proved the existence of a common ancestor. The influence of the latter was mainly through the *chansons de gestes* of which it was in most cases the model. Of these the number is large. M. Leon Gautier's list enumerates above a hundred belonging to the Charlemagne cycle, and this of course only represents survivors. Only a few, however, gave birth to prose romances. The Roland had been forestalled by the Turpin history, and of the others the majority were in interest too local, not sufficiently popular, or for other reasons unsuitable for prose. The story of Ogier le Danois (who possibly had nothing to do with Denmark, but was merely warden of the Ardenne-mark) was too famous to be left in the verse of Adenes le Roy; the traditions of the struggles between the sovereign and his vassals in Aquitaine, not so much in Charlemagne's time as in Pepin's, lent an interest to Renaud de Montauban, the Rinaldo of Italian poetry, but best known as the hero of the *Four Sons of Aymon* (q.v.), a romance that has probably never been out of print since the introduction of printing; and similar reasons, more or less strong, influenced the selection of *Doon de Mayence, Maugist d'Aygremont, Guerin de Montglave, Mille et Amys, Jourdan de Blaves, Galien Rhetoré,* and divers others. One of the most notable, independently of its connection with Don Quixote, is *Fierabras*. In the 15th century it was translated into prose by one Jean Baignon of Lausanne, who prefixed to it the early account of Charlemagne by Vincent de Beauvais, and added the concluding chapters of Turpin with the Roncesvalles story, the whole forming a kind of consecutive Charlemagne romance resembling the Arthur compilations. In this shape, and under the title of *La Conqueste du grant roy Charlemaigne des Espaignes*, it achieved extraordinary popularity, became a regular chap-book, was translated into Spanish by Nicolas de Piamonte, whose version supplied the balsam of which Don Quixote made trial, and from Spanish into Portuguese about the middle of the 18th century; when it was supplemented by an entirely new Charlemagne romance by the translator, a curious proof of the vitality of the legend.

From the lays of the minstrels of the same period there came also many independent prose romances not necessarily connected with any particular cycle: *Valentine and Orson*, which, however, is sometimes linked with the Charlemagne cycle; *Cleomades*, or *Clamades*, where Cervantes found the magic wooden horse, which by a lapse of memory he assigns to *Pierre of Provence and Magalona*, another romance of the same kind; *Partenopeus of Blois; Melusina; The Knight of the Swan*, in some respects the most interesting of all, and curious as an illustration of the growth of a romance. Originally a folklore legend of Brabant, the source of *Lohengrin*, the story was turned into a poem and incorporated in the series on Godfrey de Bouillon, who was made a descendant of the Knight of the Swan; then it was annexed by Vincent de Beauvais for his *Speculum Historiale*, from which it passed into the shape of a romance, and was translated into English at the instigation of Edward, Duke of Buckingham, who claimed to be one of the knight's descendants.

Cervantes correctly claims *Amadis de Gaula* as the founder of Spanish chivalry romance, though he may have been in error as to its being the first work of the kind printed in Spain; the Valencian *Tirant lo Blanch* must have preceded it. It was long held to be of Portuguese origin on the bare statement of Gomez de Azurara that it was entirely the work of Vasco de Lobeira; but there is ample proof that an Amadis was extant in Spain at least as early as the middle of the 14th century, very probably as early as 1300, but at any rate before Lobeira was born. Southey, in whose time the evidence was not forthcoming, may be excused for asserting the Portuguese origin of the romance; but it is strange to find M. Gaston Paris still describing it as 'portugais puis espagnol aux XV^e et XVI^e siècles.' Whether this Amadis was in verse or in prose is uncertain; we only know from one witness that it was in three books, and Garci de Montalvo, who is responsible for the existing Amadis, merely claims to have corrected three books, which previous editors and scribes had left in a corrupt state, and to have added a fourth. Nor is it a certainty that it was of purely Spanish origin. The influence of the Arthurian romances is manifest, but what is far more suspicious is the absence of Spanish colour and indications of Spanish parentage; the names are almost all akin to those of the Arthur stories, the fay Urganda is a distinctly Celtic creation, and the scene throughout is laid on Arthurian ground, Wales, England, Brittany, or Normandy, a choice not easily explained in a romancer whose business was to interest Spanish hearers or readers. But whether or not the original may have been some northern French story, it certainly was not, as has been sometimes suggested, *Amadas et Ydoine* in which there is no more resemblance to *Amadis* than there is in *Aucassin and Nicolette*.

The earliest known edition of the *Amadis* (q.v.) is of 1508, but this cannot be the first; it is too near the date of other romances obviously inspired by it and born of its success, and it is evident that it was finished shortly after the fall of Granada in 1492. The date is significant in its bearing on the curious phenomenon of the sudden outburst of a chivalry romance literature in Spain, just as the middle ages were drawing to an end and other nations were beginning to put away chivalry among the *bric-à-brac* of bygone days. But in Spain it marked the close of a campaign of seven centuries and the end of a national life of sustained excitement. Under the new order of things, the triple despotism of crown, church, and Inquisition, the nobles and minor nobility were left with a superabundance of leisure on their hands, a condition, as every seaside librarian knows, always favourable to the circulation of fiction, so that Montalvo could not have chosen a better time for his venture. But it would be unjust in the extreme to deny to the merits of the *Amadis* their share in the creation of Spanish chivalry romance. In almost every respect, story, incidents, characters, and human interest, it will bear comparison with the best of its predecessors, and as a romance of chivalry, pure and simple, it has no equal. In this lay the secret of its success. For Spain chivalry romance had a reality unknown elsewhere. *Amadis* came to a generation which had seen round Ferdinand and Isabella knights who could match any of Arthur's or Charlemagne's in exploits. Coming at such a time it is no wonder that *Amadis* was followed by a cry for more, and that more was promptly supplied. But *Esplandian*, *Florisando*, *Lisuarte*, *Amadis of Greece* were of a very different vintage. It was by Feliciano de Silva, the object of Cervantes' special detestation, that the work of continuation was chiefly carried on. He was a clever man, with a facile pen, and if not imagination, at least invention in abundance, but his greatest gift was his intuitive perception of the tastes of his readers. He perceived that it was not so much recreation as excitement they wanted, and that so far from objecting to rant, bombast, and extravagance, the more they got the better they were pleased. He seems to have been the first author who reduced writing nonsense to a system, and also the first who made a handsome fortune by his writings. The professed continuations formed, however, only a small portion of the romances, more or less in imitation of the *Amadis*, and infected by the style of Feliciano de Silva, the *Felixmartes*, *Belianises*, *Olivartes*, which continued to flow from the press until the long line ended with *Policisne de Boecia*, two years before *Don Quixote* was sent to the press.

With *Don Quixote*, fittingly, the history of romances as a branch of fiction comes to a close. There are, indeed, two other groups that claim the title, the Pastorals, and those sometimes called the Heroic, an epithet better deserved by the readers who were bold enough to face entertainment in such a formidable shape. But to these quite as much space as their merits entitle them to has been already given (see Novels).

See Paulin Paris, *Les Romans du Table Ronde* (1868–77); Gaston Paris, *La Littérature Française au Moyen Age* (2d ed. 1890), *Histoire poetique de Charlemagne* (1865), *De Psuedo Turpino: Hist. Caroli Magni* (1865); Oskar Sommer, *Morte Darthur* (3 vols. 1889); A. Nutt, *Studies on the Legend of the Holy Grail* (1888); Professor Rhys, *The Arthurian Legend* (1891); G. Paris and J. Ulrich, *Merlin, Roman en Prose d'après le MS. appt. à M. Huth* (Société des Anciens Textes Françaises, 1886); W. F. Skene, *The Four Ancient Books of Wales* (1868); J. S. Stuart Glennie, *Arthurian Localities* (1868); Birch-Hirschfeld, *Die Sage vom Gral* (1877); Herz, *Sage vom Parzival und dem Gral* (1882); E. Martin, *Zur Gral Sage* (1880); H. Zimmer (on the Breton sources of the Arthur Legend—*Göttingische Gelehrte Anzeigen*, Oct. 1890); L. Gautier, *Les Epopées Françaises* (1878–82); Melzi, *Bibliografia dei Romanzi Italiani* (1865); Gayangos, *Libros de Caballerias* (Bib de Autores Españoles, vol. xi.); Mily a Fontanals, *Poesia heroico-popular Castellana* (1874); *Turpini Historia Caroli Magni, Texte Revue par F. Castets* (1880); Ward, Catal. of Romances in the Dept. of MSS., British Museum (1883); Quaritch, Catal. of Romances of Chivalry (1882); Early English Text Society's publications; *Romania*, Papers by Gaston Paris and others.

Roman Cement. See Cements.

Romancero. See Spain (Literature).

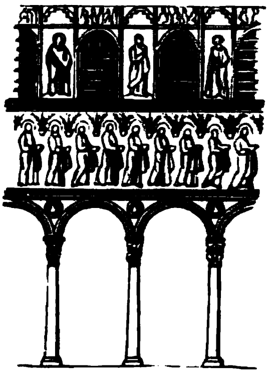
Roman de Rou. See Wace.

Roman Empire, Holy (more fully in German, *Heiliges Römisches Reich Deutscher Nation*), the official denomination of the German empire from 962 down to 1806, when Francis II. of Hapsburg resigned the imperial title. The Western Roman empire came to an end in 476 A.D.; Charlemagne sought to reconstitute it when he was crowned emperor at Rome by Pope Leo III. in 800. But the reconstituted empire fell again into fragments and chaos, till Otho the Great succeeded in making a great monarchy again, and was crowned emperor by Pope John XII. at Rome in 962. Thenceforward for more than eight centuries there was an unbroken succession of German princes claiming and in a measure exercising the powers and privileges of Roman emperors. The name of 'Roman emperor' was carefully retained; 'Holy' was added to signify that the empire was now Christian; and 'of the German nation' was sometimes appended to indicate the new nationality that dominated over the old imperial realms. The emperor was the official head of the Christian world, the temporal colleague and rival of the pope. The new German empire (since 1871) calls itself simply German, and has dropped all claim to be either 'Roman' or 'Holy.' See Germany, Vol. V. p. 180; Church History; and Bryce's great monograph, *The Holy Roman Empire* (new ed. 1889).

Romanes, George John, naturalist, was born at Kingston, Canada, on 20th May 1848, and after a private education in London and on the Continent entered Caius College, Cambridge, and graduated in 1870 with natural science honours. While still at the university he formed a friendship with Darwin, and he has powerfully reinforced his master's arguments in his Croonian, Fullerian, and other lectures, and in his various works—*Animal Intelligence* (1881); *Scientific Evidences of Organic Evolution* (1881); *Mental Evolution in Animals* (1883); *Jelly-fish, Star-fish, and Sea-urchins* (1885); *Mental Evolution in Man* (1888); *Darwin and after Darwin* (1892); *Examination of Weismannism* (1893; see Weismann). This most fertile English writer on the theories and philosophy of modern biology died 23d May 1894. His posthumous *Thoughts on Religion*, edited by Canon Gore, showed that, once a defiant agnostic, he had become almost, if not altogether, a Christian; and in this spirit he had before his death revised his *Candid Examination of Theism* (1878), published under the pen-name of 'Physicus.' He founded the Romanes Lecture at Oxford, and was F.R.S. and LL.D.

Romanesque Architecture, the debased style which succeeded Roman architecture from about the time of Constantine (350 A.D.) till the revival in the 11th century. Roman Architecture (q.v.), itself a transitional style, fades gradually into the Romanesque. When Constantine gave the Christians freedom of worship, he gave architecture a new start; and noble buildings resembling the Roman Basilica (q.v.) were built as churches all over the empire. These consisted of three- or five-aisled halls—the aisles separated by rows of columns. In Rome the columns, entablatures, and other ornaments were frequently taken from the ruins of ancient buildings which abounded there. The new style is therefore closely allied to the ancient one in the imperial city; but in Ravenna, Jerusalem, Provence, and the remoter districts, where few ancient remains existed, a simpler and ruder copy of the ancient work is found. There is always, however, a certain resemblance to the old forms which distinguishes the Romanesque from the round-arched Gothic which succeeded it. The piers along the aisles are always single columns, generally with caps intended to be Corinthian, and wide arches; the aisles are wide, with open wooden roof; and there are remnants of entablatures, mouldings, &c., which recall the ancient Roman work. The early Christians also derived their round churches from the Romans. They were probably originally tombs, copied from such buildings as the Minerva Medica (see Roman Architecture), and were the most sacred places, where the burial-service was said, and the sacraments administered. Hence they afterwards became Baptisteries (q.v.), and were finally absorbed into the church (see Rhenish Architecture), which then contained within itself everything connected with the Christian service.

In Rome there are still some thirty basilicas, and the Romanesque style may be said never to have died out there. As we recede from the centre we find its influence gradually weaken, and succumb to the Northern Gothic style. Thus, in Lombardy and Provence it was superseded by the Lombard (q.v.) and Romance styles in the 11th and 12th centuries; while in Byzantium and the East it gave way to the Byzantine style about the time of Justinian. Amongst the finest examples remaining are St Paul's (see Basilica) and Sta Maria Maggiore at Rome, and at Ravenna St Apollinare; the interior decoration of which last (see fig.) is very beautiful. The mosaics of the apse, the painted walls, and the inlaid pavements of the Romanesque churches are amongst their finest features. In colour they always excel.



Romanesque Interior.

In Tuscany there is a late form of Romanesque, of which the cathedrals at Pisa and Lucca, San Miniato at Florence, and many churches in those cities are examples. They are intermediate specimens, built during the 11th century, when the cities became prosperous, and have a certain amount of Gothic feeling; but, although beautiful in coloured decoration, they have not the simple grandeur of the early basilicas; and, although more decorated externally than these, they have not the bold and purpose-like appearance of Gothic elevations.

See, besides the standard works on architecture, Okley, *Christian Architecture in Italy* (1860); Freeman, *Historical and Architectural Sketches* (1876); and *The Architecture of Provence and the Riviera* (1888), by the present writer, D. MacGibbon.

Romania, (1) the name given by the Venetians to the eastern part of the Morea, whence the capital was called Napoli di Romania (see Nauplia).—(2) Roumelia (q.v.) was sometimes called Romania.

Roman Law. See Law, Code, Justinian.

Romano, Giulio. See Giulio.

Romanoff, House of. See Russia.

Romans, a town of France (dept. Drôme), stands on the right bank of the Isère, 12 miles by rail NE. of Valence. A bridge of the 9th century connects it with Péage on the left bank. Romans owes its origin to an abbey, founded in 837 by St Bernard, Bishop of Vienne. Silk fabrics, shoes, and hats are manufactured. Pop. (1872) 9893; (1886) 12,822; (1891) 14,720.

Romans, The Epistle to the, described by Luther as an absolutely perfect summary of the gospel (*absolutissima epitome evangelii*), was written by the apostle Paul (q.v.) in late winter or early spring of 58–59 A.D., at Corinth, while he was living in the house of Gaius, and just before his setting out for Judea with the money that had been collected at his instance in Macedonia and Achaia for the poor of Jerusalem. Apart from chap. xvi., which stands by itself, the epistle consists of two portions, marked off respectively by the doxology in xi. 36, and by the benediction in xv. 33. The first portion, which is mainly doctrinal, again falls into two sections—i.-viii. and ix.-xi.—in the former of which the Pauline doctrine of justification by faith is explained. The need for a justification through grace and received by faith alone, if there is to be effectual justification at all, is elaborately shown, and the doctrine is vindicated, historically and experimentally, against various conceivable objections, first from the religious, and then from the moral point of view. In the second division of the first portion the disparagement and neutralisation of the divinely bestowed privileges of Judaism apparently involved in the preaching of this doctrine without restriction among the Gentiles are considered. The second, or practical, part of the epistle deals with points of Christian morality and problems of Christian tolerance.

The epistle is addressed to the Christians in Rome. Who these were—whether they were Jews or whether they were Gentiles—and how they had come to be Christians, can only be conjectured. It is impossible to infer much about them or their circumstances from the epistle itself, for the church in Rome was not one with which the apostle, at the time of writing, was personally acquainted. Most probably he did not exactly know in what numbers or proportions the Jewish-Christian and Gentile-Christian elements existed within it; but he was warranted in assuming (as he seems to have done) that it contained both, and that the controversies with which he had become only too familiar elsewhere might break out at any moment in Rome also. The epistle gives no support to the tradition that the church in Rome had been founded personally by Peter; but doubtless it had relations with Jerusalem, and so may well be believed to have owed something to his indirect influence at least. The immediate object of the apostle Paul in writing to the Romans when he did is easily explained by the outward and inward circumstances through which, as we know, he was at the time passing. Having completed his preaching in the eastern part of the empire 'from Jerusalem to Illyricum' (xv. 19), he was purposing to extend his apostolic activity among the Gentiles westward as far as to Spain; and with a view to his success in the new field it was only natural that he should desire, so far as he could, to obviate possible misconceptions of his teaching, and to prepare for it a friendly and sympathetic reception in the metropolis of the world.

The Pauline authorship of the epistle as a whole has never been called in question; indeed it is one of the four canonical epistles which, along with the Apocalypse, were regarded by Baur as the only quite indubitable relics we possess of the apostolic age. Baur, it is true (following Marcion), rejected chaps. xv. and xvi., regarding them as additions of the 2d century. His arguments, which were based chiefly on what he conceived to be the too conciliatory character of certain expressions (such as xv. 8, 14, 15, 19), have not found general acceptance, and their force is disallowed even by some of his own followers (Hilgenfeld, Schenkel, Pfleiderer). At the same time there is some evidence, both internal and external, which indicates that these chapters are somewhat loosely attached to the main body of the epistle; in some ancient copies it closed with xiv. 23, immediately followed by xvi. 25-27 (see Revised Version, margin). A view widely accepted by scholars of various schools is that they consist of a postscript, or postscripts, or (the view of Lightfoot) that at some period after the original composition and transmission of the epistle the apostle, in order to adapt it for a wider circulation, re-issued it with omission of the last two chapters, as also of the word Rome at the beginning. Schultz in 1829, following up a hint of Semler (1769), suggested that xvi. 1-20 was really a fragment of a Pauline epistle to the Ephesians, and this suggestion, with various modifications, has been accepted by very many critics, among whom may be mentioned Reuss, Renan, and B. Weiss.

See the introductions of Reuss (6th ed. 1887), B. Weiss (2d ed. 1889; Eng. trans.), and Holtzmann (2d ed. 1886; this account is the fullest); and the commentaries by Philippi, Jowett, Godet, Gifford (in *Speaker's Commentary*), Moule (in *Cambridge Bible*), Liddon (1893), and Lipsius in Meyer's *Hand-Commentar*.

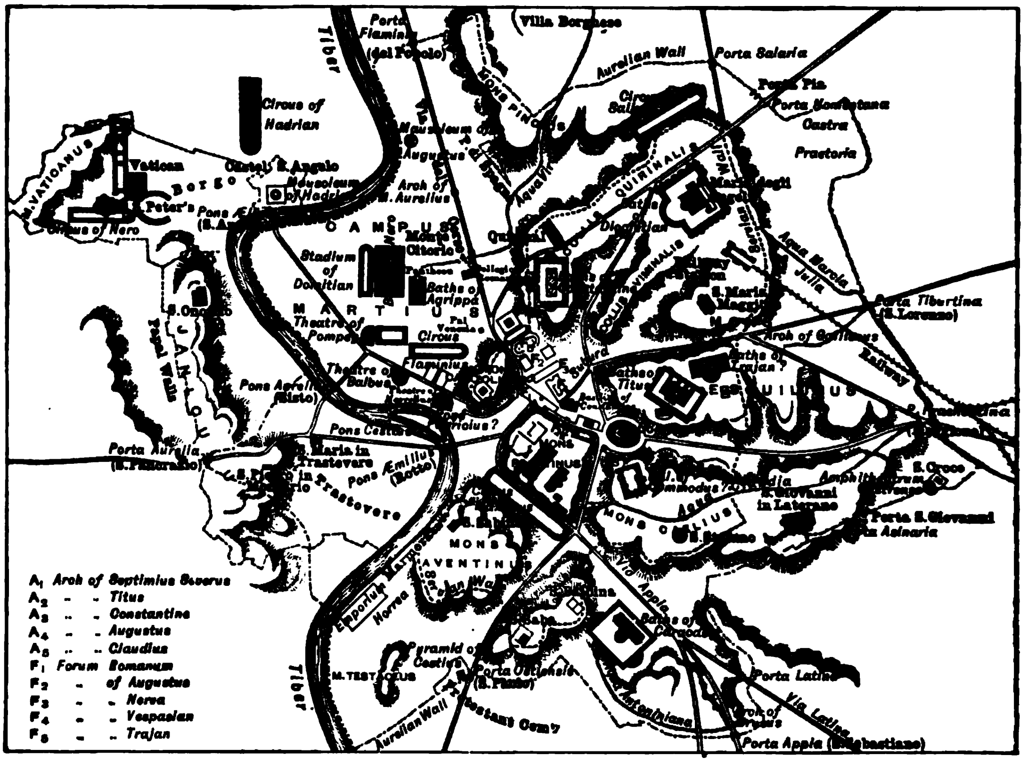
Romansch (Ger. *Churwälsch*, from the town of Chur), a name applied to the Romance dialect, or rather agglomeration of cognate dialects, spoken from the Grisons to Friuli on the Adriatic. Ascoli includes all varieties under the common name of Ladino, although strictly that term applies to the dialect of the Engadine, as Rumonsch does to that of the upper Rhine valley. There are dictionaries by Conradi (Zur. 1820) and Carisch (Chur, 1821). See also J. Ulrich's *Rhätoromanische Chrestomathie* (1882-83) and *Rhätoromanische Texte* (1883-84).

Romanticism (through the adjective *romantic*, from *romant* or *romaunt*, 'romance;' see ROMANCES), a movement in feeling and thought that has transformed the literature and art of most nations, has been defined by Mr Theodore Watts as 'the renascence of the spirit of wonder in poetry and art.' It was a revolt against pseudo-classicism; a return from the monotonous commonplace of everyday life to the quaint and unfamiliar world of old romance; a craving for the novel, original, and adventurous; an emphasising of the interesting, the picturesque, the 'romantic,' at the expense, if need be, of correctness and elegance, and the current canons of 'good taste.' Deep humour, strong pathos, profound pity are amongst its notes. Romanticism is not necessarily limited to any one period; there are romantic elements in Homer, Æschylus, Sophocles; the poetry of Dante is eminently romantic when contrasted with ancient classical poetry as a whole; but though what is romantic for one generation tends to become classic —and so tame, though not really insipid—for a later one, and though the romantic is almost inevitably one side of a truly artistic temperament, there are certain epochs that are specially romantic, and certain writers in those epochs more romantic than their fellows. The 18th century was notoriously classic in ideal, or pseudo-classic—conventional, pedantic, academic; and the revolt against spiritual ennui which followed is the romantic movement *par excellence*. The movement arose under various conditions in the several countries, had a somewhat varying character and course, and sometimes tended towards the merely crude and grotesque. In England, the fountainhead of the movement which culminated in the beginning of the 19th century, it may be traced from the Percy Ballads and Chatterton, from Cowper and Blake and Burns, to Scott and Byron, Wordsworth and Coleridge, Keats and Rossetti. In Germany there were tendencies in that direction in Lessing, in Schiller, in Goethe, as well as in the philosophy of Schelling, and the 'Sturm und Drang' period was largely romantic in its temper; but it was Novalis who was the prophet of 'romanticism,' and among the other representatives of the school were the Schlegels, Tieck, Kleist, Fouqué, and Hoffmann. In France beginnings are found in Rousseau, in Chateaubriand, and others; but the great chief of French romanticism is Victor Hugo. Other French romantics are Lamartine, Dumas, Gautier, George Sand, Flaubert, Mürger. The romantic movement in the three countries is discussed in the articles on the literature of each (ENGLISH LITERATURE, Vol. IV. p. 375; GERMANY, Vol. V. p. 188; FRANCE, Vol. IV. p. 789). The other countries were more or less moved by the same spirit; see also the articles on the literatures of the principal countries. The influence of Percy's *Reliques* is traced in the article BALLAD. In Germany romanticism included with the love of the mediæval an affection for the oriental; in religion it led some of its notable representatives to Catholic ideals and into the Catholic Church; and in politics it was associated with reactionary conservatism. The aims of the romantics in painting are defined at PAINTING, Vol. VII. p. 700; see also PRE-RAPHAELITISM. In music Weber has been called the 'creator of romantic opera;' but see OPERA, Vol. VII. p. 608. Berlioz is regarded as the type of French romanticism in music.

See (under Idea) IDEALISM, REALISM; Pater in *Macmillan's Magazine*, vol. xxxv.; for Germany, the works by Julian Schmidt (1848), Haym (1871), Brandes (1873); for France, Stendhal, *Racine et Shakespeare* (1823); Gautier, *Histoire du Romantisme* (4th ed. 1884); and many essays by Sainte-Beuve and Schérer.

Romany. See GYPSIES.

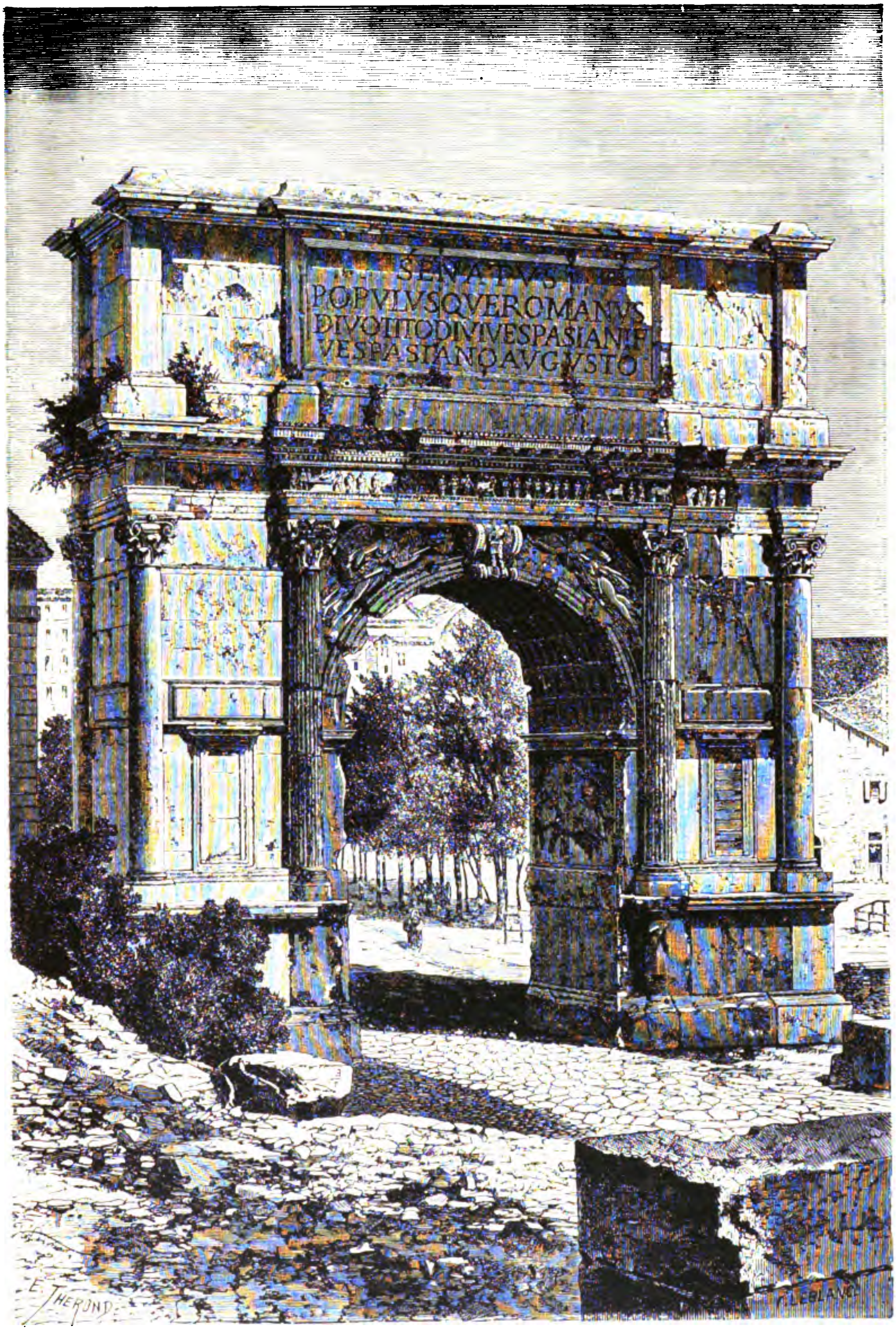
Rome, the capital of the modern kingdom of Italy, stands on the Tiber, about 15 miles from its mouth. Roman legend ascribed the foundation of the city to Romulus, at a date corresponding to 753 B.C. But recent explorations have proved that the site was inhabited in the neolithic and early bronze period. The existence of a town with a considerable population at a time long before the date ascribed by tradition to the foundation of the city has been established by the discovery in 1874 of a cemetery on the Esquiline, near the railway station, which contained pottery of the type usually assigned to the 9th or 10th century B.C. In the time of the kings (753–510 B.C.) the city occupied seven hills, whose summits rise from 80 to 120 feet above the river and the intervening valleys. These hills are believed to have been formed by subaerial erosion of beds of soft tufa previously erupted by submarine volcanoes. Of these seven hills five—the Palatine, the Capitoline, the Aventine, the Cælian, and the Esquiline—being more or less isolated, were termed *Montes;* and two, the Quirinal and Viminal, being mere spurs jutting out from the tableland to the east, were called *Colles*. The Esquiline, however, is properly rather a *Collis* than a *Mons*, being connected with the tableland by a narrow neck. The Palatine and the Capitoline, being the most defensible sites, were doubtless the first to be occupied, and this accords with the Roman legend, which makes the Palatine the site of the primitive city founded by Romulus, the Capitoline being occupied by a rival Sabine settlement which, under Tatius the Sabine king, soon extended to the Quirinal, a contiguous spur of the tableland, separated only by a narrow valley from the Capitoline. We are also told that the Aventine, which after the Palatine and the Capitoline was plainly the most desirable site, was occupied by a colony of Latins in the time of Ancus Martius, the fourth king. Under Servius Tullius, the sixth king, the Esquiline, together with the Viminal, which is a mere spur of the Esquiline, is said to have been added to the city. These legends conform to the probabilities of the case.


Tiber
Porta Flaminia (del Popolo)
Villa Borghese
Aurelian Wall
Porta Salaria
Porta Pia
Porta Nomentana
Castra Praetoria
Circus of Hadrian
M. VATICANUS
Vatican
Castel S. Angelo
Borgo
Mausoleum of Hadrian
S. Peter's
Circus of Nero
Pons Ælius (S. Angelo)
Mausoleum of Augustus
Arch of M. Aurelius
MONS PINCIUS
Aqua Virgo
QUIRINALIS
Quirinal
Baths of Diocletian
Agger
Aqua Marcia
Julia
CAMPUS MARTIUS
Monte Citorio
Stadium of Domitian
Pantheon
Baths of Agrippa
Theatre of Pompey
Circus Flaminius
Theatre of Balbus
Theatre of Marcellus
COLLIS VIMINALIS
S. Maria Maggiore
Porta Tiburtina (S. Lorenzo)
Arch of Gallienus
Railway
Baths of Trajan?
Baths of Titus
ESQUILINUS
Subura
S. Onofrio
Papal Walls
JANICULUS
Pons Aurelius (Sisto)
Pons Cestius
Porta Aurelia (S. Pancrazio)
S. Maria in Trastevere
S. Pietro in Montorio
Trastevere
Pons Æmilius (Rotto)
MONS PALATINUS
MONS AVENTINUS
Servian Wall
Emporium
Marmorata
Horrea
S. Sabina
S. Balbina
S. Saba
MONS CÆLIUS
S. Stefano
Aqua Claudia
Amphitheatrum Castrense
S. Croce
S. Giovanni in Laterano
Porta S. Giovanni
Porta Asinaria
Via Appia
Baths of Caracalla
Pyramid of Cestius
M. TESTACCIUS
Porta Ostiensis (S. Paolo)
Protestant Cemy
Aurelian Wall
Via Antoniniana
Porta Latina
Via Latina
Arch of Drusus
Porta Appia (S. Sebastiano)
A₁ Arch of Septimius Severus
A₂ " " Titus
A₃ " " Constantine
A₄ " " Augustus
A₅ " " Claudius
F₁ Forum Romanum
F₂ " of Augustus
F₃ " " Nerva
F₄ " " Vespasian
F₅ " " Trajan

Map of Ancient Rome:

The positions of a few of the more important modern places of interest are also indicated; the ancient names being given in *Italic* and the modern in Roman letters.

The settlement on the Palatine attributed to Romulus was fortified at a very early period,


SENATVS
POPVLVSQVEROMANVS
DIVOTITODIVIVESPASIANIF
VESPASIANOAVGVSTO
E. THEROND

ARCH OF TITUS, ROME.

Vol. VIII., page 780.

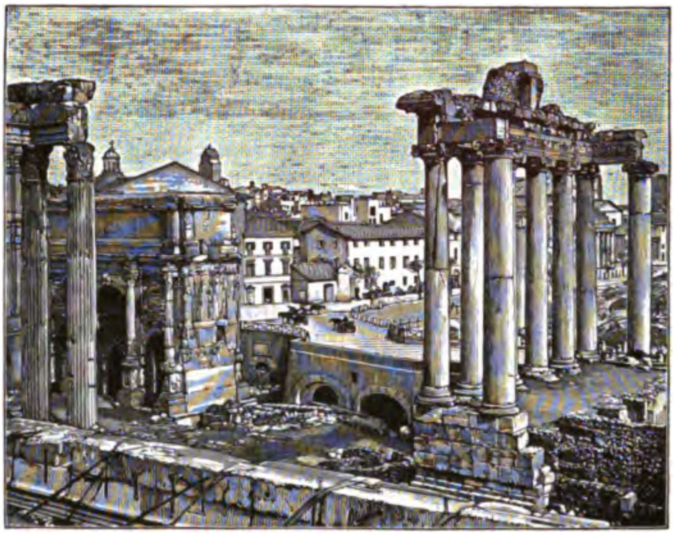
possibly about the date assigned to the foundation of the city. Remains of this earliest wall have been discovered in the course of recent excavations. The steep slopes were scarped, and a retaining wall, consisting of large stones fitted together without mortar, was built up from the base of the slope, rendering the hill almost impregnable. The Palatine was thus made into a sort of artificial platform, rising some 100 feet above the surrounding valleys, and was called the 'square city' (*Roma quadrata*). In the time of the later or Etruscan kings at least five of the settlements on the seven hills had been surrounded by separate defences. These fortified hills, with the marshy hollows between them, were then enclosed by a huge rampart or *agger* of earth, faced with an exterior wall of unmortared masonry, which is still in one place 50 feet in height, with an inner retaining wall of similar construction. Outside the rampart was an enormous fosse, which from recent excavations appears to have been in some places 30 feet in depth and 100 feet in breadth, from which the materials for the agger were obtained. In the construction of this rampart the older walls, which ran along the crests of the Palatine and Capitoline hills, were utilised, as is indicated by the fact that the agger can only be traced where it crossed the intervening valleys, or where it protected the spurs where they joined the tableland. The agger, begun probably by Tarquinius Priscus, has received the name of Servius Tullius, by whom probably the portion which included the Quirinal and the Esquiline was completed. A considerable fragment of this part of the agger may be conveniently examined in the goods yard of the railway station. An excellent cross section is exposed on the northern crest of the Quirinal in the Via di S. Nicola di Tolentino, and a further extension may be traced in the gardens of the Barberini and Colonna palaces. A very perfect fragment may also be seen in the valley below the southern slope of the Aventine.

For 800 years, till the reign of the Emperor Aurelian, the Servian agger formed the only defence of the city. The wall which bears the name of Aurelian is to a great extent identical with the present walls. It enclosed the suburbs which had grown up beyond the Cælian, the Esquiline, and the Quirinal, and included two additional hills, the Pincian, and part of the Janiculum, as well as the low-lying ground near the Tiber called the Campus Martius, which now forms the busiest and most densely populated part of the modern city. The Aurelian Wall, as it is called, was begun by Aurelian in 271 A.D., and completed by the Emperor Probus in 280. It was restored and partially rebuilt by Honorius, and repaired by Belisarius. It is 12 miles in circuit. The Leonine Wall, enclosing the Vatican Hill and the remainder of the Janiculum, was built by Leo IV. in 848. In 1527 some additional space on the Vatican was enclosed, and bastions to strengthen the weak parts of the old wall were added. At the present time populous suburbs have arisen to the east and north beyond the walls, while to the south extensive spaces within the wall are uninhabited. In 1888 no less than 1465 acres, chiefly on the Cælian and the Aventine, were occupied by vineyards, fields, and gardens, while public gardens and squares occupied 106 acres.

To the period of the kings belongs the *Cloaca Maxima*, a huge arched sewer of Etruscan masonry, which drained the marshy hollow between the Capitoline, Palatine, and Esquiline hills. A portion of this valley became the Forum Romanum, at once the market and the place of political meeting for the Roman, Sabine, and Latin tribes, who occupied the surrounding hills. The *Cloaca Maxima* (q.v.), though the oldest and best known of the sewers, is rivalled in magnitude by two other ancient sewers which enter the Tiber nearly at the same point. The so-called Mamertine prison at the foot of the Capitol, now consecrated as the subterranean church of S. Pietro in Carcere, was a deep vaulted well from which, and from the Tiber, the water-supply must have been obtained during the regal period. When Rome was supplied with water by aqueducts from the Alban hills and the Apennines this well, perhaps the most ancient structure in Rome, was converted into a dungeon, in which state-prisoners, among them Jugurtha and the Catiline conspirators, were confined. That St Peter, by whose name the well is known, was ever confined here is a mere legend, of no authority or probability.

In the great aqueducts we have the most notable remains of the Republican period. The oldest was the *Aqua Appia*, constructed by Appius Claudius Cæcus in 312 B.C., which brought water from springs upwards of seven miles distant from the city. The *Anio Vetus*, 43 miles long, was commenced in 273 B.C., and brought water from the river Anio. The *Aqua Marcia*, 62 miles in length, was constructed in 144 B.C., and brought water from the Alban hills at a level sufficiently high to supply the Capitol. The *Aqua Julia*, the *Aqua Claudia*, and the *Anio Novus*, constructions even more gigantic, date from the imperial age. Altogether there were fourteen of these aqueducts, with an aggregate length of 351 miles. These vast structures, striding on their huge arches across the Campagna, and still bringing copious supplies of water from the Apennines and the Alban hills, are among the most striking features of modern Rome. A portion of one of these aqueducts was utilised in the construction of the Aurelian Wall, the arches being simply built up with masonry. The remains of the enormous arches by which the water of the *Aqua Claudia* was brought across the deep valley between the Cælian and the Palatine also exhibit the vast scale of these erections (see AQUEDUCT).

In the time of the Republic the centre of the public life of the city was the *Forum Romanum*, an oblong space, containing about 2½ acres, surrounded by shops (*tabernæ*). It was traversed by the *Via Sacra*, a winding road, along which triumphal processions passed to the Capitol. The great blocks of lava with which this road was paved still, for the most part, remain *in situ*. The Temple of Vesta and the House of the Vestal Virgins stood on one side of the Forum beneath the Palatine, and on the other side was the Regia, or House of the Pontifex Maximus. Close by were the *rostra*, the beaks of captured Carthaginian ships, between which was the platform from which orators harangued the people. Farther to the north-east was the Senate House, whose walls are preserved in those of the church of S. Adriano; the neighbouring church of SS. Luca e Martina being constructed out of the offices of the Senate House. Beyond the Senate House stood the Treasury and the Tabularium. In course of time the open space of the Forum became surrounded and occupied with stately public edifices, of which the most conspicuous remains are the eight columns of the Temple of Saturn, built in 491 B.C., the Colonnade of the Twelve Great Gods (*deorum consentium*), the Temples of Concord, of Castor and Pollux, built in 496 B.C., of Vesta, of Julius Cæsar, of Vespasian, and of Faustina. We see also the foundations of the Triumphal Arch of Augustus, the vast ruins of the Basilica Julia, the base of the column of Phocas, and the milestone from which all Roman roads were measured. To the north of the Forum stands the Triumphal Arch of Septimius Severus, to the south the Arch of Titus (see ARCH). So much of the open space of the Forum became occupied by great public monuments and edifices that in the time of the emperors additional fora were required. These were erected on the eastern side of the Forum Romanum. Of the Forum Julium only three arches of the outer wall remain. Of the Forum of Augustus a portion of the enclosing wall, a massive archway, and three columns of the Temple of Mars Ultor, which stood within the Forum, now cleared of rubbish, are among the most imposing and accessible remains of the architecture of the early empire. Of the Forum of Nerva two columns may be seen in the Via della Croce Bianca. Of the Forum Pacis, built by Vespasian, nothing remains except one massive fragment of a wall. The most magnificent of the imperial fora was the Forum of Trajan, which was reckoned one of the wonders of the world. Within its walls stood the Basilica Ulpia, which has been partly excavated, so as to expose the bases of many of the columns.



The Forum Romanum at the present time.

Beyond it stands the great Column of Trajan, 124 feet in height, with spiral bas-reliefs representing scenes from Trajan's campaigns against the Dacians, forming the most instructive historical monument in Rome. We are shown the march of a Roman army, the construction of bridges, assaults on forts, and all the varied incidents of a campaign, constituting a pictorial record containing some 2500 figures of men and horses, which may compare with the Bayeux tapestry, or the pictorial narratives of Egyptian campaigns which are represented on the walls of Theban temples. In the same style, but of inferior art, is the Column of Marcus Aurelius in the Piazza Colonna on the Corso, usually called the Antonine Column. It bears reliefs representing scenes in the wars with the Marcomanni.

On the western side of the Forum Romanum rises the Palatine Hill, its summit covered with the substructures of the Palaces of the Emperors, the Houses of Augustus, of Tiberius, of Livia, of Caligula, of Domitian, and of Hadrian. Most magnificent of all is the Septizonium or Palace of Septimius Severus, rising in seven stages of massive masonry, which form a southern extension of the Palatine Hill. Besides these imperial palaces, the Palatine included a magnificent Stadium the most perfect in existence, imperial reception-halls, several temples, with gardens, baths, barracks for soldiers, and a basilica or hall of justice, in which St Paul must have pleaded before the emperor. The Golden House of Nero, built on the opposite side of the Forum, and occupying the greater portion of the Oppian Hill, was demolished to make room for the Colosseum and the Baths of Titus, so that practically nothing is left save some substructures, the cisterns known as the Sette Sale, and the base of the colossal statue of Nero, which stood in front of the Golden House.

Of the numerous temples in Rome, of which there are said to have been three hundred, the names, and in many cases the sites, of 153 are known. The foundations of the great Temple of Jupiter Capitolinus may be traced in the gardens of the Caffarelli Palace, now the German embassy. Of the temples which remain the preservation is due in several cases to their having been converted into churches. The columns in front of the church of S. Lorenzo in Miranda, which faces the Forum, formed part of the Temple of Antoninus and Faustina. Ten columns of the Temple of Ceres are built into the walls of S. Maria in Cosmedin. S. Maria del Sole is a round temple formerly called the Temple of Vesta, but now believed to be the Temple of Hercules Victor. Another temple, supposed to be the Temple of Fortuna Virilis, is now the church of S. Maria Egiziaca. The church of SS. Cosmo e Damiano is the Temple of Sacra Urbs, erected by the Emperor Maxentius. The *cella* of the Temple of Venus and Rome, built by Hadrian, is preserved in the church of S. Francesca Romana. It is believed that the church of SS. Sergio e Bacco was the Temple of Concord, that the church of S. Stefano Rotondo was the Temple of Mater Matuta, and that of S. Nicola was the Temple of Piety; while Santa Maria sopra Minerva stands on the ruins of a Temple of Minerva, S. Maria Liberatrice probably occupies the site of a Temple of Vesta, and the round church of S. Teodoro was a temple of unknown attribution. In 27 B.C. Agrippa built a vast dome in front of the Thermæ which he erected in the Campus Martius. It is called by Pliny and other writers the Pantheon, and may have served as a sort of entrance-hall to the Thermæ. In 608 it was consecrated as the church of S. Maria ad Martyres, and now goes by the name of S. Maria Rotonda. Of all the buildings of ancient Rome none is more perfectly preserved. The diameter of the dome, which is lighted only by a central aperture in the roof, is larger than the dome of St Peter's; the walls, 19 feet in thickness, have deep niches which were filled with statues of deities; and the floor is of Phrygian and Numidian marbles, with porphyry and granite slabs.

The Thermæ of Agrippa, of which the Pantheon is the only portion that remains, were the earliest of the eleven great public baths which formed so characteristic a feature of imperial Rome. The Thermæ of Trajan, and the adjacent Thermæ of Titus, built on the site of the Golden House of Nero, occupied almost the whole of the Oppian Hill; but of these baths little is left save the foundations. On the slope of the Quirinal stood the Thermæ of Constantine. In the Piazza del

Quirinale stand two colossal horses from the thermæ which occupied the site. In the formation of the steps which lead down from the piazza, and of the Via Nazionale, substructures belonging to these thermæ were discovered, and portions of their massive walls may be seen in the gardens of the Colonna and Rospigliosi palaces. At the other end of Rome, on the low ground south of the Cælian, are the ruins of the Thermæ Antoninianæ, usually called the Baths of Caracalla, by whom they were begun in 212 A.D., and completed by Alexander Severus. They were built to accommodate 1600 bathers, and, after serving for centuries as a quarry, are still the vastest, and in their desolation perhaps the most impressive, of all the ruins in Rome. The lofty walls are still standing, and, as the halls have been cleared of rubbish, the arrangements of Roman thermæ (see BATH) can here best be studied. We see the Calidarium, the Tepidarium, and a Frigidarium, with an Exedra and a Stadium or racecourse. The outer wall encloses a space of nearly 27 acres, of which the baths themselves occupy more than 6 acres. Even more magnificent were the Thermæ of Diocletian, on the summit of the Quirinal, designed to accommodate 3600 bathers. The semicircular curve which forms such a conspicuous feature in the Piazza delle Terme was the exedra of these baths. One of the smaller circular halls forms the church of S. Bernardo, while a portion of one of the great vaulted central halls, with its columns of Egyptian granite, serving probably as the Tepidarium, was converted by Michelangelo into the magnificent church of S. Maria degli Angeli. Another hall is used as a prison, another as a fencing-school, others now serve as barracks, stables, coach-houses, and warehouses for timber, while the cloisters of a Carthusian convent built out of the ruins are now converted into a museum.

A large marshy plain, which now forms the most densely populated part of Rome, lay outside the Servian Walls, extending from the foot of the Capitoline and Quirinal hills to the Tiber. This, being used for military exercises, was called the Campus Martius. Towards the close of the republican era this suburban plain began to be utilised for the erection of places of public recreation, such as baths, theatres, and racecourses. These were connected by the Porticoes, a network of colonnades forming covered walks, serving as a protection alike from the sunshine and the rain, along which the citizens could stroll to the various places of recreation and amusement. The Campus Martius was traversed by the Flaminian Way, approximately represented by the modern street called the Corso, which was bordered on either side by the stately tombs of Roman nobles, and spanned by the triumphal arch of Claudius and by that of Marcus Aurelius, demolished in 1662. On these fields were built the Baths of Agrippa and the Baths of Nero. Here was erected the Theatre of Balbus and the vast Theatre of Pompey, said to have contained seats for 40,000 spectators. Some of its substructures may be seen behind the church of S. Andrea della Valle. Somewhat nearer to the Capitol was the Theatre of Marcellus, of which a considerable portion still stands, forming one of the most characteristic examples of Roman architecture of the best period. This theatre was begun by Julius Cæsar, and finished in the year 11 B.C. by Augustus, who named it after his nephew Marcellus, the son of Octavia. In the 11th century, like the Colosseum and the Mausoleum of Hadrian, it was turned into a fortress by the turbulent Roman nobles of the Orsini family. The interior is now occupied by the Palazzo Orsini-Savelli, while the outer arches are used as rag-shops and smithies.

In the same characteristic Roman style as the Theatre of Marcellus, but of a more debased type, is the great Flavian Amphitheatre, built for gladiatorial exhibitions and for the combats of wild beasts, which goes by the name of the Colosseum. Commenced by Vespasian, it was dedicated by Titus 80 A.D., and finished by Domitian. It is built in the form of an ellipse, the longer diameter measuring 613 feet and the shorter 510 feet. It rises to a height of 160 feet, covering five acres of ground. In the middle ages it was used as a fortress and afterwards as a quarry; but, though so large a portion has been demolished, it constitutes perhaps the most imposing monument of Roman magnificence which is left (see AMPHITHEATRE). The earlier amphitheatres were mostly of wood, and have perished. The Piazza di Monte Citorio on the Corso is believed to occupy the site of the Amphitheatre of Statilius Taurus, erected in 31 B.C., the foundations having been found 88 feet below the present surface of the street. At the side of the church of S. Croce in Gerusalemme are considerable remains of the Amphitheatrum Castrense, which was utilised in the construction of the Aurelian Wall, from which it projects, forming a sort of semicircular bastion. Below was the Circus of Elagabalus, from which came the Egyptian obelisk now in the Pincian Gardens.

The oldest circus was the Circus Maximus, in the valley between the Palatine and the Aventine. It is supposed to date from the regal period, but was enlarged by Julius Cæsar. It was about three furlongs in length and one in breadth, nearly the size and shape of Eaton Square, and is said to have been capable of seating 250,000 spectators. The site is now occupied by the Jewish cemetery and the gas-works. The arrangements of a Roman circus can best be studied in the well-preserved circus on the Appian Way, near the tomb of Cæcilia Metella, built in 311 A.D., which usually bears the name of the Emperor Maxentius, but is more correctly assigned to his son Romulus. It is 350 yards long and 86 broad. The metæ, the spina, the carceres, and the seats for the emperor and the spectators may still be traced. An Egyptian obelisk from this circus now adorns the Piazza Navona (see CIRCUS).

Of the Circus of Flaminius, built in 220 B.C. on the Campus Martius immediately below the northern slope of the Capitoline Hill, no vestiges remain. The same is the case with the Circus of Nero on the Vatican, which occupied the hollow between S. Peter's Church and the Sacristy through which the visitor now drives to the Vatican Museum. While the circus was designed for chariot-races, the stadium was used for foot-races. Of these there were several, but the Imperial Stadium on the Palatine, between the house of Augustus and the buildings of Septimius Severus is the only one which remains in a tolerable state of preservation. The Stadium of Domitian on the Campus Martius is believed to be represented by the present Piazza Navona, recently renamed the Circo Agonale. Both of these stadia are about the size and shape of St George's Square, Pimlico, or the site of the Houses of Parliament.

The roads leading out of Rome beyond the Servian Walls were bordered by tombs, many of which, on the erection of the Aurelian Wall, were included within the city. On the Appian Way (q.v.) are the tombs of the Scipios, the inscriptions on which, forming the earliest contemporary records of Roman history, are among the treasures of the Vatican. Farther on four ancient columbaria have been excavated. Outside the Aurelian Wall is the Tomb of Cæcilia Metella (see ROMAN ARCHITECTURE), wife of the triumvir Crassus, which in the 13th century was converted into a fortress by the Gaetani family. It is a cylindrical block of masonry, 65 feet in diameter, resembling the keep of a feudal castle. Another remarkable tomb is the Pyramid of Caius Cestius in the Via Ostiensis. The most magnificent of Roman tombs was the Mausoleum of Hadrian, now the castle of S. Angelo. It was a cylindrical tower of masonry, 240 feet in diameter and 165 feet in height, surmounted by a colossal statue of the emperor. When the Goths besieged Rome the tomb was converted into a fortress by Belisarius. It afterwards became the castle of the popes, and citadel of Rome, and in 1527 was defended against the French by Benvenuto Cellini. Of similar construction and hardly inferior in magnitude was the Mausoleum of Augustus, which stood behind the great church of S. Carlo al Corso. In the middle ages it formed the castle of the Colonna family, and is now occupied as the Teatro Corea. Two obelisks of Egyptian granite faced the entrance, one of which now stands in the Piazza of S. Maria Maggiore, and the other fronts the Palace of the Quirinal. In all there are eleven Egyptian obelisks which ornament the gardens and piazzas of Rome. Two stand near the Pantheon close to the sites of the Temples of Isis and Serapis, before which they were originally erected. Another, now in the Piazza del Popolo, was brought from Heliopolis by Augustus, and placed in the Circus Maximus. That in the Piazza di Monte Citorio was also brought to Rome by Augustus. That in the Piazza of S. John Lateran, 104 feet in height, is the largest in existence. It was erected at Thebes by Thothmes III., and removed by Constantine to the Circus Maximus. The obelisk in the Piazza di S. Pietro was brought from Heliopolis by Caligula, and placed in the Circus of Nero, near its present site. On the Pincian is an obelisk of Hadrian; and there is another in the gardens of the Villa Mattei.

Of the triumphal arches those of Augustus, Tiberius, Claudius, Marcus Aurelius, and Trajan have disappeared. The Arch of Septimius Severus, which spanned the Sacred Way just as it began to climb the Capitol, remains in a fair state of preservation. At the other end of the Forum, also spanning the Sacred Way, is the Arch of Titus, with the well-known reliefs representing the spoils from the Temple at Jerusalem (see ARCH). A little farther south, where the Sacred Way joins the Appian Road, stands the Arch of Constantine, fronting the Colosseum and the three huge arches of the Constantine Basilica. The so-called Arch of Drusus crosses the Appian Way where it passes through the Aurelian Wall. The Arch of Dolabella, built in 10 A.D., is almost hidden in the brickwork of the Aqueduct of Nero, called the Aqua Claudia; and the Arch of Gallienus on the Esquiline, erected in 262 A.D., is in the degraded style of the time. See ARCH (TRIUMPHAL).

Of the twelve bridges over the Tiber three are survivals of the eight or nine ancient bridges. The oldest is the Pons Fabricius, built in 62 B.C. by L. Fabricius, leading from the city to the island in the Tiber. The Pons Cestius, believed to have been built by the Emperor Gratian, leads from the island to the right bank of the river. The Pons Ælius, now called the Ponte S. Angelo, was built by Hadrian in 135 A.D. in front of his Mausoleum, and now serves as the approach to St Peter's and the Vatican. The Ponte Rotto, or 'broken bridge,' was part of the Pons Æmilius, built in 181 B.C. Two picturesque arches remained till the recent 'improvements.' It is now replaced by a suspension bridge. The Ponte Sisto was built by Pope Sixtus IV. to replace the Pons Aurelius.

Modern Rome.—It is impossible within moderate limits to give an adequate account of Rome, which contains more objects of interest than any other city in the world. A bare enumeration of facts must therefore suffice. The Observatory in the Collegio Romano is situated in 41° 53′ 52″ N. lat. and 12° 28′ 40″ E. long. The population was 226,022 in 1870; 272,560 in 1876; 300,467 in 1881; 401,044 in 1888; and 407,936 in 1891. The walls, which enclose 3880 acres, are 14 miles in circuit, with fifteen gates, two of which are closed. Since 1870 more than 3000 new houses have been built, 82 miles of new streets have been formed, and 5½ millions sterling have been spent by the municipality on the improvement of the city. During the progress of these improvements 1824 inscriptions, 2360 lamps, 191 marble statues, 266 busts, and 36,679 coins have been found. There are twelve bridges, five of which are old, and the rest comparatively new. The chief gates are the Porta del Popolo and the Porta Pia on the north, the Porta S. Lorenzo and the Porta Maggiore on the east, the Porta S. Sebastiano and the Porta S. Paolo on the south. Old Rome stands on the left bank of the Tiber; on the right bank, occupying the Vatican and Janiculum hills and the low ground between these hills and the river, are St Peter's, the Vatican Palace, the Borgo, and the Trastevere. The business part of the city occupies the plain on the left bank between the hills and the river, traversed by the Corso, the principal thoroughfare of Rome, about a mile in length, leading from the Porta del Popolo to the foot of the Capitoline Hill. From the Piazza del Popolo two great streets diverge on either side of the Corso, the Via di Ripetta to the right, skirting the Tiber, and to the left the Via del Babuino, leading to the Piazza di Spagna, whence the Scala di Spagna, the resort of artists' models, ascends to the Pincian Gardens, on the site of the gardens of Lucullus, which command a splendid view of the city, and form the fashionable drive and promenade of the Romans.

Before Rome became in 1870 the capital of Italy, the greater part of the Pincian, Quirinal, and Esquiline hills was occupied by villas of the Roman nobles, with extensive gardens planted with ilexes and vines. With two exceptions these have been destroyed, and their sites have been covered with modern houses, and too often by blocks of ugly barrack-like buildings, many stories in height, let out in tenements. The dirty but picturesque mediæval city is assuming the aspect of a modern capital, broad, straight thoroughfares having been driven through quarters formerly occupied by narrow streets and mean, crowded houses. Of the new streets the most important are the Via Venti Settembre, from the Porta Pia to the Quirinal, and the Via Cavour and the Via Nazionale, which lead from the railway station, the first to the Forum, and the second to the lower end of the Corso. This is continued to the west by the Corso Vittorio Emmanuele as far as the Borgo, crossing the Tiber by a new bridge. The older foreign quarter lay at the foot of the Pincian, around the Piazza di Spagna, but the healthier sites on the slopes and summits of the Quirinal and Esquiline are now more frequented.

Of the palaces the largest are the Vatican, the residence of the pope, and the Quirinal, now the residence of the king, but formerly a papal palace, in which the conclaves were held for the election of the popes. Many of the palaces of the Roman nobles contain collections of pictures and statuary. Chief among them are the Palazzo Borghese, containing, next to the Vatican, the best collection of pictures in Rome, the Palazzi Colonna, Doria, Barberini, Rospigliosi, Chigi, Torlonia, Farnese, Corsini, and di Venezia, now the Austrian embassy. Among the notable villas are the Villa Borghese, standing in a great park below the

Pincian; the Villa Ludovisi, on the Pincian; the Villa Albani, outside the Porta Salara; and the Villa Medici, on the Pincian, now the Académie Française, with a splendid collection of casts. The gardens of the Villa Mattei, on the Cælian, command one of the best views in Rome. The picturesque arches of the Aqua Claudia traverse the gardens of the Villa Wolkonsky.

Besides the private collections Rome abounds in libraries and museums. The Collegio Romano, formerly a great Jesuit college, is now occupied by a public library of modern books called the Biblioteca Vittorio Emmanuele, by the Kircherian Museum of Antiquities, and by a well-arranged prehistoric and ethnological museum. The Palazzo dei Conservatori, on the Capitol, contains many of the best ancient statues. In the cloisters of the Carthusian convent in the Thermæ of Diocletian are stored the antiquities brought to light during the recent excavations. Others from the excavations at Falerii are collected in the Villa di Papa Giulio, outside the Porta del Popolo. The Villa Medici contains a good collection of casts from ancient statues. The Lateran Palace contains an unrivalled collection of inscriptions and sculptures from the Catacombs, and a few good statues and mosaics. The Lateran is exterritorial, and the Museum is the property of the popes.

The chief papal collections are contained in the galleries attached to the Vatican, probably the largest palace in the world. In addition to the private gardens and apartments of the pope, the Vatican Palace comprises immense reception-halls with a series of chapels, libraries, picture-galleries, and vast museums of sculptures, antiquities, and inscriptions, which can here be only enumerated in the briefest manner. The Sistine Chapel, built in 1473 by Sixtus IV., is covered with magnificent frescoes by Michelangelo and the great Florentine masters. The Capella Nicolina, built by Nicolas V., and the Pauline Chapel, built by Paul III. in 1590, are also painted in fresco; the first by Fra Angelico, and the second by Michelangelo. Raphael's Stanze and Loggie are halls and solars covered with inimitable frescoes executed by Raphael, Perugino, Giulio Romano, and other masters of their school. Beyond the Loggie is the picture-gallery, containing the best collection of oil-paintings in Rome. The world-famous Vatican Library, with its priceless MSS., its collections of early printed books, of Christian antiquities, ancient maps and jewellery, is contained in two immense halls. The vast sculpture-galleries, with their unrivalled collections, comprise the Museo Chiaramonte, the Braccio Nuovo, and the Museo Pio-Clemente, which includes the Cortile di Belvedere, containing the Laocoon, the Apollo Belvedere, and the so-called Antinous, perhaps the most beautiful statue in the world. The inscriptions are contained in the Galleria Lapidaria, the Etruscan antiquities in the Museo Gregoriano, below which is the Egyptian Museum.

The churches, said to be upwards of 300 in number, are among the most conspicuous features of modern Rome. Many of them are rather what we should call mortuary or memorial churches, opened only once a year on the festival of the saint to whom they are dedicated. There are also the churches of the great religious orders, twenty-eight parish churches, and the titular churches of the cardinals. The most noteworthy are the five patriarchal churches, the seven pilgrimage churches, and the eight basilican churches. Others are interesting either from their early date, their historical associations, from the archæological or artistic treasures they contain, or from the fragments of earlier structures which they enclose. First in rank are the five patriarchal churches. S. Giovanni in Laterano (see LATERAN), between the Cælian and the Esquiline hills, ranks as the first church in Christendom. It dates from the time of Constantine. It was, till the rebuilding of S. Peter's, the metropolitan cathedral of Rome and of the western patriarchate. It retains its 5th-century baptistery and the 13th-century cloisters, the most beautiful in Rome. The Santa Scala, brought by the Empress Helena from Jerusalem, has for centuries been the chief object of veneration among pilgrims. The church itself was burned down and rebuilt in the 14th century, and has been repeatedly altered and modernised. The adjoining palace of the popes is now converted into a museum, chiefly of Christian antiquities. The Basilica of St Peter (S. Pietro in Vaticano), the largest church in the world, was rebuilt in the 16th century from the designs of Bramante, Michelangelo, and Bernini. It was begun in 1506, and consecrated in 1626. It is in the form of a Latin cross, with a vast central dome. The interior length is 615 feet, the height of the nave 150 feet, and of the cross which surmounts the dome 435 feet. S. Paolo fuori le Mura, a vast 4th-century church, was before the fire of 1823 the most interesting church in Rome. It has been rebuilt in a style of great magnificence. S. Lorenzo fuori le Mura, occupying the site of a church founded by Constantine, was rebuilt in 578, and remodelled in the 13th century, but still retains the ancient marble and granite columns. The Basilica Liberiana, on the Esquiline, is commonly called S. Maria Maggiore, being the largest of the eighty churches in Rome dedicated to the Virgin Mary. It is one of the oldest churches in Rome, the nave dating from the 5th century.

These five patriarchal churches, together with S. Croce and S. Sebastiano, constitute the seven ancient pilgrimage churches. The five patriarchal churches, together with S. Agnese, S. Croce, and S. Clemente, are the eight basilican churches. S. Agnese fuori le Mura was founded by Constantine, and rebuilt in the 7th century. It contains many early Christian inscriptions. S. Croce is a 5th-century basilica, and is said to have been erected by the Empress Helena. S. Clemente is the most archaic church in Rome. The upper church dates from the 12th century; the lower, which is entirely underground, from the 4th; and below it there are far older substructions dating from the imperial and republican periods. In addition to the eight basilican churches, others already mentioned conserve the remains of earlier buildings. S. Maria in Cosmedin, one of the most interesting churches in Rome, preserves ten columns of the Temple of Ceres, out of which it was constructed, and twenty ancient columns taken from other buildings. It has also a beautiful tesselated pavement of ancient marbles. S. Maria degli Angeli and S. Bernardo were constructed out of the Thermæ of Diocletian, and S. Pietro in Carcere out of the Mamertine prison. S. Giorgio in Velabro, a 4th-century church, was rebuilt in the 7th century, but preserves sixteen of the ancient columns. S. Costanza, outside the Porta Pia, was erected by Constantine, and contains interesting 4th-century mosaics. The granite columns in S. Maria in Araceli, on the Capitol, have been taken from some earlier building. On the Cælian we have SS. Giovanni e Paolo, founded in the 5th century and rebuilt in the 12th; S. Stefano Rotondo, a 5th-century church, containing the episcopal throne of Gregory the Great; and the interesting church of S. Gregorio, built in 575 on the site of his father's house. On the Aventine are S. Balbina and S. Sabina, both of the 5th century. On the Esquiline are S. Pudenziana, a very ancient church, with 4th-century mosaics, probably constructed out of a private house; S. Prassede, a 9th-century church, with ancient granite columns and 9th-century mosaics; and S. Pietro in Vincoli, a 5th-century basilica, with twenty ancient Doric columns, and containing Michelangelo's statue of Moses, and the supposed chains of St Peter, which were undoubtedly presented by Pope Leo I. to the Empress Eudoxia in 442. On the right bank of the Tiber are S. Crisogono, a 12th-century church, with ancient porphyry columns and a fine mosaic pavement; S. Maria in Trastevere, a 5th-century church, rebuilt in the 12th century, with twenty-two ancient columns, some fine mosaics, a splendid marble pavement, with numerous interesting early inscriptions in the portico; S. Cecilia has 9th-century mosaics; while the Piazza of S. Pietro in Montorio commands the finest view of Rome. S. Maria sopra Minerva, near the Pantheon, the chief Dominican church, is the only Gothic church in Rome. Among the vast modern churches are the Gesù, the gorgeous church of the Jesuits, containing the tomb of S. Ignatius Loyola; S. Carlo al Corso, now the fashionable church of Rome; S. Andrea della Valle; SS. Apostoli; S. Maria Vallicella, commonly called Chiesa Nuova; and the Cappuccini, with its catacombs and Guido's picture of St Michael.

One of the greatest improvements which has been effected is the embankment of the Tiber, and the straightening and deepening of its channel. This has put a stop to the disastrous floods by which the lower parts of the city were formerly inundated. But the municipality being now practically bankrupt, the grandiose schemes for the further reconstruction of the city, and for making Rome a port by the canalisation of the Tiber, are for the present suspended.

In addition to the objects of interest which have been briefly enumerated are the vast Catacombs (q.v.) extending underground for many miles, the Ghetto, the Sapienza, the Propaganda, and the Protestant cemetery with the tombs of Keats and Shelley. The best panoramic views of Rome are from the Pincio, the Villa Mattei, S. Pietro in Montorio, the Janiculum, the garden of the Priorato di Malta, and from outside the Porta S. Giovanni. Rome is now a fairly healthy city, except in the late summer months; the water-supply is unrivalled both for quality and quantity, and the streets are well cleansed. No city excels Rome in its public fountains.

There are practically no manufactures in Rome. Hats, gloves, neckties, false pearls, and trinkets are made, and there are cabinet-makers, and a few foundries on a small scale, but compared with other great cities the absence of factory chimneys is very notable. There are printing-offices, but the Italian book-trade is centred at Milan. The chief industry is the manufacture of small mosaics, small bronzes, of statuary, casts, and pictures, either original or copies of the works of the great masters.

All the necessaries of life have to be imported from a distance, the Campagna which extends for many miles around Rome being uninhabitable on account of the malaria. It is an unenclosed and untilled waste, roamed over by herds of half-wild cattle. Corn and wine are brought from Tuscany, and from the fertile Terra di Lavoro near Naples. The prosperity of the city depends on the expenditure of the courts of the Quirinal and the Vatican, of the army of functionaries in the public offices, of the garrison, and of the foreign visitors who crowd the hotels during the winter months. The railways from all parts of Italy converge outside the city, which they enter near the Porta Maggiore on the Esquiline, and have a common terminus on the summit of the Quirinal close to the Baths of Diocletian. The omnibus service is good, and well-managed tramways traverse several of the broad new streets.

See R. Burn, *Rome and the Campagna* (1870); J. H. Parker, *Archæology of Rome* (1872–80); T. H. Dyer, *City of Rome, its Vicissitudes and Monuments* (2d ed. 1883); F. Wey, *Rome* (trans. from Fr., new ed. 1886); R. Lanciani, *Ancient Rome in the Light of Recent Discoveries* (1888); with other works by Gell, Nibby, Hare, Professor Middleton, &c., and those cited on p. 794.

ROMAN HISTORY.—Rome, the 'Mistress of the World,' the 'Eternal City,' gives name to a political empire which lasted eleven centuries, till its transfer to Byzantium, where it lasted eleven centuries more; also to a religious empire which since 42 A.D. has acquired spiritual sway over a yet larger dominion than its pagan predecessor, and which, in accord with imperial Germany, formed the twin-factor of the Holy Roman Empire, dissolved in 1806.

Colonised in the bronze age by Alban shepherds who migrated from their hills in fear of volcanic disturbance, Rome, according to her officially adopted legend, dates from 21st April 753 B.C., when Romulus, first of her seven kings, settled on the Palatine mount. From his quadrilateral stronghold—*Roma quadrata*—he made conquest of the Capitoline and Quirinal. After his successor Numa, the Cælian was annexed by Tullus Hostilius and the Aventine by Ancus Marcius. To the hills, now five under Tarquinius Priscus the fifth king, were added the Esquiline and Viminal by Servius Tullius, who walled in the seven with a stone fortification. So that under her seventh and last king, Tarquinius Superbus, the City of the Seven Hills was already 'built for empire,' on marshy soil made habitable by drainage, and connecting with the seaboard by the Tiber—a waterway so clearly the 'outlet of her supremacy' as to warrant the derivation of 'Rome' and 'Romulus' from the *Rumon* or river.

Latin in population, with a Sabine infusion, Rome was divided into three tribes—the Ramnes, the Tities, and the Luceres, and again into thirty *curiæ*. The tribal division disappeared early; that into curiæ lasted well into republican times. Out of the curiæ, originating in common religious observances, grew the *populus Romanus*, including all freeborn Romans. Its king (*rex*) was not always hereditary either in his regal or his religious capacity, nor merely elective. When a king died, his successor was chosen by the heads (*patres*) of families (*gentes*). These patres—the guardians of religious observance, of popular right, of state interests—had power to choose a provisional king (*inter-rex*), who, with the patres for assessors, decided on the new king, who was then proposed to the curiæ in assembly (*comitia curiata*) and, if approved, confirmed by the patres. The king had now absolute authority, civil, religious, and military. The patres were his councillors—the senate—having the above indicated powers, always subject to the king, who consulted them at pleasure, and filled up vacancies. In solemn assembly the Romans met in the Forum under the king or inter-rex, who put questions to the vote, when each curia voted in turn, its vote being determined by the majority within itself, and the preponderance of these votes deciding the result.

Romulus, Numa, Tullus Hostilius, and Ancus Marcius—the first and third Latin, the second and fourth Sabine—are little more than legendary names; the warrior chief Romulus typified by his *Roma quadrata* and *Comitium* or place of assembly in the Forum; the priestly Numa by his Temple of Vesta and his Regia close to it; the statesman

Tullus Hostilius by his Senate House (Curia Hostilia); and the administrator Ancus Marcius by his state-prison, his bridge across the Tiber, his fortification of the Janiculum, and his founding of the seaport Ostia. In Tarquinius Priscus (616–578 B.C.) we have an Etruscan and less shadowy Romulus, admitting into the senate a hundred new patres from conquered Latin states, and laying out the Circus Maximus for the entertainment of the people. Servius Tullius, on Tarquin's initiative, distributed all freeholders (for military purposes primarily) into tribes, classes, and centuries. Drawn up in order of battle, the centuries (bodies of one hundred) in front were composed of the wealthier citizens as better able to equip themselves for attack; behind them came the centuries of the second and third classes, poorer and less fully appointed—the three forming the heavy-armed infantry; while centuries of the fourth and fifth classes, poorer still and correspondingly equipped, held the rear. The full strength of the freeholders was divided into two equal parts—the *seniores* and the *juniores*, the latter engaged in active duty, the former as reserves. Each corps consisted of 85 centuries or 8500 men—i.e. of two legions, each about 4200 strong, auxiliary to which were the sappers and trumpeters. Finally, the six centuries of cavalry were supplemented, from the wealthiest citizens, by twelve more. For the army thus organised Servius drew levies from his four regions, corresponding to his four tribes, the Suburan, the Palatine, the Esquiline, and the Colline. These tribes included freeholders outside the gates, also entitled to meet and vote with the centuries at their comitia (*comitia centuriata*). Under her seventh and last king Rome became formidable throughout Central Italy, and owed to him the Temple of Jupiter Capitolinus, and the *Cloaca Maxima*—the drainage system tapping the hills around the Forum and carrying the waste into the Tiber. But Tarquin's rule was so masterful as to drive the people to revolt, the last provocation being his son's outrage on the noble Lucretia. When engaged at a siege near the coast he was dethroned; he and his race were exiled in perpetuity, and regal government replaced by the Republic. Three great efforts to reinstate him were defeated, and he died at Cumæ.

The Republic.—The regal check on them withdrawn, the patricians made their power so felt by the plebeians as to start a conflict between them lasting two hundred years. The king was now represented by two consuls, elected annually, and from the patrician order. The plebeians, freeborn citizens as they were, retained their votes by classes at the *comitia curiata* and by centuries at the *centuriata*, but many of them were attached as clients to patricians who commanded their votes, and all of them were excluded from the higher offices of state. Unable to elect one of themselves consul, the plebeians had not even the power to carry the patrician candidate they favoured, being in a minority in the *comitia centuriata*, and, again, in a greater minority in the ultimate and decisive assembly, the *comitia curiata*. The absolute authority wielded by the consuls they felt to be still more oppressive when, in state crises, it was merged in a dictator; so their first attempt to safeguard their liberties and lives was directed at the consular power. The first advantage they gained was the 'right of appeal,' by which no magistrate (the dictator excepted) could subject a Roman citizen to capital punishment unless with approval of the *comitia centuriata*. Power to extort such rights the plebeians possessed in their military capacity, refusing, as soldiers, to serve unless their demands were conceded. The secession of their legionaries to the Mons Sacer, on the Anio three miles off, secured them annually elected magistrates of their own, *tribuni plebis*, with power to protect them against the consuls. From two the tribunes were increased to five, and by 449 B.C. to ten. In no sense a magistrate, the tribune was a check on authority, and his power developed gradually till the tribunate, formidable at the close of the Republic, became still more so under the empire. By the Publilian law (471 B.C.) the assemblies convened by the tribune (*concilia plebis*) were made legal; not yet their decisions (*plebiscita*). At these the voting was by tribes, not by curiæ or centuries, whence the object of the tribunes was to add as many to the tribes as possible. To become member of a tribe it was necessary to be a freeholder, and so the tribunes, to multiply freeholders, agitated to secure for the plebeians their share of the *agri publici* or state-lands. Having partially succeeded in this, they won another advantage from the ever-resisting patricians—the appointment for one year of a commission of ten patricians (*decemviri*) to make public a code of law binding on patrician equally with plebeian. This code—the famous Twelve Tables—substituted written and published law for that unwritten code which, confined to the patrician few, was always interpreted in their interests. An attempt to reappoint, possibly to perpetuate, the decemvirate caused another secession; the consuls were again created; and from the growing vantage-ground of their *concilia*, increased by accessions to the plebeian order from without, the tribunes extorted the recognition of the *plebiscita* as legally binding on patricians. The *concilia*, now become *comitia tributa*, could henceforth carry reforms which, if sanctioned by the patres, had the validity of state-law. Another concession gained was intermarriage between plebeian and patrician, and thereafter the consulate—still the patrician stronghold—was attacked. The two consuls were replaced by six military tribunes drawn from either order. Of these consular tribunes the plebeians generally had the majority until, obstacles and delays notwithstanding, the Licinian and Sextian laws were passed (367) replacing the consular tribunes by consuls, two in number, of whom one at least should be a plebeian; enlarging the priestly college from two to ten functionaries, of whom plebeians were to constitute half; relieving the poorer plebeians from debt; and promoting their interests by advantageous reforms in the ownership and cultivation of land. Patrician monopolies shrunk rapidly. In 356 the dictatorship, in 350 the censorship, in 337 the prætorship, and in 300 the colleges of pontiffs and augurs were thrown open to plebeians. The *patrum auctoritas*, or control by patricians of the decrees (*plebiscita*) of the people in assembly, became a dead letter; and the two hundred years' conflict issued in the recognised validity of all measures carried in the *comitia tributa*—a conflict memorable not only for the ability displayed by either order, but for the respect for law observed equally by both.

For her first fifty years of republican life Rome expanded little. Nearest her were the Latins, the Volscians to the south-east, the Æquians to the east, and the Hernicans between the two last. Allying herself with the Latins and Hernicans, she kept the Volscians and Æquians in check till her policy became triumphantly aggressive in the sixty years between 449 and 390. Having razed the south Etruscan stronghold, Veii, she pushed northward to the Ciminian forest, whence she drew down on her the Celtic conquerors of north Etruria, who, defeating her on the Allia, took and sacked the city, all but the Capitol. Recovering rapidly from this disaster, she riveted her hold on south Etruria, gradually subjugated her old enemies and allies, the Volscians, Æquians, Latins, and Hernicans, and dominated Central Italy from the Ciminian forest to the Latin shore. The Sabellian tribes of the Apennines now gave her trouble. The most powerful of these, the Samnites, had overrun Campania; but from this she dislodged them, and, in spite of a formidable revolt extending from the Sabine Hills to the Latin shore and Campania itself, she made good her command of plain and seaboard, lying compact and firm between north Etruria with its detached cities, the Apennines with their miscellaneous tribes, and Southern Italy with its enervated Greek population. The Samnites, in a second war lasting twenty-two years, failed to get the better of her; in a third, with the northern Etruscans and the Celts as allies, they made a last attempt to crush the growing giantess. This too she defeated after desperate conflicts, in which she purchased victory dearly: the Celts were shattered; the Etruscans bought peace by heavy indemnities; and the Samnites on honourable terms became her allies. In characteristic fashion she proceeded to consolidate what she had won, planting 'colonies'—i.e. agricultural garrisons—of Roman citizens wherever their presence was required, and in this way controlling Central Italy from Adriatic to Mediterranean. At the invitation of Greek Tarentum, beset with marauding hordes, she successfully intervened in the south, till in turn Tarentum, incurring her hostility (281-280), brought King Pyrrhus of Epirus to repel her. At first the Epirotes prevailed, but their two victories were as costly as defeats, and in a third great battle at Beneventum (275) they were so punished that Pyrrhus returned to Greece. The fall of Tarentum shortly after left Rome dominant in the peninsula from the extreme south to the Ligurian and Celtic frontier. *Divide et impera* was her policy—detaching the subject states or tribes from each other to draw them more closely to herself, leaving them 'home rule,' but reserving the safeguard of coast and frontier and power to make peace or war with the outside world. Among her outlying communities the colonies of *cives Romani* above mentioned ranked first; next came those Latin towns which enjoyed the full franchise, this being sparingly conceded to other communities, of which the lowest received civil but not political rights, their members excluded from the tribes, and, as soldiers, serving not in Roman legions, but in contingents apart. To the urban communities within her pale Rome gave self-government liberally, with assemblies, senates, and magistrates, always, however, subject to the central authorities—the Roman consuls, prætors, and censors. For the administration of justice these colonies and enfranchised towns were annually visited by the prætor's representatives, called prefects, who also assumed control of such communities as were without local government. The military system was modified till the old citizen army, with its order in battle determined by civic rank, became the professional institution in which superior fighting power and experience were primary considerations to be paid for accordingly. On distant campaigns the consul in command received extension of his *imperium*, out of which grew the 'proconsul,' empowered to hold the field till the war was at an end.

Eleven years after her victory over Pyrrhus Rome engaged with Carthage in her mighty struggle for the empire of the Mediterranean. To secure her expansion westwards she had first to expel the Carthaginians from Sicily. Having gained to her side the Syracusan king Hiero, she took Agrigentum, and in 260, with her first naval armament under the consul Duilius, she signally defeated Carthage on Carthage's own element. Following up this advantage, she transferred the war to Africa, and was at first so successful as to recall a considerable part of her forces. But her consul Regulus, whom she left behind, was worsted and made prisoner, a series of naval disasters ensued, and Carthage seemed about to regain more than she had lost of Sicily, when the consul Catulus (241), in command of a splendid fleet, gained a decisive victory over the Carthaginians, who thereupon undertook to evacuate Sicily and the adjacent islands. This ended the first Punic war, twenty-two years in duration, the result to Rome being her acquisition, not only of Sicily, which she henceforth governed as a 'province,' but (a few years later) of Sardinia and Corsica, also governed like Sicily by magistrates sent every year from the capital. Finding Rome her match at sea, Carthage resumed hostilities by acquiring a foothold in Spain, which was to become her military basis for further operations against her rival. Under Hamilcar, the great general who conceived this plan, she occupied the peninsula as far as the Tagus; Hasdrubal continued the work of subjugation till his death (221); and finally Hamilcar's son Hannibal, who, with more than his father's genius, shared all his father's antipathy to Rome, pushed the conquests of Carthage up to the Ebro.

Meanwhile Rome herself was engaged in subduing the Celts in the valley of the Po, and having planted three colonies—Placentia, Cremona, and Mutina—to safeguard her new possessions, she turned her attention on Spain, and got Carthage to make the Ebro her northern boundary in the peninsula. But such engagements could not long be respected. Saguntum, a Greek colony in alliance with Rome, on the east coast of Spain, was besieged and taken by Hannibal, though a Roman embassy to Carthage had protested against the operation. The second Punic war was declared in 218, and Rome sent one army under P. Cornelius Scipio to Spain, and another under T. Sempronius Gracchus through Sicily to Africa. But Hannibal's plans, long matured in secret, were carried out with unexampled celerity. Scipio had got no farther than Massilia when Hannibal, having crossed the Pyrenees, was already at the Rhone; and after fighting his way over the Alps against every obstacle—the hostility of the tribes included—descended on Cisalpine Gaul with but 26,000 surviving of his army of 59,000 men. Defeating the Romans on the Ticino and the Trebia, he realised his expectation of getting the Celts to join him, and in the spring of 217 he pushed on to the city through east Etruria. He annihilated the consul Flaminius at Lake Trasimene; and from Spoletium within a few days of Rome he turned eastward, plundering as he went, and paused for supplies in north Apulia. The Romans, now gravely alarmed, elected a dictator, Quintus Fabius Maximus; but his masterly inactivity did not satisfy them, and they sent two consuls with a numerous army to hurl back the invader. In the great battle of Cannæ Hannibal's victory was complete—the Romans losing 70,000 men to Hannibal's 6000, and Southern Italy—all but the Latin colonies and the Greek coast-towns—came to his side. Macedonia and part of Sicily declared for the conqueror, and the Greek communities one by one were surrendering to him. The Romans tried to recover Campania and laid siege to Capua, and this brought Hannibal up from Tarentum. He even marched directly on Rome herself and rode up to the Colline gate; but he retired unable to make any impression on the city and its defenders; he conciliated no allies; and fell back on South Italy, leaving Capua an easy prey to its besiegers. Five years had done little to encourage the Romans, till Hasdrubal, defeated in Spain, crossed the Alps and skirted the east coast of Italy, to reinforce Hannibal in the south. But he was beaten and killed on the Metaurus by Nero, who, turning southwards, marched up to Hannibal's camp and threw Hasdrubal's head into it. The war in Italy was virtually at an end. Hannibal's attempt on Rome had failed. Meanwhile young Publius Scipio, having driven the Carthaginians from Spain, returned to the city with the proposal to descend on Carthage herself. The senate, not without misgiving, consented. Scipio's successes in Africa compelled Hannibal to leave his vantage ground in Southern Italy and come to the aid of his hard-pressed compatriots. The great battle at Zama left Scipio the victor, Hannibal a fugitive, and Carthage suing for peace. Her request was granted, and she retained her territory, but bound herself to undertake no wars outside Africa and (without the consent of Rome) no wars inside. She surrendered nearly all her navy and had to pay an indemnity of 10,000 talents in fifty years. Rome was now (202) mistress of the Mediterranean, but she had to consolidate her acquisitions. Sicily, easily ruled under a prætor, became her granary and the provision store for her legions. Spain, however, required prætors invested with consular power and a permanent garrison of four legions to keep her in order. The insurrection of Viriathus lasted till the fall of Numantia after a memorable resistance; and not before Scipio Africanus the younger took it in hand could the country really be called pacified and its rich resources made available. Meanwhile Rome had a secret dread of the resuscitation of Carthage, and she courted every pretext for renewing war with her and razing her to the ground. That came in 151 when Carthage, goaded by Masinissa's forays, broke her treaty obligations to punish him. In 149 Rome laid siege to her, and by 146 she was stamped out from the roll of great cities. Her territory was now the Roman province of Africa, protected by Masinissa's three sons, who ruled Numidia. In Italy herself the cities that had declared for Hannibal were severely punished. In the north the Celts forfeited their separate political existence. In the south Roman settlers occupied confiscated lands—nearly everywhere but in Apulia and Lucania; and even the Latins soon felt the preponderance of the Roman element, which tended more and more to assert itself.

Fifty years after she became mistress of the west, Rome had also become the mightiest state in the east, first by conquering Philip of Macedon, who had been the ally of Hannibal, and whose ambition to dominate the Ægean drew Rome into the second Macedonian war (200), which ended in Philip's defeat at Cynoscephalæ and the reduction of Macedon to a minor power. Next came the 'liberation of Greece,' which, with the alliance that followed, enabled Rome to proceed against Antiochus, king of Syria, who in 197–196 had overrun Asia Minor and penetrated into Thrace. Beaten by land and sea, Antiochus sustained a decisive defeat at Magnesia in Asia Minor, and fell back behind the Halys and Taurus range, to the west of which all the kingdoms and communities were now under Rome's protection. Western Greece, however, began to give trouble, and Philip of Macedon's successor, Perseus, incurred a final encounter with the Romans in a third Macedonic war, terminating in his utter rout and capture at Pydna (168). So that, twenty-two years thereafter, Macedonia had sunk into a Roman province, whose governor came gradually to control the Greek states till the whole peninsula was subservient to Rome. Steadily strengthening her hold on Asia Minor, Rome further assumed the guardianship of the king of Syria; while in Egypt, which in 168 had acknowledged her suzerainty, she restored a *protégé* of hers to the throne, at the same time, true to her policy, dividing and weakening his power. From Syria to Spain the Mediterranean was now a Roman lake, but her authority was better established in the west than in the east. In the former her provincial government was fairly established; not so in the latter, which, besides its more elastic frontier, possessed a civilisation in some respects superior to her own.

With the establishment of her supremacy without began Rome's troubles within. The ennobled plebeians (*nobiles*) combined with the old patrician families (*optimates*) to exclude all but themselves from high office or the senate. The constitution had become an oligarchy in which the comitia, nominally supreme in electing magistrates and passing laws, were practically superseded. The prestige of having saved Rome from Hannibal and raised her to undisputed empire belonged to the aristocratic senate, while the graver disasters (at Trasimene and Cannæ) were due to the people's favourites. But that prestige was getting gradually impaired by economic failure at home and confusion abroad, and the people were awaking to a sense of the power the senate had taken from them. The small holders, particularly in Etruria and South Italy, burdened with military service and competing vainly with foreign importations of corn and labour, deserted the farms on which they could neither thrive nor live, and the multiplication of colonies throughout the peninsula gave but temporary relief. To arrest the imminent annihilation of these freeholders—Rome's main-stay—Tiberius Gracchus, the tribune (133), proposed his reform, which was practically the first of a series of attacks on senate-rule. Occupiers not recognised by the Licinian law were to be evicted; occupation was not to extend beyond 1000 acres; public grazing-lands were to be reclaimed for tillage. The senate opposed him strenuously, and he was killed in an incidental collision; but his struggle was renewed on a larger scale by his brother Gaius, who curtailed the senatorial power by getting the comitia to deprive it of privilege after privilege. He, too, fell in a brawl, and by 111 his reforms had already been frustrated and a quite new aspect given to the agrarian question. But the popular party had been taught its lesson by means of the tribunate to reassert its power in the comitia to work out its salvation. Gaius Gracchus had been dead ten years when the client-state Numidia was seized by Jugurtha, who had supplanted its legitimate governors and insulted the Roman name. The popular leaders insisted on his chastisement; but the war, mismanaged under patrician officers, was carried to a triumphant close by the people's favourite, the low-born, illiterate, but efficient Marius, who in January 104 brought Jugurtha in chains to Rome. Still greater successes awaited their hero. Having annihilated the Cimbri and Teutones, who had inflicted four defeats on the patrician generals, and been made consul for the sixth time, he aided the popular vindicators, Saturninus and Glaucia, to harass the senate. But the advantages they secured were small, their violence had to be curbed by Marius himself, and at last the populace turned upon and killed them. The rise of Marius, however, was fraught with far-reaching results. His six consulships, his intervention as a soldier in politics, his military reforms, by which all classes, irrespective of rank or means, were admitted to the legion, and the compulsory levy replaced by volunteer service under a popular leader were epoch-making in the revolution.

The commercial class—soon to develop into the equestrian order—had by their power in the courts and their increasing exactions as farmers-general (*publicani*) been at feud with their controllers, the magisterial class in the provinces, and fiscal reform became urgent. The Italian communities—the allies of Rome—had long felt their burdens increase as their privileges waned, and they demanded their share of the conquests they had helped to achieve. Promises of relief and expectation of securing the Roman citizenship had brought them in crowds to the capital, to be driven back again by an exclusive senate and people. The tribune Drusus strove to bring about fiscal reform and the redress of the Italians, but though he carried his laws he could not make them valid, and finally he was assassinated. The equestrians remained supreme in the courts, while the murder of Drusus roused the irritated Italians to rebellion (90–89) in the central highlands and the south especially. The Social War began, the insurgents aiming at the erection of a new Italian state governed on the lines of the Roman constitution. To suppress them the two consuls of the year, each with five legates, including Marius and his future rival Sulla, headed the legions, but were disastrously beaten. In the north, however, Marius and Sulla, and in Campania the consul Cæsar, were partially victorious, but so partially that reform after reform had to be conceded, till the Italians could obtain the franchise merely for the asking. The war at length died out by the absorption of the insurgents into the Roman citizenship; but the internal troubles continued. The new citizens enlarged their political claims, the senate was distracted by personal feuds, economic distress prevailed among all, and a war with Mithridates threw Marius and Sulla into rivalry as to which should command the expeditionary force. The action of the tribune Sulpicius in dealing with this complicated crisis intensified it the more. He introduced laws to entrust Marius with the Mithridatic campaign, to allow the new citizens to vote in all, not in a restricted, number of tribes, to confine the freedmen to the four urban tribes no longer, to unseat any senator more than 2000 denari in debt, to recall from exile those suspected of complicity with the Italian insurgents. Every one of these proposals, bitterly contested, would yet have become law but for the consul Sulla, who, heading in Campania the legions assigned him in the Social War, marched on Rome—the first consul who ever invaded her with her own troops. The flight of Marius and Sulpicius left him free to impose arbitrary measures, among them that by which the sanction of the senate was required before any bill could be entertained by the comitia; and, having seen the consular elections safely through, he set out against Mithridates (87).

In his absence Cinna attempted as consul to carry the reforms of Sulpicius, but was driven from Rome amid the massacre of the new citizens in voting assembly. He in turn rallied round him the legions in Campania, and joined by the veteran Marius, who reappeared from Africa, he entered Rome and was recognised as consul, as was Marius himself (for the seventh time). After a brutally vindictive massacre Marius died (86), and Cinna remained supreme, securing the consulship to himself and a confederate, and getting the newly-enfranchised Italians enrolled in all the tribes. In 84 he died, and next year Sulla, having concluded a peace with Mithridates and left Asia tranquil, landed at Brundusium with a powerful army, including many of the *nobiles* who had fled from Cinna. Resistance, nowhere formidable, he quickly overcame and (82) entered Rome, to find his lieutenants triumphant in North Italy and to annihilate the remnants of the Marian party just outside the city. But he failed to use his power, absolute as it was, for the abatement of long-standing evils and the prevention of coming disasters. Triumphant everywhere, he instituted a reign of terror—slaying, proscribing, and confiscating through revenge or suspicion. For nine years his rule as dictator, in spite of much salutary administration, was marred by a remorseless partisanship which left the future to take care of itself—creating in the sons and heirs of the proscribed and dispossessed the handy tools of agitation, justified as this increasingly became by ruined agriculture, by the multiplying of *latifundia* with their necessary evictions, and by the rapid disappearance from nearly all Italy of her substantial freeholders. Life and property, already widely forfeited at his bidding, were still further endangered by brigandage, which culminated in the formidable rising of Spartacus, who held out for two years (73–71). Still fortifying the senate, Sulla left the tribunes with no power of interdict save in protecting individual plebeians, and he excluded them from ever holding high office; he took from the equestrians the control of the courts, giving it back to the senate, to which he also restored its exclusive rights in the colleges of pontiffs and augurs. He extended the application of the criminal law—a wise measure; but he did more than any Roman before him to facilitate the rise to supreme power of any ambitious governor of a province or leader of a provincial army. He forged in fact the weapon by which his system fell (70).

In Spain Cneius Pompey, one of Sulla's favourites, held a commission from the senate to crush the Marian governor Sertorius, who had defeated successive proconsuls sent to humble him. With the submission of the natives following the murder of Sertorius he returned to Rome, and found the opposition to Sulla looking out for a leader to effect a change of government. His ambition to have a triumph, to be made consul for next year (70), and by consequence to receive command in the east, was gratified for the sake of his name and influence. He was elected consul with Crassus, the victor over Spartacus, their troops being just outside the gates, and on the triumph and ovation granted to the two generals ensued Pompey's fulfilment of the bargain—the reinstatement of the tribunes in their authority and of the equestrians in the courts, and the weeding out from the senate of Sulla's notorious tools. The example set by Sulla was improved upon, and henceforth the republican constitution was at the mercy of the strongest leader supported by the strongest battalions. Pompey's next move was to obtain command abroad, and after some delay this was found in a mission to clear the Mediterranean of pirates. For this formidable undertaking the tribune Gabinius secured him large powers, tenable for three years, including authority over all Roman magistrates in the Mediterranean provinces for fifty miles inland. These, backed by a splendid fleet and army, were yet further enhanced by the tribune Manilius, who got Pompey entrusted with the campaign against Mithridates and with the charge of Roman interests in the east. The wiser senators gave ominous warning against these measures, but were powerless against tribunes and people, seconded by equestrians, who as the commercial class drew much of their wealth from Asia. So Pompey set out in 67. Meanwhile Cæsar had come to the front—a patrician, who was also the nephew of Marius and son-in-law of Cinna, and whose consummate ability, shown in the revindication of the tribunate and the carrying of the measures in support of Pompey, had full scope now that Pompey's back was turned. He deepened his hold on the people by avenging the injured names of Marius, Cinna, and Saturninus, pleading for the children of the proscribed, and bringing Sulla's headsmen to justice.

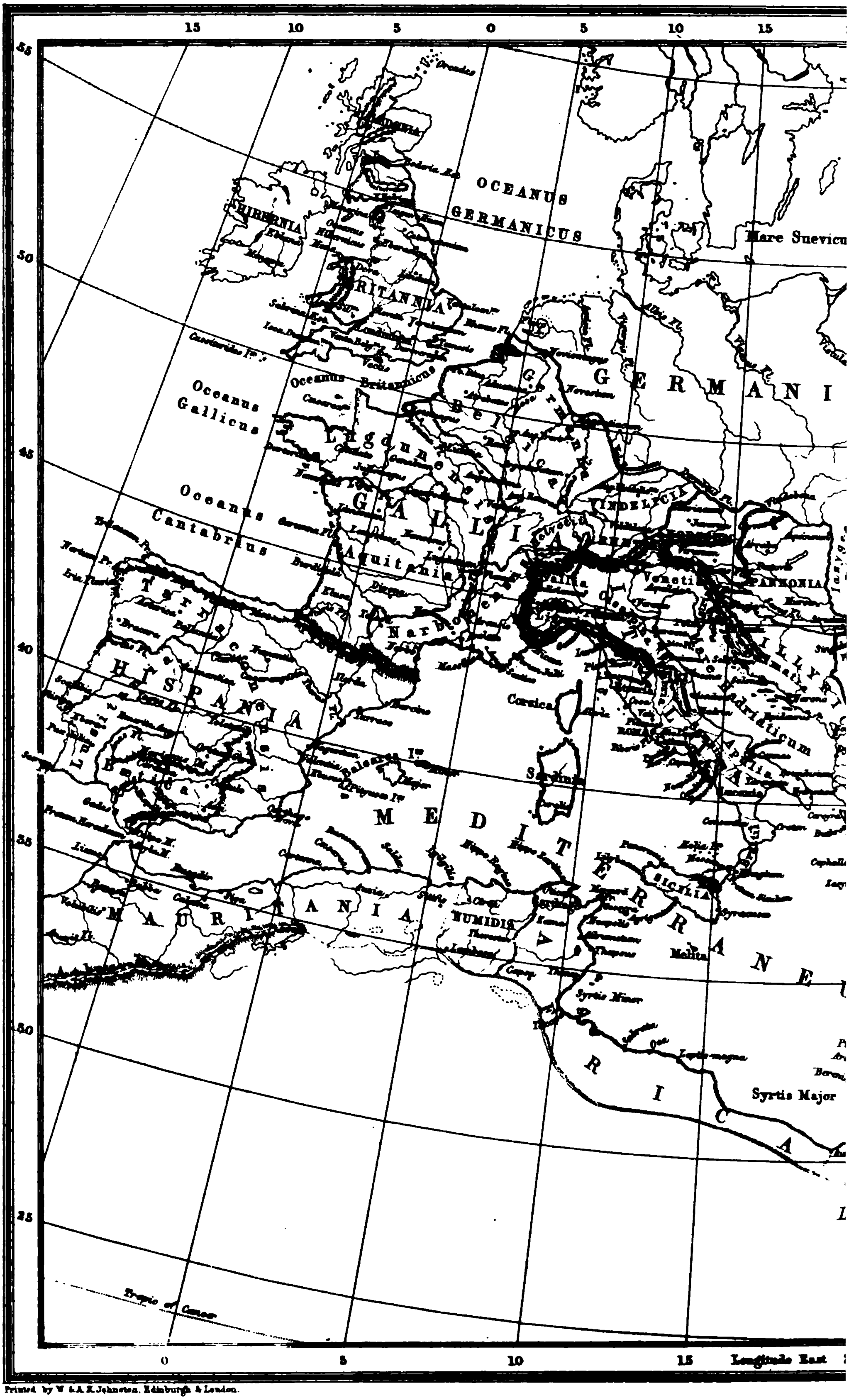
Rising in popular favour by his efforts to enfranchise the Transpadane Latins and his munificent promotion of public works and entertainments, he spared no means, constitutional or the reverse, to put himself on even terms with Pompey before that magnate's return. Crassus, the millionaire, he found a tractable auxiliary, in concert with whom he was rapidly gaining powers hardly inferior to Pompey's, when the Catilinarian conspiracy (63), exposed and defeated by Cicero as consul, involved Cæsar in the ill-will in which the middle classes held popular adventurers. Pompey had now returned to importune the senate for the ratification of his measures in Asia and the bestowal of land on his legionaries. His demands met with determined opposition, till Cæsar, posing as his friend, formed with him and Crassus the coalition—the first, if irregular, triumvirate—of which Pompey was the head, Cæsar engaging to see Pompey satisfied, and Pompey in return promoting Cæsar's candidature for the consulship. Cicero strove to undo a coalition he knew to be fatal to his ideal of a conservative republic, but in vain; he saw the senate weakened by a quarrel with the equestrians and its authority impugned by the friends of Catiline, who arraigned him for having, with the senate's approval, violated the law in putting to death the conspirator's lieutenants. The triumvirate in 59 fulfilled its compact. Cæsar obtained the consulship and the satisfaction of Pompey's demands, conciliated the equestrians at the expense of the senate, and carried an agrarian law enabling him one day to reward his faithful troops. But his crowning success was his obtaining for five years the military command of Cisalpine Gaul, Illyricum, and later of Transalpine Gaul, from which he could scan every political move in Italy. Next year (58) Clodius, the tribune, proceeded against Cicero, who, thrown over by Pompey and with Cæsar out of reach, fled from Rome and was outlawed—to be recalled (57), and his outlawry annulled by senate and people, in the reaction induced by Clodius's misdeeds. Cicero, to fortify the constitution, renewed his efforts, only to fail and retire from public life. The triumvirs tightened their alliance. Cæsar secured his command for five years more; Pompey and Crassus were elected consuls, and Pompey received as province the two Spains, with Africa, and Crassus, Syria—the Roman empire being at the mercy of all three, not, however, for long. Crassus was defeated and killed by the Parthians (53), and Pompey was slowly but surely drawn into antagonism with Cæsar. Rome, in the absence of efficient government, was in ceaseless turmoil, till the senate in despair induced Pompey to remain in Italy, electing him sole consul (52), giving him, with fresh legions, five years' more command, and, in fact, pitting him as its champion against Cæsar. It tried to reduce Cæsar to impotence, either by keeping him at his post, and so baulking his candidature for the consulship, which required his presence in the capital, or, by terminating his command at its legal expiry, to detach him from his troops and make him pursue his candidature in Rome as a private individual. Negotiations between him and the senate only left the latter more uncompromising; and with well-inspired audacity he crossed the Rubicon (49) and advanced on the city. Unprepared for such a move, Pompey and most of the senatorial party, including the consuls and many nobles, withdrew to Greece, leaving Cæsar to enter Rome in triumph. The mighty duel between the two chiefs had begun. After a brief pause Cæsar hurried to Spain, and, victorious over the powerful armies of Pompey's legates, returned to Rome, where, appointed dictator in his absence, he almost immediately renounced the post, and as consul for 48 crossed over into Greece and dealt Pompey a crushing blow at Pharsalia. The Pompeian cause struggled on till 45, when it collapsed at Munda, and Cæsar was made by the senate dictator for life. Unlike Sulla, he used his power with a clemency, a statesman-like wisdom, and a patriotism that made men almost forgive, if not forget, how he came by it. The roll of his salutary reforms and innovations is indicated elsewhere (see CÆSAR); but here our interest centres in the significance of the empire he initiated. That meant the merely nominal retention of the old constitution with its senate, its comitia, its consuls, and its tribunes, under the fiction that the supreme power was held at the people's will. Really it meant an autocracy reaching to the remotest province, resting in the last resort on the military arm—an autocracy whose founder took the title 'imperator,' as expressing his arbitrary and uncontrolled *imperium*, in token of which he appeared with the laurel wreath and the triumphal garb and sceptre. From the senate which he summoned and presided at to the assembly where he carried laws, and the court where he dispensed justice, he was everywhere the chief magistrate. The empire he designed to bequeath was to be bounded by the ocean on the west, by the Rhine and Danube on the north, by the Caucasus and the Euphrates on the east, and by the African desert on the south, and within these limits he wanted to extend the Roman citizenship, and admit their communities to share the government. This scheme of consolidation he did not live to carry out; but he reduced fiscal burdens in the provinces and curbed the authority of their governors.

His assassination, March 15, 44, was followed by an attempt, powerfully aided by Cicero, to win back the old republican constitution; but Cæsar's representative, Antony, at the head of seventeen legions, combined with Lepidus and Octavian, just made consul, in spite of his youth, to form the second triumvirate, which began operations by proscribing and assassinating its opponents—Cicero among the number. A stand made at Philippi by Brutus and Cassius was crushed by Octavian and Antony, after which the triumvirs divided the empire between them—Octavian taking Italy and the west, Antony the east, and Lepidus Africa. Antony contemplated with Cleopatra an eastern empire, while Lepidus, having lost Africa, was exiled, and the death of Sextus Pompeius, after the destruction of his fleet in the Mediterranean, left Octavian, who had been sagaciously strengthening his position in the west, with only Antony for rival. The inevitable collision took place off Actium (31), and the victorious Octavian, after the suicide of Cleopatra and her paramour, remained master of the east (29). Two years more saw him in Rome, the grand-nephew and heir of Cæsar, armed with authority to mould a government out of republican and imperial institutions. For this he had every qualification.

The Empire.—Augustus began (28–27 B.C.) by a restoration of the republic, with himself as *princeps*, the republican constitution being retained, while the *princeps* held the real power. By decrees of the senate he assumed, in token of supreme dignity, the cognomen 'Augustus,' and also the *proconsulare imperium*, which far exceeded the old proconsular command in width of area and length of tenure, the provinces being governed by legates appointed and controlled by him alone. Of army and navy he was commander-in-chief, raising or dissolving both, and declaring or concluding war at pleasure. His *imperium*, contrary to precedent, he was allowed to retain within the *pomœrium*, the city's consecrated boundary, giving him there the power wielded by a proconsul in his province. Augustus refrained from exercising this in Rome, but as tribune of the people he controlled the entire administrative machine, so that, what with proconsular command and the *tribunicia* *potestas*, he possessed powers which made all others of minor importance. Head of the state, he was also head of religion as *pontifex maximus*, and from time to time he had privileges and exemptions decreed him by the senate. Anxious as he was to retain the outward show of republican institutions, they declined under the weight of his personal influence. The comitia were 'transferred from the Campus to the senate,' which in the succeeding reign nominated and voted for candidates to all magistracies except the consulship, these magistracies being in request for the social distinction they carried, not for any power they conferred. The emperor as *princeps* virtually appointed them, and his subordinates transacted their work. The consulship itself, the highest ambition of the private citizen, and a prerequisite for provincial command, was shorn of its duties, excepting those of presiding in the senate and regulating its proceedings. Prætor, ædile, tribune ceased to be what they were under the republic—the last named swallowed up in the *tribunicia potestas*. Only the quæstor retained something of the old significance. But the senate, in theory at least, continued to represent the republican system. To it, in the absence of a princeps, the real power reverted, and from it the new princeps received the authority and the privileges still derived by a fiction only from the people. But the princeps was really nominated by the army, and though the senate was formally deferred to as beyond his jurisdiction, he could in his capacity as censor man it as he chose, till it survived but in name, like the comitia and the magistracies. These innovations had their compensating side. The provinces, previously at the mercy of nominees of the Roman people, now under the control of the princeps or emperor, gradually gained equality with the Italians as Roman citizens, and made corresponding advances in civilisation and prosperity.

With the establishment of the imperial system the fortunes of Rome are reflected in those of her emperors, to narrate which would be to repeat the biographies given elsewhere. Henceforth we have but to deal with epoch-making events. Tiberius (14–27 A.D.) had little of his predecessor's esteem, genuine or assumed, for republican institutions. The senate became more of an imperial tool, all power more and more embodied in the princeps. The simple mode of life affected by Augustus was replaced by a splendour conspicuous in multiplying palatial residences, in the bodyguards, the courtiers, the aulic etiquette subsequently carried to unheard-of lengths. The population of Rome, from the highest to the humblest, deteriorated—a wealthy, indolent, luxurious upper class maintaining mobs of dependents, below whom was the proletariat, which the emperor from time to time provisioned and amused. Secure against public opinion, Tiberius relied on the military arm, and in Rome herself had his prætorian guard, some 6000 strong, within ready call. These troops acquired a power which overshadowed all others as the emperors became more and more dependent on them. Caligula (37–41) did much to show with what depravity the imperial system was compatible, and in the succeeding reigns of Claudius (41–54) and of Nero (54–68) the evils it could generate had further illustration. The former, made emperor by the prætorians in defiance of the senate, was the creature of profligate and scheming wives, the second of whom poisoned him; the latter perpetrated every crime or excess within his power, till, at the age of thirty, he committed suicide, to the joy of Romans, provincials, and of the army itself. Like his two predecessors he had first been hailed by the soldiers as imperator, and thereafter invested with power by the senate; but with him the succession from Augustus expired; and whom to replace him by was the question. Galba (69), the nominee of senate and soldiers alike, incurred the enmity of the prætorians, who killed him in the interests of Otho (69), now proclaimed emperor. But the legions on the German frontier preferred their own general, Vitellius (69). Otho, defeated at the head of his prætorians, committed suicide, and Vitellius succeeded him, in turn to be murdered after being disavowed by the army in Syria, who proclaimed their commander, Vespasian. With him began the Flavians (69–96), strong and beneficent emperors, save one. Vespasian (69–79) disclaimed the divine attributes associated with the Cæsar-worship of his Julian predecessors, and not only returned to the simpler life and more modest court of early imperial days, but tried to resuscitate the authority of the senate, and even ostentatiously to keep himself within the law and to promote the welfare of the people. Titus (79–81) improved on this sound policy, while providing public baths and the amusements of the Colosseum; but his brother Domitian (81–96) became infamous for profligacy and cruelty, popular only with the worst of his prætorians. Nerva (96–98) was restoring the best traditions of the Flavii, when, after sixteen months' reign, he was murdered by the prætorians, impatient of his austerities—not, however, before he had adopted as son and successor Trajan (98–117), commanding on the Rhine. The assumption of empire by a born provincial illustrates the gradual weakening of Rome's connection with her rulers, whose seat of government became really the military headquarters for the time being. He and the following three emperors gave Rome a century of beneficent rule—the happiest hundred years yet known to her. Living like a plain soldier, he conciliated the senate by the deference he paid it, and the people, whose good he consulted, while keeping the Roman name respected abroad. His adopted successor, Hadrian (117–138), gave up to travel the time spent by Trajan in war, visiting the provinces from the east to Britain, providing them with public buildings, improving the discipline of the army, and indeed the whole administrative organisation. A provincial himself, he adopted a provincial to succeed him—Aurelius Antoninus, a native of Gaul (138–161). He too earned the love of the Roman world, and on his death an adopted son of his, Marcus Aurelius, became emperor (161–180). He was a thinker and moralist, whom necessity made also a man of action, called away to defend the Danube and Upper Rhine. Unhappy in his wife, he was still more so in his son Commodus, and died at headquarters, closing the line of the good emperors. The profligate reign of Commodus (182–192) accentuated still more the ascendency of the soldiers, who killed his upright and austere successor, Pertinax (193), and became for nearly a century the makers and unmakers of emperors. The Augustan system was gone; except on a few insignificant occasions, the senate did not assert its right to nominate; the soldiers, often serving on the frontiers, were the arbiters of empire. The prætorians next sold it to the highest bidder, the rich senator Didius Julianus; but this was resented by the provincial armies, who started their own nominees.

The ensuing conflicts between these 'pretenders' resulted in the triumph of Septimius Severus (193–211), an able, unscrupulous African soldier, who, ignoring the senate, till then the formal ratifiers of imperial authority, set the further precedent of posing as proconsul in the city itself, made the palace, not the forum, the justice-seat, and raised the prefect of the prætorians to power only inferior to his own. Caracalla (211–217), that he might impose on the provinces the taxes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OCEANUS
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Mare Suevicu
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BRITANNIA
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Gallicus
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Cantabricus
GERMANIA
Belgica
Lugdunensis
GALLIA
Aquitania
Narbonensis
VINDELICIA
NORICUM
PANNONIA
Venetia
ILLYRICUM
Adriaticum
Corsica
Sardinia
HISPANIA
Tarraconensis
Lusitania
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NUMIDIA
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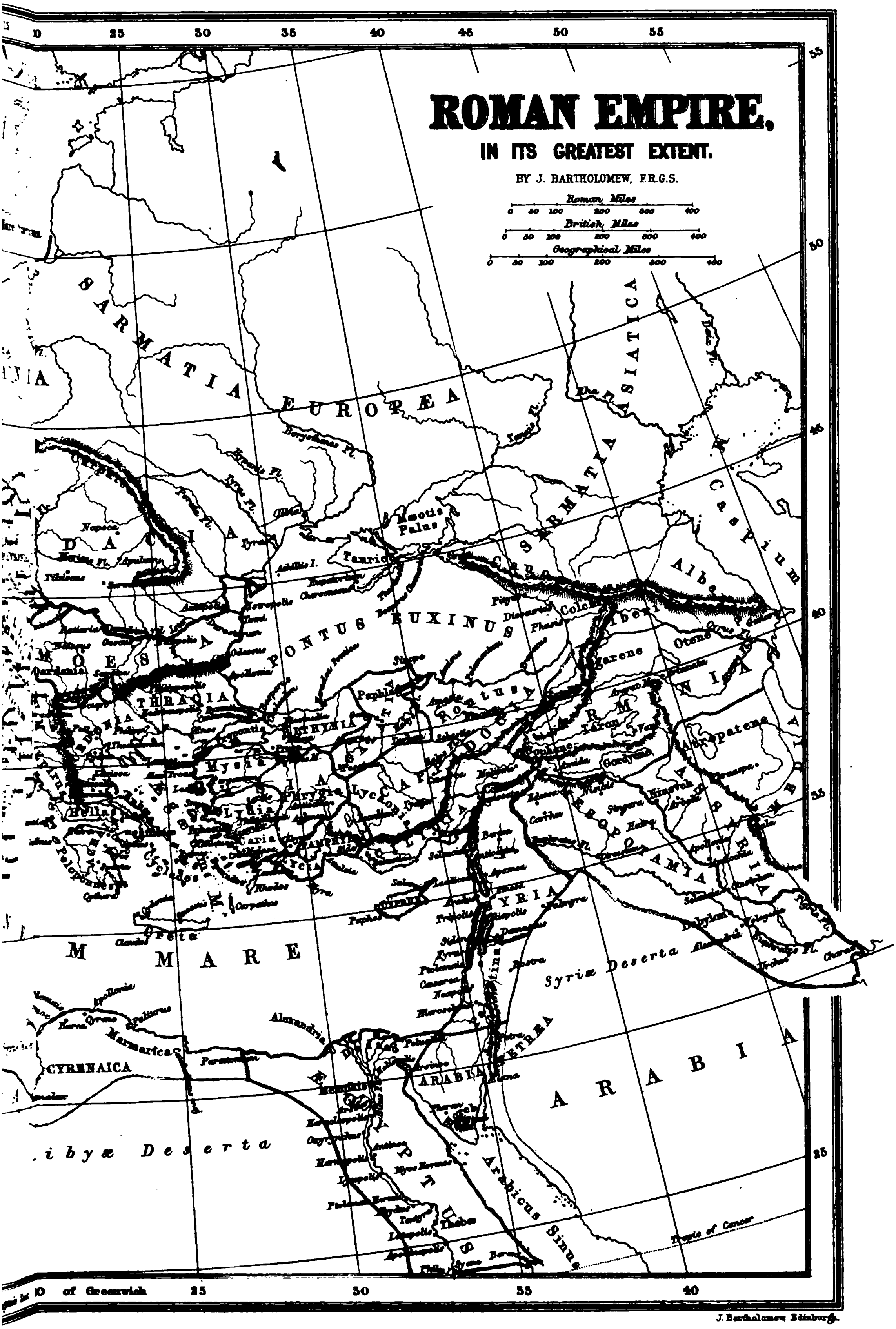

ROMAN EMPIRE,

IN ITS GREATEST EXTENT.

BY J. BARTHOLOMEW, F.R.G.S.

Roman Miles
0 50 100 200 300 400
British Miles
0 50 100 200 300 400
Geographical Miles
0 50 100 200 300 400
20
25
30
35
40
45
50
55
of Greenwich
SARMATIA EUROPÆA
SARMATIA ASIATICA
Borysthenes Fl.
Tanais Fl.
Rha Fl.
Daix Fl.
Hypanis Fl.
Tyras Fl.
Porata Fl.
Olbia
Mæotis Palus
Taurica
DACIA
Napoca
Apulum
MŒSIA
THRACIA
Apollonia
Odessus
PONTUS EUXINUS
Chersonesus
Colchis
Phasis
Dioscurias
Pityus
Iberi
Alba
Caspium
Cyrus Fl.
Otene
Sinope
Paphlagonia
Amasia
Pontus
BITHYNIA
Mysia
Lydia
Caria
Lycia
Phrygia
Lycaonia
CAPPADOCIA
Cilicia
Tarsus
ARMENIA
Sophene
Taron
Gordyene
Atropatene
Nineveh
Arbela
Singara
Nisibis
Carrhae
Edessa
Samosata
MESOPOTAMIA
Euphrates Fl.
Tigris Fl.
Babylon
Seleucia
Ctesiphon
Charax
Antiochia
Apamea
SYRIA
Palmyra
Damascus
Berytus
Sidon
Tyrus
Ptolemais
Cæsarea
Bostra
Petra
Syriæ Deserta
ARABIA
ARABIA PETRÆA
Palestina
Salamis
Cyprus
Paphos
Rhodos
Carpathus
Creta
Cyclades
Macedonia
Hellas
Peloponnesus
Cythera
MARE
Apollonia
Cyrene
Barca
Marmarica
CYRENAICA
Parætonium
Alexandria
Pelusium
Memphis
Heracleopolis
Oxyrynchus
Hermopolis
Antinoe
Lycopolis
Ptolemais
Tentyra
Thebæ
Latopolis
Apollinopolis
Syene
Philæ
Berenice
Myos Hormos
ÆGYPTUS
Arabicus Sinus
Libyæ Deserta
Tropic of Cancer
Persicus Sinus

J. Bartholomew, Edinburgh.

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paid by Rome, gave the rights of citizenship to the former, thus equalising all and unifying the empire. His brutal personality has no further interest for us any more than that of his fifteen successors, nearly all of whom came by a violent death, generally at the hands of the soldiers who had set them up. For them the dreary *Augustan History*, or its vivid condensation by Gibbon, must suffice, with our own articles on Heliogabalus, Severus, the three Gordians, Decius, Gallus, and Gallienus. They left the Roman empire weak at every frontier, exposed to the Franks on the Rhine and the Goths on the Danube. The former ravaged Gaul and Spain, the latter Asia Minor and Greece, while the Persians, relieved of the Parthian yoke, had again become a formidable power in the east. In Rome and throughout Italy anarchy and distress prevailed till a temporary revival was brought about by the *Illyrian emperors*—Claudius (268–270) driving back the Goths, and the yet abler Aurelian (270–275), by his victories over Goths and Germans and his successes in the east and west, restoring the lustre of the Roman arms, and, for a brief space, the unity of the empire.

Diocletian (284–305), also an Illyrian, the next great name on the imperial roll, introduced a system of safeguards against dissolution within and aggression from without. He assumed the most capable colleague he could find to share with him the government of the empire. This was Maximian, who, like himself, took the title of Augustus. He further reinforced this dual control by associating with him Galerius and Constantius, able generals, like Maximian, whom he proclaimed as *Cæsares*, below the two *Augusti* in rank, but with the right of succession to these. He himself had Thrace, Egypt, and Asia under him; to Maximian he gave Italy and Africa, to Constantius Gaul, Spain, and Britain, to Galerius the Danubian provinces. Thus internal sedition was suppressed within the empire, and, this distraction removed, the frontier fortifications could be perfected. The Rhine, the Danube, and the Persian boundary were garrisoned at frequent intervals and the barbarians kept in check, while all temptation of the soldiers to sedition was overawed by the repressive measures at the command of the four rulers acting in concert. Rome now ceased to be the one capital. If she remained a capital, it was as the seat of a nominal senate. The *Augusti* and *Cæsares* lived at their headquarters, Diocletian at Nicomedia, Maximian at Milan, Constantius at Treves, Galerius at Sirmium. This was a momentous departure from the tradition by which the emperors had claimed to be but the supreme magistrates of the city and the chiefs of her armies. Rome indeed was less imperial than any town in which the emperor chose to live. The policy of keeping the soldiery estranged from the emperor's presence took the form of increased dignity in his demeanour and mode of life, the oriental magnificence introduced by Aurelian reaching extravagant lengths in Diocletian. He reorganised the services, civil and military, under new titles, which came to be more valued than the republican consul or senator, and typified the completely autocratic power he assumed. So long as he lived his system worked effectively; but after twenty-one years, and in breaking health, he abdicated publicly the power he felt incapable of wielding. His masterful personality no longer felt, rupture between *Cæsares* and *Augusti* ended in civil wars, till the son of the Cæsar Constantius, Constantine, who had himself become Cæsar of the army in Britain, overcame all rivalry, and in 323 ruled the empire single-handed. Christianity, since its rise under Augustus and its spread under Tiberius and the later emperors, had triumphed over the last attempt under Diocletian to crush it by persecution, and the politic Constantine, adopting it as his own religion, made it also the state's. To the tottering imperial fabric it brought new strength, armed with which he proceeded to develop Diocletian's policy of rehabilitation. From Rome he transferred the seat of government to Byzantium, henceforth called Constantinople, commanding by its position the Greek and Asiatic worlds. Remodelling Rome's traditional institutions, he made a new senate, with a large infusion of Greeks, all of his own choosing; he instituted a new *præfectus urbi*, and founded in the 'Rome on the Bosporus' an absolute monarchy. Reducing the number of soldiers under each general, he weakened the army's power to revolt by dividing it into two classes, one for the towns, the other for the frontiers. The same subdividing process he carried into the provinces, splitting them up into districts, which again he rearranged into thirteen larger ones, subject to four prefects, responsible in their turn to the emperor. Multiplying officials who owed everything to him, he made them the nucleus of a new nobility, to supersede the old, and to find their interest in perpetuating his power. These sagacious measures, coupled with the prestige of the new religion, reinforced the empire greatly; but the taxation required to keep it up proved an element of weakness. The costly court and the highly paid officials drained the treasury, which had to be replenished by exactions from the people, who met them from the proceeds of the land they tilled. The forays of barbarians, increasing in number and range, steadily reduced the means of these small holders, who thus, except in profound peace, could not satisfy the tax-gatherers. Farms disappeared, not to be replaced, and unproductive waste-lands encroached more and more within the frontier. The death of Constantine was the signal for civil war among the rival Cæsars, till Constantine's only surviving son, Constantius II. (351–363), succeeded in reuniting the empire under the same house. Not without misgiving he made a 'Cæsar' of his cousin Julian and entrusted him with Gaul, where Julian's success was such as to rouse his jealousy. Constantius accordingly commanded his cousin's legions to start for Persia; but instead of complying they proclaimed Julian emperor and Augustus. Constantius died soon after, and an inevitable collision was averted. Julian (361–363) interests us more by his defence of the Rhine frontier and his Persian campaign than by his 'apostasy' from Christianity. He succeeded in staving off the barbarian inroads on the western provinces; but his diversion in favour of the 'creed outworn' did not survive his last encounter on the Tigris, where he was killed. Jovian, who succeeded him on the battlefield, outlived him a few months, and Valentinian I. (364–375), the next emperor, at the instance of the army which proclaimed him, took as colleague his brother Valens, whom he made emperor of the east. For ten years the dual government prevailed, and the barbarians were kept in check at the Rhine and Danube, but his death found Valens unequal to his post. The Goths, goaded by the Huns in their rear, had thrown themselves on the hospitality of their imperial neighbours, but were so harshly treated that they turned on them and killed Valens in battle (378). They threatened Constantinople, but the next emperor, Theodosius (379–395), made them his allies and even auxiliaries, so that he was able to keep on the throne his colleague of the west, the feeble Gratian. That emperor was murdered (383) by Maximus, whom Theodosius recognised as Cæsar and left in command of Gaul, Spain, and Britain, till Maximus (386), worsted by Theodosius in his attempt on Italy and

Africa, was compelled to acknowledge Valentinian II. as emperor in the west (391). A few months afterwards Valentinian was murdered by Arbogast the Frank, who nominated in his place a creature of his own, Eugenius. Again Theodosius triumphed over the usurper; but after his great victory at Aquileia he died (395), leaving as emperors his two sons—Arcadius in the east and Honorius in the west.

The next eighty years are amongst the most dismal in the world's history. The provinces, drained to inanition by taxation levied for army and court, were further visited by intestine war and barbarian inroads. At first the policy of conciliating the invader, and giving him military command and administrative office, succeeded. But gradually the barbarians established in the east began to aim at conquest in the west, and Alaric the Goth first occupied Illyricum, whence he ravaged Greece, to be driven out by the Vandal Stilicho, the able general of Honorius. Retaining Illyricum, he led his people *en masse* into Italy; but after his crushing defeat at Pollentia he again retreated before Stilicho. On the murder of that officer he returned and besieged and took Rome, which bought him out at a heavy price. Honorius, from his seat at Ravenna, could not be made to concede him the lands he wanted for his people and the post in the imperial army he claimed for himself, so Alaric again appeared before Rome, to accept the office of commander-in-chief under her improvised 'Augustus,' the prefect Attalus. This incapable ruler was displaced by Alaric, who resumed his negotiations with Honorius. These being again fruitless, he took and sacked the city, but died shortly after. His successor Ataulf drew off his people to Gaul, and (419) a succeeding king, Wallia, received formal permission from Honorius to settle in the southwest, where at Toulouse he founded the Visigothic dynasty. Spain, already divided between Vandals, Sueves, and Alans, was in like manner formally made over to those invaders by Honorius, whose authority at his death (423) was on the western continent merely nominal. His successor, Valentinian III. (423–455), witnessed the conquest of Africa by the Vandals and of Gaul and Italy by the Huns. The former, under Genseric, having taken Carthage, were recognised by Valentinian in their new African kingdom in 440; and the latter, the rulers, under Attila, of central and northern Europe, confronted the emperors of east and west alike as an independant power. Attila marched first on Gaul, but the Visigoths, since their conciliation by Honorius, were loyal enough to oppose him, and, commanded by Aetius, signally defeated the Huns at Châlons (451). Next year Attila invaded Lombardy, but got no further, and died (453). In that year Valentinian, the last representative of the house of Theodosius in the west, was murdered; but his nine successors have no claim on our attention here. The outstanding events in the history of Rome are now her siege and sack by Genseric (455), and the quarrel between the Emperor Orestes (a Pannonian) and the barbarian soldiery in Italy —the latter requesting and the former refusing a grant of a third of the lands. The soldiery defeated and killed Orestes, whose son Romulus Augustulus resigned the 'useless purple' in favour of their leader Odoacer (476). The empire of the west was gone, Italy was under a barbarian king, and Rome ceased to be the capital. Thenceforth the history of Rome is merged in that of Italy (q.v.), where will be found such outstanding events as the restoration to the city, or to the pope, of the lands rescued by Pepin (q.v.) from the Lombards, the taking of Rome in 1084 by the Emperor Henry IV., the short rule of Rienzi (q.v.), the sack in 1527 by the Constable de Bourbon (q.v.), the Napoleonic invasion of 1796, the republic of 1849, and the re-establishment in 1870 of Rome as capital of Italy. The history of the Eastern Empire is given at BYZANTINE EMPIRE.

Rome Prehistoric, Regal, and Republican: Gilbert's *Geschichte und Topographie der Stadt Rom im Altertum* (1883–90); and the well-known works of Mommsen (Eng. trans. 1862–66), Peter, Nitzsch, Drumann, Schwegler, Duruy (Eng. trans. 1883–86), and Ihne, superseding in great part the epoch-making Niebuhr and the useful works of Arnold and Long. Rome Imperial: Gardthausen's *Augustus und seine Zeit* (first part 1891); Mommsen's fifth volume (Eng. trans. 1887); Merivale; Gibbon (embodying most of what is valuable in Tillemont); Hermann Schiller's *Geschichte der Kaiserzeit;* Von Reumont; Gaston Boissier's *La Fin du Paganisme* (2 vols. 1891); Hodgkin's *Italy and her Invaders* (1880–85); Professor Pelham in the *Encyclopædia Britannica;* Bury, *History of the Roman Empire* (1893); Shuckburgh, *History of Rome* (1894); and the general histories of Rome by Schmitz, Liddell, Merivale, Gilman, and Pelham, as well as a serviceable abridgment of Mommsen. Rome Mediæval: Gregorovius's *Geschichte der Stadt Rom* (Eng. trans. 1895); Von Reumont; Ranke's *History of the Popes;* Sismondi, *Abbatés L'Italia nel Medio Evo* (1891); and the church histories of Baronius, Robertson, and Milman. Books of interest are Dyer, *History of the City of Rome* (2d ed. 1883); Graf, *Roma nella Memoria del Medio Evo* (1882–83); Lanciani, *Pagan and Christian Rome* (1893); R. Burn, *Ancient Rome and its Neighbourhood* (1895); and see Cerroti's *Bibliografia di Roma* (1893) and Villari's 'Rome Mediæval and Modern' in the *Encyclopædia Britannica*. Becker's *Gallus*, Lockhart's *Valerius*, Graham's *Neæra*, Westbury's *Acté*, and Wiseman's *Fabiola* are works of fiction dealing learnedly and attractively with Roman history and life.

RELIGION.—The religion of ancient Rome was in pedigree closely akin to the Greek, which accounts for the ease with which in later times the two religions became blended. Rome's earliest occupants, the Latins and the Sabines, had, like the Greeks themselves, a Pelasgic progeniture, and the greater number of her divinities were ultimately descended, through the Latin and Sabine, from Pelasgic originals. The Etruscan infusion into Roman nationality affected religion mainly on its external side, that of ceremonial. Among these Italian races—Latin, Sabine, Etruscan—religion took an Italian development, redolent of their racial and local characteristics, of which, as compared with the Greeks, lack of creative power was one; hence we miss in the Roman divine world that wealth of legend which makes the Greek so picturesque, while from the same cause the Roman divinities betray fewer of the failings by which those of Greece often sink to the human level. The Roman genius, with its practical and objective turn, determined the more observant spirit of its religious worship, which in its minute attention to detail, both in word and act, implied a graver, more reverential notion of deity. Sprung from shepherds and husbandmen of the simplest patriarchal type, the early Romans strike a rural and domestic note in their religion, worshipping especially the gods of nature, of field and forest, the bounteous protectors of flocks, or donors of harvests, like Faunus, Vertumnus, Saturn, Ops, and the gods who shielded the house and its inmates, gods of the family (Lares and Penates). This worship long retained in Rome the rural and household traits of its original inspiration, and far down in the history of the empire we find numerous festivities antique as to observance and yearly as to recurrence, in the Saturnalia, Lupercalia, and such like. Side by side with her agricultural, pastoral, and household divinities Rome from the earliest times continued to worship the deities who protected her civic life—state-deities, like her founder and maintainer, Jupiter. With her political growth these came more and more to the front. After Jupiter, the head of the divine world, comes Mars, the defender of the city, father of Romulus and of the Roman people, and Quirinus, the deified Romulus. A second Rome-defending trinity was composed of Jupiter, with his sister and consort Juno and his daughter Minerva. Beside them in reverential honour was worshipped Vesta, goddess of the sacred fire and of the household hearth, which was the groundwork of the state. The deities just enumerated, especially the protective or tutelary deities, formed the main body of the state-religion of the Romans—a state-religion of which their second king, the Sabine Numa, was the revered founder and organiser. Of subordinate importance, but closely intertwined with public life and its concerns, came the worship of abstract, chiefly moral entities, embodied in the religious conception as Virtus, Fides, Pietas. Such deities gradually multiplied according to the appreciation or whim of individuals, till nearly every possible condition or influence, including the commonest occurrences and agencies, even accidental phenomena, were endowed with divine being, and worshipped accordingly. So we find Orbona, the averter of bereavement and bringer of comfort to its victims, Fessonia, the preserver from weariness, Quies, Febris, Abeona and Adeona (the goddesses invoked on departure and arrival). The natural world, the civic, the moral—the three elements above indicated—were the chief components of Rome's religion, and during her supremacy constituted a triune whole jealously guarded by the state from every foreign contamination. But with the spread of her dominion, particularly on her coming into closer contact with the Greeks in lower Italy, she imported into her religion extraneous, mostly Greek, objects and modes of worship. She came early to revere the oracular Apollo of Delphi, and (432) erected in Rome a temple in his honour as the plague-averting deity. Castor and Pollux were another acclimatisation, and her temple to them dates from 304. The worship of Æsculapius she took from Epidaurus (291). So long as her civilisation continued national Rome kept this foreign cult, though introduced and sanctioned by the state, as something separate from her old constitutional religion, which was thus maintained free from all corrupting or disintegrating infusion. Subsequently to the second Punic war, however—that turning-point in her civilisation—in an incredibly short time she became penetrated by Greek influences, and threw wide the door to the mythological traditions of Greece. She did indeed retain, for the most part, the names she had given her gods and the rites by which she worshipped them; but these were gradually undermined and overspread by Greek notions, until her literature, in so far as it dealt with religion, became impregnated with Greek legend and spirit. Nor was it Greece at her best that Rome followed in this subjection to her influence. Greece had long parted with her better traditions, and could convey little but what was sceptical and frivolous of her own or what was superstitious and fleshly of her eastern neighbours. Asia and Egypt, through the intermediation of Greece, and latterly at first hand, became the source of a sombre, sensual, degrading cult, which Rome, professedly at least attached to her healthier, more masculine worship, strove fruitlessly to countervail. Augustus did his best to prop up the declining religion through restoration of old usages and festivals, the rebuilding of temples on a more magnificent scale, and the discouragement of superstitious importations. Ovid made himself the poet of a similar inspiration in his *Fasti*, wherein he tried, by revivifying the old forgotten ceremonials, to reawaken the spirit from which these had sprung. Later emperors interposed from time to time in the same cause; but in vain. Religion and morals deteriorated with a rapidity that helps to explain the steady, irresistible advance of that religion of which Rome became the seat.

Preller's *Römische Mythologie;* Mommsen's *History of Rome;* Fustel de Coulanges, *La Cité Antique* (1864); Bouché-Leclercq, *Histoire de la Divination dans l'Antiquité* (4 vols. 1879–82); Roscher, *Ausführ. Lexikon der Griech. u. Röm. Mythologie;* and Gaston Boissier's *La Religion Romaine* should be consulted for fuller information, and the excellent article in the *Encyclopädie der Klass. Altertumskunde;* also Jean Reville, *La Religion á Rome sous les Sévères* (1886).

On Rome, its history and antiquities, see also the articles in this work on CÆSAR, AUGUSTUS, and the great men of ancient Rome; those on the Roman gods; the maps of Italia Antiqua and Roman Empire; and the following articles:

Agrarian Laws.
Alphabet.
Amphitheatre.
Apotheosis.
Arch.
Army.
Art.
Auguries.
Baths.
Byzantine Empire.
Camp.
Canon Law.
Carthage.
Catacombs.
Censors.
Church History.
Church (States of the).
Consul.
Dictator.
Divination.
Emperor.
Equestrian Order.
Family.
Gladiator.
Hannibal.
Inscriptions.
Italy.
Jugurtha.
Justinian.
Latin Language and Literature.
Legion.
Numerals.
Numismatics.
Painting.
Pope.
Prætor.
Rienzi.
Roman Empire (Holy).
Sculpture.

Rome, (1) capital of Floyd county, Georgia, on the Coosa River, 72 miles by rail NW. of Atlanta. It has iron-foundries, and manufactories of ploughs, nails, &c., and ships cotton. Pop. (1880) 3877; (1890) 6957.—(2) A city of New York, on the Mohawk River, 109 miles by rail WNW. of Albany, and at the junction of the Erie and Black River canals. It contains a number of mills and manufactories of iron, brass, copper, and other goods. Here is Fort Stanwix, which was successfully defended against St Leger, and 6 miles to the south-east the battle of Oriskany was fought, during the Revolution. Pop. (1875) 12,511; (1890) 14,991.

Rome, PRIX DE, the great prize given by the School of Fine Arts and the Conservatory in Paris, consists of a certain sum for four years, during which the recipient is expected to study painting at Rome and to lodge in the Villa Medici. The second prize is a gold medal.

Rome-scot, a name for Peter's-pence (q.v.).

Romford, a market-town of Essex, on the Bourne or Rom, 12 miles ENE. of London. It has large cattle and corn markets, iron-foundries, extensive market-gardens, and a very large brewery of 'Romford ale.' The church of St Edward the Confessor was rebuilt in 1850. Romford is the capital of the Liberty of Havering-atte-Bower, once part of the lands of the Saxon kings. Pop. (1851) 3861; (1891) 8408. See George Terry's *Memories of Old Romford* (1880).

Romilly, SIR SAMUEL, English lawyer and law reformer, was born son of a watchmaker of Huguenot descent, at London, March 1, 1757. At sixteen he was articled to one of the Chancery clerks, at twenty-one entered himself at Gray's Inn, and afterwards went the Midland Circuit, but found his chief employment in Chancery practice. In 1784 he made the acquaintance of Mirabeau, who introduced him to Lord Lansdowne; in 1790 he published an able pamphlet on the French Revolution. In 1806 he was, at the instance of Mr Fox, appointed Solicitor-general in the Grenville administration, and was compelled to accept the honour of knighthood. He took his seat for Queenborough, as in later parliaments for Horsham, Wareham, and

Arundel. He now devoted himself, by pamphlet and parliamentary agitation, to ameliorate the severity of the criminal law, which at that time inflicted Capital Punishment (q.v.) on over 200 different offences. His bills were session after session rejected, but Romilly nevertheless persevered, and, if he saw little fruit of his labours in his lifetime, made his name famous over Europe. He took an active part in the anti-slavery agitation, and in opposing the suspension of the Habeas Corpus Act, the spy system, and the despotic acts of the government. In July 1818 he was spontaneously chosen by the electors of Westminster as their representative. His wife died on the 29th October of that same year, and the shock so preyed upon his mind that three days after (November 2, 1818) he put an end to his life. See his *Speeches in Parliament* (2 vols. 1820), and his Autobiography (3 vols. 1840).—His second son, JOHN, BARON ROMILLY, born in 1802, was educated at Trinity College, Cambridge, and called to the bar at Gray's Inn in 1827. He was made Solicitor-general in 1848, Attorney-general in 1850, Master of the Rolls in 1851, and created a Baron in 1866. As Master of the Rolls Romilly incidentally rendered great services to his country, by superintending the publication of public records tending to throw much light upon English history and events. He died on December 23, 1874.

Romney, NEW, a municipal borough and Cinque Port in the south of Kent, 8 miles SW. of Hythe. It ceased to be a port in the days of Edward, and is not now either on the seashore or on a navigable river. Pop. (1881) 1007; (1891) 1306. Old Romney, a small village, is 1½ mile further inland. New Romney is the capital of the Romney Marsh district of fertile pastures, has a great sheep fair, and is connected with Lydd by a railway line 3 miles long. Of its five churches only one (St Nicholas) remains.

Romney, GEORGE, painter, was born at Beckside, near Dalton-in-Furness, Lancashire, on 15th December (o.s.) 1734. He was the second in a family of ten sons and one daughter, his father a clever carpenter and cabinet-maker; and after a very brief schooling he worked for ten years at his father's trade. Meanwhile he saw much of one Williamson, a watchmaker, philosopher, and alchemist; and meanwhile also he carved wood and drew. In 1755 he was articled to a 'Count' Steele at Kendal to be taught 'the art or science of a painter;' in 1756 married Mary Abbot of Kirkland; in 1757 set up as a portrait-painter on his own account; and in 1762 came up to London alone, leaving behind wife, boy, and baby girl—the last died a twelvemonth after. Of Romney's next thirty-five years there is little to record, beyond his two visits to France (1764; 1790) and his two years' residence in Italy (1773–75), after which, for twenty-two years, he lived in Cavendish Square. He slaved at his art, and his art so far rewarded him that Lord Thurlow said, 'Reynolds and Romney divide the Town: I am of the Romney faction,' and that in the single year 1786 he made by portrait-painting 3500 guineas. Of all his sitters the most celebrated is Lady Hamilton (q.v.), the 'divine lady,' so Romney called her. He painted her as 'St Cecilia,' as 'Joan of Arc,' as 'A Magdalene,' and in fully thirty other characters. The loveliest of them all, 'A Bacchante,' was lost at sea on its way back from Naples; but 'Sensibility,' sold originally for 100 guineas, fetched £3045 in 1890. Miss Sneyd as 'Serena' is another of his masterpieces, and so also is 'The Parson's Daughter' (since 1879 in the National Gallery).

The thirty-five years went by, and at last, in 1799, Romney returned to Kendal, to die there on 15th November 1802. *Finis!* No; the true *finis* is given by Edward FitzGerald: 'How touching is the close of Romney's life. He married at twenty-one, and, because Sir Joshua and others had said that marriage spoilt an artist, almost immediately left his wife in the north, and saw her but twice till the end of his life, when old, nearly mad, and quite desolate, he went back to her, and she received him, and nursed him till he died. This quiet act of hers is worth all Romney's pictures.'

See Fitzgerald's *Letters* (p. 182); Lord Tennyson's 'Romney's Remorse;' Lives of the painter by Hayley (1809), and his son, the Rev. John Romney (1830); Hilda Gamlin's *Romney and his Art* (1894); Espinasse's *Lancashire Worthies* (1877); and Lord Ronald Gower's *Romney and Lawrence* ('Great Artists' Series, 1882), with a catalogue by Algernon Graves of more than 300 of Romney's works, portraits mostly, but several also 'fancy subjects' for Boydell's Shakespeare Gallery, &c.

Romorantin, a town of France (dept. Loir-et-Cher), 45 miles by rail E. of Tours. Pop. 6714.

Romsdal, the valley of the impetuous Rauma in central Norway, which reaches the sea half-way between Bergen and Trondhjem. It is celebrated for its magnificent scenery; the mountains rise precipitously to 5000 feet—the Trolltinder or Witch Needles are 5880 feet high—the floor of the valley is strewn in places with gigantic blocks from mountain landslips; and cascades dash 3000 feet down the sides of the mountains.

Romsey, a municipal borough of Hampshire, on the Test, 8 miles NW. of Southampton. The fine cruciform abbey church, mainly Norman, but with Transition, Early English, and Decorated features, was the church once of a Benedictine nunnery, founded about 910 by Edward the Elder. Sir William Petty was the son of a Romsey clothier; and Lord Palmerston, of whom there is a bronze statue (1868) in the market-place, lived close by at Broadlands. A corn exchange was built in 1865, a town-hall in 1866. Pop. (1851) 2080; (1891) 4276. See Littlehales' *Romsey Abbey* (1886).

Romulus, legendary founder and first king of Rome, son by Mars of Rhea Silvia, the daughter of king Numitor of Alba Longa, was along with his twin-brother Remus exposed by their uncle Amulius, who had usurped Numitor's throne, but was suckled by a she-wolf, and brought up by the shepherd Faustulus and his wife Acca Laurentia. In 753 B.C. he founded his city on the Tiber, slew his brother, and invited for his citizens all homeless fugitives around, who carried off Sabine maidens for their wives. After Romulus had seen the Romans and Sabines united, and firmly established his city, he was carried up to the heavens in a chariot of fire (716 B.C.), and later worshipped as Quirinus.

Romulus Augustulus. See ODOACER; and ITALY, Vol. VI. p. 247.

Ronaldshay. See ORKNEY ISLANDS.

Roncesvalles. See ROLAND.

Ronciglione, a town of Central Italy, 30 miles NNW. of Rome. Pop. 5434.

Ronda, a Moorish town of Spain, stands on each side of a grand gorge through which flows the Guadiaro, and across which two bridges are stretched, one 255 feet from the water, 43 miles W. of Malaga. Pop. 19,181.

Rondeau (Fr.), a form of poem characterised by closely-knit rhymes and a refrain, and, as defined in the 17th-century, consisting of thirteen lines, divided into three unequal strophes; the two or three first words of the first line serve as the burden, and recur after the eighth and thirteenth lines. It has been brought into vogue by Swinburne.

Rondo (Ital.), the most obvious and elementary form in music, in which the first subject, clearly marked out, followed by a second, more or less definite, recurs again in its original key. In later developments the repetition may take place twice, thrice, or even four times, sometimes in part only, or in modified form, the intervening sections being varied in different ways. A large proportion of songs and instrumental pieces are in this form; and the final movement of a sonata, symphony, or concerto is frequently a rondo.

Rondout, till 1872 a post-village of New York, on the Hudson River, with a pop. of 10,000; now a part of Kingston.

Ronge, JOHANN. See GERMAN CATHOLICS.

Ronsard, PIERRE DE, the 'Prince of Poets' to his contemporaries, was born at the Château de la Poissonnière, in Vendôme, September 11, 1524. At nine he was sent to the Collége de Navarre, but soon after entered the service of the Dauphin as page, and on his master's death (1536) became attached to the household of the Duc d'Orleans, second son of the king. In 1538 he accompanied James V. of Scotland back to his kingdom with his new bride, Marie de Lorraine, and, after a stay of nearly three years at the Scottish and six months at the English court, returned to France to re-enter the service of the duke. But his career was soon cut short by deafness, the result of an illness, whereupon he determined to abandon arms for letters. Accordingly he repaired to the Collége de Coqueret, then under Daurat, the 'dark star' of the famous *Pléiade*. Here also studied at the same time three others of the seven, Baïf, Belleau, and Joachim du Bellay. The *Défense et Illustration de la Langue Française*, written by the last, appeared in 1549, the manifesto of the movement—a revolution in French poetry. Ronsard's period of study lasted for seven years, and bore its first fruit in 1550 in the four books of his *Odes*, the best practical illustration of the Pléiade doctrines. The volume excited the most violent opposition among the adherents of the older national school, but on the whole the new party had the best of the controversy, and their method made its way. Ronsard was a favourite of Marguerite, sister of Henry II., and was pensioned both by Henry II. and François II. In 1552 appeared his *Amours* and the fifth book of his *Odes*; his *Hymns* in 1555; the conclusion of the *Amours* in 1556; and in 1560 *Œuvres Complètes*, collected, it is said, by request of Mary Stuart, wife of Francis II. Twenty days after the massacre of St Bartholomew Ronsard published *La Françiade*, a fragment of an epic, which fortunately he did not complete. Charles IX. heaped further favours upon the lucky poet, who after the king's death, feeling the burden of enfeebled health, retired to the abbey of Croix-Val in Vendôme, where he spent most of his remaining years in lettered ease, honoured to the end with the attentions of the great. In 1584 he collected and republished his whole works in one volume, and died at his priory of St Cosme at Tours in December 1585.

The best editions of his works are by Prosper Blanchemain (8 vols. 1857–67) and Ch. Marty-Laveaux (6 vols. 1887–91). See also Sainte-Beuve's *Œuvres Choisies de Ronsard* (1828), and the studies by Scheffler (Dresden, 1874) and Chalandon (1875).

Rood (A.S. *ród*, 'a gallows, cross,' akin to *rod*), a cross or crucifix, often also applied to the actual cross on which our Lord suffered, although, when used to signify the relics of the true cross, it is commonly found with the prefix Holy, from which Holyrood at Edinburgh derives its name. In its most ordinary signification rood is applied to the large and striking crucifix which was placed at the entrance of the chancel in most mediæval churches. On either side of the cross most commonly were placed figures of the Blessed Virgin and St John, in allusion to John, xix. 26. The manner of placing the rood differed in different churches; most commonly it stood upon a gallery or screen at the entrance of the chancel, which was called the Rood-loft or Rood-screen, and which was sometimes of stone, but oftener of wood, richly carved and painted. In England, after the Reformation, the rood of course was, as a rule, removed from all churches; but in a good many country churches the rood-screen still remains in a more or less perfect form. Often, when the rood-screen itself has disappeared, the staircase in the wall leading up to it still may be seen. A very fine foreign example of the rood is in the great church of Louvain. See SCREEN.

Rood, a measure of surface, the fourth part of an acre, and containing 40 square poles or perches or 1210 square yards. The square rod or rood used in estimating mason-work is equal to 272¼ square feet.

Roof. The coverings of houses vary in every climate and every age. In warm countries, such as India, flat roofs, covered with cement, are almost invariably used. Those of Palestine, Egypt, and Assyria also were flat, and were composed of wooden beams, covered with thick layers of earth, forming an impenetrable protection from the fierce heat of the sun. In countries where the climate is milder, and rain more abundant, roofs sloping from a central ridge are the usual form. The Greeks and Romans constructed their roofs in this way. Those of Greece were, in important works, covered with marble slabs, carefully grooved together, so as most effectually to protect the interior from rain. In the common buildings of Greece and Rome, roofing-tiles are used. In the rainy climate north of the Alps roofs of a much steeper pitch are employed, so as the more readily to throw off rain and snow. The angle at the ridge is not uncommonly a right angle; and roofs slated in the usual way should never be less than ⅓d of the span (or width between supports) in height. When large slates are used ¼th of the span in height will suffice.

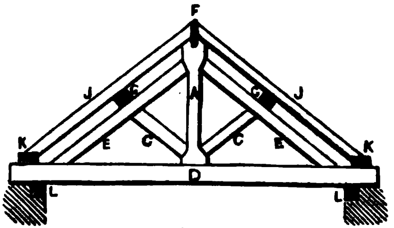


Fig. 1.

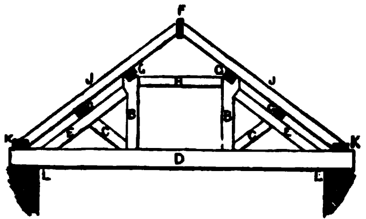


Fig. 2.

When roofs are well constructed they serve to bind the walls together, and thus to strengthen the building; they must not be made too heavy, otherwise they crush the walls. The actual covering of the roof and its supports are therefore made as light as possible, and the strength concentrated in principals or trusses. The following are the commonest forms of these trusses: Fig. 1 represents what is called a king-post roof (A being the king-post), and fig. 2 a queen-post roof (B, B being the queen-posts). The latter is used for wider spans than the former, and has the advantage of leaving the centre of the roof clear of timbers, so that attic rooms may be introduced. The other members of the truss are named as follows: C, C, C, C, braces or struts; D, D, tie-beams; E, E, E, E, principal rafters; F, F, ridge-pieces; G, G, &c. purlins; these and the ridge-piece are laid across from truss to truss, and carry the common rafters, J J. H is a collar. K, K, the pole-plates, and L, L, the wall-plates, are laid along at the wall-head, to bind the wall and feet of rafters together.

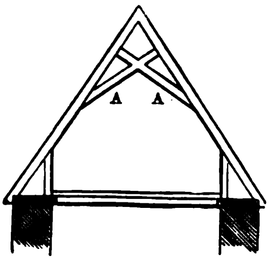


Fig. 3.

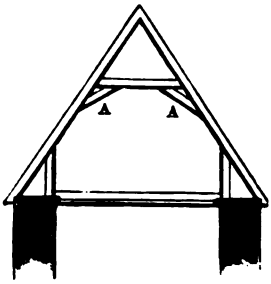


Fig. 4.

The above system of construction has been used from a very early time to the present day. The early Christian, and probably the Roman, basilicas had exactly such roofs. In early Gothic times roofs of this kind were made ornamental by carving the king-post, and moulding the tie-beam. During the Decorated style an arch or a series of cants (A, A) was introduced, as shown in figs. 3, 4, and 5. As the style progressed curved braces were placed under the tie-beam, to support it; these were carved, and rested on elegant corbels, the spandrels between the braces and the wall being filled with tracery. In the Perpendicular style the central part of the tie-beam is cut away, and the beautiful hammer-beam roofs of the period become usual (see fig. 6). The roof of Westminster Hall is one of the finest examples of this kind of roof. These open timber-roofs are much used in England both in churches and halls, but abroad chiefly in the latter, as the church roofs were more frequently vaulted. In modern times, when great spans have to be roofed over, combinations similar to those used in lattice bridges (see BRIDGE, Vol. II. p. 411) are required. Iron has been introduced, and by means of it, spaces of almost any width can be roofed over. See also CEILING, MANSARD ROOF, FAN-TRACERY, &c.

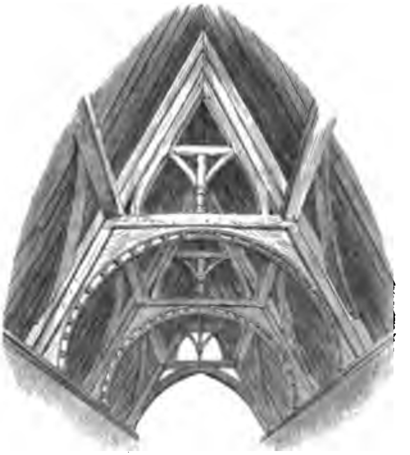


Fig. 5.

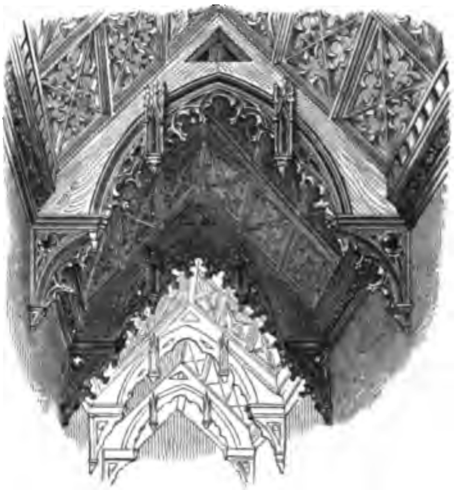
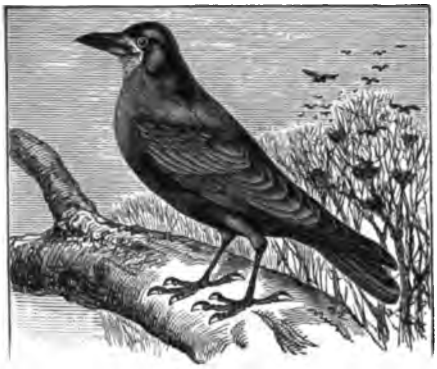


Fig. 6.

Rook (*Corvus frugilegus*), a species of Crow, common in Britain and in many parts of Europe and Asia, especially in northern and central regions. In late autumn there is a migration from the Continent to the eastern shores of Britain, and a return in early spring. Some of the characters of the rook have been contrasted with those of other species of Corvus in the article CROW. The plumage is bluish black; the forehead, cheeks, and throat are bare; the bill, legs, and feet are black. White and piebald spots sometimes occur. The rook does not breed till it is about two years old. The nest, built of twigs with a lining of grass and roots, is almost always on a lofty tree. The noisy cawing of the builders in March is one of the familiar signs of departing winter. The eggs (three to five) are bluish green with olive-brown markings. As to food, the rook is almost omnivorous, but it depends in great part on insects and grubs. Unlike the crow, the rook is characteristically a social bird, feeding in great flocks, nesting in rookeries, and sometimes combining to beat off a common foe. Confident perhaps in their numerical strength, and reliant on their habit of posting sentinels, rooks are by no means shy, for they sometimes nest in the trees of a town garden, and, though much afraid of a gun, soon grow accustomed to scarecrows and noise. They are very wide-awake birds, exhibiting no small degree of that acuteness which is often displayed by gregarious birds and beasts. They show sagacity in choosing fit trees on which to nest, in posting sentinels who warn the others when danger threatens, and in distinguishing real from fictitious sources of alarm. Though quarrelling and mutual robbery are common during the nest-building, there is no doubt that rooks have a sort of social feeling, which manifests itself sometimes in the punishment which they inflict on an offending member. The same rooks seem to take possession of their old nests year after year, repairing the damage done by the winter storms. The male rook feeds the female assiduously during incubation, and sometimes takes her place on the nest. Both parents bring food to their young ones, and the nestlings are provided with little stones essential to the grinding of the food in the gizzard. The rook can be tamed, and may exhibit something of the imitative power possessed by several related birds. While rooks are useful in so far as they destroy many injurious insects and grubs, they sometimes damage trees by breaking off the twigs, they root up grass and young corn, and do other damage to the crops. In moderate numbers they are useful, but in multitudes they are compelled to leave their natural food and become injurious.



Rook (*Corvus frugilegus*).

Rooke, Sir George, British admiral, was born in 1650, near Canterbury, at the country-seat of his father, Sir William Rooke. Entering the navy, he found himself at thirty a post-captain, and in 1689 was promoted to the rank of rear-admiral of the red. He took part in the action off Beachy Head between the Earl of Torrington and a French fleet under Tourville; and in 1692 he distinguished himself greatly in the memorable battle off Cape La Hogue, fought between the French fleet and the combined English and Dutch force under Admiral Russell. For this he received the rank of vice-admiral of the red, knighthood, and a pension of £1000 a year. In 1702 he commanded the expedition against Cadiz, and destroyed the Plate-fleet in the port of Vigo. In conjunction with Sir Cloudesley Shovel he accomplished the capture of Gibraltar, 21st July 1704. On the 9th August of the same year he engaged off Malaga a much heavier French fleet under the Comte de Toulouse, and fought one of the bloodiest of naval battles, the honours of which fairly remained with the English, though the escape of the enemy's fleet through the hazy weather rendered it a somewhat barren triumph. The struggle lasted through nearly a whole day; the French loss was upwards of 3000, the English upwards of 2000 men. Sir George was received with marked distinction by Queen Anne, but, finding the government hostile to him on political grounds, resigned his employments as well as his seat in parliament, and led the life of a quiet country gentleman on the family property in Kent till his death, 24th January 1709.

Roon, Albrecht Theodor Emil, Count von, Prussian soldier, was born at Pleushagen near Kolberg in Pomerania on 30th April 1803, entered the army in 1821, was appointed in 1827 to teach in the cadet school of Berlin, and joined the general staff in 1833. He held amongst other positions that of topographer in the general staff surveys (1833–35), teacher in the military academy (1835), military tutor to Prince Frederick-Charles (1843), and member of the commission for reorganising the Prussian army (1859). In the last-quoted year he was made war minister, and in 1861 marine minister as well. He carried the bill for army reform through the House of Representatives; the effects of his labours in reorganising the army were brilliantly realised in the great wars of 1866 and 1870–71. His rewards included the title of count (1871) and the rank of field-marshal (1873). For a few months before his retirement (November 1873) he acted as president of the Prussian cabinet. He died in Berlin on 23d February 1879. A pupil of Karl Ritter (q.v.), Von Roon illustrated his teacher's methods in an elementary work on general geography (12th ed. 1868) and in a more advanced book dealing with general geography, ethnology, and politics (3d ed. 1847–55). See Life by Von Gossler (1879), an anonymous Life (Gütersloh, 1888), and *Deutsche Revue* (1890–91).

Root. The exact use of the term in botany is not quite fixed. Old usage restricted it to the roots of seed plants, the organs of other plants which have the same general functions receiving various names; thus the roots of cryptogams were called rhizoids. The formal definition of root then used to be a part of a plant which produces no leaves, which has its growing-point protected by a root-cap, and which is developed endogenously—from the inner and not from the outer tissues. But it is more satisfactory to use the word in its physiological rather than in its strictly morphological sense, and to describe as roots all those parts of plants which (1) absorb nourishment from the soil or from water and not from the air, (2) fix the plant to the earth, (3) and grow, as a rule, *downwards* into the earth, and away from the light, not *upwards*, and towards the light, as 'shoots' do. Thus not only the complex roots of the seed plants, but also the rhizoids of cryptogams and the mycelia of fungi are called roots, in contradistinction to all those parts of plants which grow upwards towards the light, and which produce reproductive organs, which may conveniently be called shoots. But it is distinctly to be understood that organs of the same kind, from the morphological point of view, may have different forms and different functions; thus shoots may function as roots, and roots may grow up into the air as shoots. Further information as to the physiology of roots will be found in the article upon Vegetable Physiology; in this article it is chiefly the morphology of roots that will be dealt with.

As the leaf surface of a seed plant is developed the root system grows; in a large sunflower it occupies about one cubic yard, in a large tree hundreds of cubic yards. This system, resulting from the branching of the primary, secondary, and other roots, the ultimate divisions consisting of root-hairs, is so complete that scarcely the space of a quarter cubic inch is unoccupied. Abundance of water, to balance the transpiration, and of salts, for other purposes of plant-life, is thus secured. The root system of aquatic plants is small, water being easily obtained and transpiration slight.

All roots at first are thin hair-like organs; the greater thickness that those of the dicotyledons attain is due to a secondary growth. The thickened roots serve only as organs of attachment, and of course as conducting channels, but not at all as organs of absorption. These absorbing parts, root-hairs, are protuberances of the outer layer of cells of the roots. They arise shortly behind the growing tip, and they die off in a few days, so that only an inch or two of root bears root-hairs. In this way the root-hairs are continually brought into contact with portions of untouched soil.

A longitudinal section near the apex of a root of a seed plant shows the following arrangement of parts. Near the apex is the growing-point, a mass of actively dividing cells, called the primary meristem; by division these give rise to, below, several layers of simple cells (the root-cap), above, the main mass of the root, which, immediately above the primary meristem, consists merely of simple 'meristem' cells. A little higher up the meristem differentiates into three layers—the dermatogen, the periblem, and the plerome. These undergo further differentiation, so that a mature root consists of the following parts: (1) an outer layer, the epidermis, developed from the dermatogen; (2) several layers of simple cells, the cortex, developed from the periblem; (3) the fibro-vascular cylinder, an innermost mass of simple cells, and the pith, both developed from the plerome. The root-cap serves as a protection to the delicate growing-point of the root as it forces its way through the soil. It is continuously worn away by the particles of the soil, and as continuously reformed by the primary meristem cells. The epidermis binds the whole together, and many of its cells develop into long hairs, the absorbing root-hairs already mentioned. The cortex has no special function. The bundle sheath, when it occurs, separates the cortex sharply from the rest of the root. The fibro-vascular cylinder is the part of the root that acts as the channel for the ascending water and salts (crude sap), and gives it also its strength as an organ of attachment. The cylinder consists of smaller bundles of wood vessels and of bast fibres arranged alternately. The centre of a young root is occupied by pith.

Secondary thickening may occur in roots as in stems, and is due to the formation of a layer of actively dividing cells, the cambium. The bundles of wood and bast are placed alternately in a cylinder, and the cambium ring seen in transverse section waves in and out so that it passes inside the bast bundles and outside the wood bundles. The result of this is that the secondary thickening of roots results in a mass of tissue similar to that formed by secondary thickening of stems (see Stem). Thickened roots usually lose their original cortex and epidermis and gain a fresh covering in the following way. A layer of tissue, the root-sheath or endodermis, is differentiated which envelops the fibro-vascular cylinder; within this lies a layer of parenchyma, simple tissue; it is called the pericambium or phellogen. This layer gives rise to the new covering, which consists of two parts, phelloderm and periderm (which is of cork), corresponding to the original cortex and epidermis.

Forms of Roots of Seed Plants.—The primary root is merely the enlarged radicle of the seedling; it is the direct prolongation of the stem. All secondary roots arise from this first root; the secondary roots may give rise to others and so on until the common much-branched root is formed. If the primary root is very thin the whole system is called a fasciculated root; if the secondary fibres are also very fine it is called a fibrous root (e.g. the grasses); if the fibres are very much thickened it is said to be a tuberous root (e.g. the dahlia). When the primary root is much thicker than the secondary roots it is called a tap-root, and may be further classified according to its shape, as spindle-shaped (e.g. the carrot) or turnip-shaped. Much-thickened roots are usually storehouses of food material—e.g. the fasciculated root of the Turk's cap, lily, or the tap-root of the turnip. Roots are also described as fleshy (e.g. the beet-root), or as woody (e.g. the roots of trees). Fleshy roots usually die in the autumn; woody roots may live for many years, even when the shoots die down every autumn. Roots are usually buried in the soil, but they may be aerial, as for instance the roots of climbing plants such as ivy; these arise from the stem and fix the plants to their supports. In the tropics many plants have aerial roots; thus the mangrove forms forests in the swamps. The Indian fig has aerial roots from which, after they have become fixed in the ground, new plants may spring. Orchids are examples of the Epiphytes, which have aerial roots which merely fix the plants to trees but do not derive any nourishment from them. Aquatic plants often have roots which do not penetrate into the mud but float freely in the water. Many plants will form new roots after all the old ones have been cut off if they are placed in water or in a damp soil. This is taken advantage of by gardeners in their method of propagating such plants as fuchsias, oleanders, &c. from cuttings.

Esculent roots are numerous, and many roots also contain secretions either peculiar to themselves, or more abundant than in the other parts of the plant, and become therefore useful in medicine or in the arts, while some are very poisonous. The roots used for food, besides the Tuber (q.v.), Bulb (q.v.), and Corm (q.v.), are generally those which are thick and fleshy. The plants to which they belong are of very different genera and orders—some of the natural order Cruciferæ, as the turnip and others of the genus Brassica—some of the order Chenopodiaceæ, as beet and mangold wurzel—some of the order Umbelliferæ, as the carrot, parsnip, &c.—and some of the order Leguminosæ.

Comparative.—Most of the Thallophytes (Algæ, Fungi, and Lichens) have only a rudimentary differentiation into stem, leaf, and root, or none at all; but the most highly developed members of each division have an outward distinction of parts to which such terms may be given; still the roots even of these are distinguishable from the roots of vascular plants by the absence of a root-cap, and by their branching, which is never endogenous.

The Vascular Cryptogams—ferns, horsetails, lycopods, &c.—are highly differentiated in form and in their tissues. The roots arise in acropetal succession on the stem, or in many ferns on the petioles; their branching is monopial or dichotomous; they are all alike—the first root never becomes like a tap-root, the lateral roots arise from the innermost layer of the cortex. The roots grow by successive divisions of an apical cell. The Selaginellæ, a group of the Lycopodineæ, are remarkable for having true roots, but a few have no root-caps on them. The growing-point too is formed by a primary meristem and not by an apical cell.

The roots of the Seed Plants, consisting of Gymnosperms—i.e. Cycadeæ, Coniferæ, Taxaceæ, and Gnetaceæ, and of Angiosperms—i.e. Monocotyledons and Dicotyledons, have already received a general description: a few points of comparison may here be repeated. The primary root is a continuation of the primary stem; it is directed towards the micropyle of the embryo-sac (see Ovule), and even it is of endogenous origin, its first rudiment being covered by the nearest cell of the suspensor. All the parts of the seed plants, shoots and leaves as well as roots, are distinguished from the parts of all other plants, except the Lycopodiaceæ, and for a short time the embryos of some Coniferæ, by having a small-celled primary meristem at the growing apices instead of the typical apical cell of many Algæ, and of the Muscineæ, Ferns, and Horsetails. The root-cap is formed, not as in the cryptogams, by transverse divisions of an apical cell, but by rapid division in the direction of the apex, and in gymnosperms from the periblem, in angiosperms from the dermatogen. Also the first rudiments of lateral roots, shoots, and leaves do not arise from single cells, as in the cryptogams, but from protuberances of a few small cells. The formation of a closed cambium ring in the primary and stronger lateral roots, and the subsequent secondary increase in thickness, is a characteristic of gymnosperms and dicotyledons, and does not occur in the cryptogams. This habit often results in the formation of persistent root systems, which in the monocotyledons are often replaced functionally by rhizomes, tubers, and bulbs.

The stems of the Cycadeæ are not unlike those of the Tree-ferns, but unlike them they have tap-roots; secondary roots appear above ground. In the Coniferæ the endosperm bursts the seed-coat at the root end, and the root, which develops a strong tap-root with lateral members, is thrust out.

The primary root of monocotyledons soon ceases to grow, lateral roots spring from the axis, each new root springs from a point higher up the stem, and being stronger than the older ones, there is no secondary thickening and no persistent root system. Some saprophytic monocotyledons form no roots at all. In dicotyledons an axis below the cotyledons is called the radicle, but the upper and often the larger portion consists of a part of the stem called the hypocotyl; the lower part is the true embryo root. The root is the first part to issue from the burst seed-coat; it grows and gives rise to lateral roots. If the primary stem grows vigorously the primary root also grows rapidly and forms a tap-root. If the growth ceases adventitious roots are often formed between the former lateral ones, which may themselves give rise to lateral roots. For further information, see Sachs's *Physiology of Plants* (1887) and Goebel's *Classification and Morphology of Plants* (1887).

ROOT-STOCK or *Rhizome* is the name given to an underground stem when its shape is cylindrical; to a creeping stem, in short. It is easily distinguished from a root by the fact that it ends in a bud, and bears leaves or scales. It gives off roots every here and there. In the autumn the aerial leaves die down, but the rhizome lives through the winter, and in the spring its terminal bud goes on growing. Rhizomes are usually by the autumn well stored with reserve food-matter for the use of the bud in the following spring. Examples: the anemone, the lily of the valley, the yellow iris, many ferns.

Root, in Algebra, denotes any value of the unknown quantity in an equation which will render both sides of it identical (see EQUATIONS, INVOLUTION). The *square* root is that number which, multiplied by itself, produces the given number; the *cube* root, the number which, multiplied into itself and then into the product, produces the given cube; so with fourth root, fifth root, &c. The determination of the roots of equations, either formally or actually, constitutes the greater portion of the science of Algebra.

Root, GEORGE FREDERICK, an American composer, was born at Sheffield, Massachusetts, 30th August 1820, taught music in Boston and New York, studied a year in Paris, and returned to write numerous songs that became widely popular. Among them are 'Rosalie, the Prairie Flower,' 'There 's Music in the Air,' and, during the civil war, 'The Battle-cry of Freedom,' 'Just before the Battle, Mother,' and 'Tramp, tramp, tramp, the Boys are marching.' His more pretentious works, including a Te Deum, are less known. In 1872 he received a doctorate from Chicago University. He died 6th August 1895.

Root and Branch Men, a party in the Commons who supported a petition signed by 15,000 London citizens, praying that episcopacy might be destroyed 'root and branch.' Nathaniel Fiennes, Sir Harry Vane, and Hampden were of the party. A bill to give effect to the petition was introduced in 1641, but was ultimately dropped.

Root-parasites, plants which grow upon, and derive their nourishment from, the roots of other plants. Such are the Broom-rapes (Orobancheæ, q.v.), species of Thesium, &c., and the Rafflesias (q.v.), with other Rhizantheæ (q.v.).

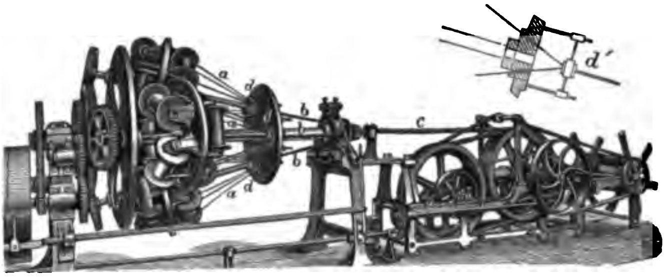
Ropes. The staple fibre for ropes has long been Hemp (q.v.), but since the middle of the 19th century several other fibres have come largely into use. Hemp is better suited for cordage (the general term for ropes, cords, and twine of all kinds) than for weaving purposes, because it gives way when much folded into sharp folds more readily than other important textile fibres—flax, for example. Manilla hemp (*Musa textilis;* see ABACA), belonging to a quite different order of plants from the common hemp, makes the strongest ropes now manufactured, and is largely employed. Coir fibre, from the husk of the cocoa-nut, is another important rope-making material which, though long used in India, has in Europe only taken its place as a valuable cordage fibre in comparatively recent years. It is fairly strong, and, size for size, it has the advantage of being considerably lighter than either hemp or manilla. Unlike these, coir rope is never tarred for preservation. Sisal hemp, from the *Agave sisalana* of South America, though not nearly so strong as common hemp, is also much used, especially for ropes of small size. For certain purposes, such as driving parts of textile machinery, cotton ropes are largely employed. There are only two other rope fibres which as yet can be said to be of any importance in Britain—viz. the Sunn hemp (*Crotalaria juncea*) of India and the *Phormium tenax* of New Zealand. A large number of plants valuable for cordage grow in India, for a list of which, as well as for an account of the native process of rope-spinning, see Balfour's *Cyclopædia of India.*

As regards the strength of ropes, it will be readily understood that in this respect specimens of the same kind of vegetable fibre will vary considerably. Healthy plants will yield a better fibre than those of more feeble growth, and some supplies of the same kind of material will have been more carefully prepared for spinning than others. The amount of care and skill bestowed upon the spinning process itself will also vary in the case of different manufacturers. Tarred ropes, again, though more durable, are not so strong as when left untarred; and as tar is liable to be impure it will happen that it weakens or injures the fibre more at one time than at another. These matters will partially explain why an unexpected difference not unfrequently occurs in the strength of two similar ropes which might be supposed to be equally strong. In the valuable work by W. G. Kirkaldy on his father's *System of Mechanical Testing* (1891) he gives the breaking stress of a large number of tested ropes, and in his remarks on this section of his experiments points out that the strength of some of these is much lower than it ought to be. He thinks that this can only be accounted for by adulteration of the fibre. It is probable that jute is sometimes mixed with better material. In one instance he found some rubbish called 'batch' hidden inside the rope. The following examples will show approximately the comparative strength of ropes made of three different materials. They are taken from a table in Mr Kirkaldy's work giving the results of the testing of seventy specimens of ropes.

	Circumference.	Breaking or Ultimate Stress.
Common hemp, untarred......	2·56 in.	4840 lb.
Hemp, tarred....................	2·69 "	4263 "
Manilla..........................	2·62 "	7044 "
Cotton...........................	2·48 "	3089 "

In these instances the strength of the untarred hemp rope is below and that of the manilla rope is above the average. Mr Kirkaldy states that the calculated 'stress per fathom-weight,' by a method akin to calculating the tensile strength per square inch of metals from actual tests, gives a more useful basis to compare the value of ropes than the breaking stress does. This stress per fathom-weight in each of the above examples was: hemp, untarred, 3457 lb.; hemp, tarred, 2631 lb.; manilla, 6905 lb.; cotton, 2860 lb.

Ropewalk Spinning.—Notwithstanding the successful application of machinery to the manufacture of ropes, the old process of ropewalk spinning is still practised on a considerable scale. The successive stages in the process are (1) heckling the fibre; (2) spinning the yarn; (3) tarring in 'hauls' consisting of about 300 yarns, laid close and parallel in lengths of say 100 yards; (4) winding the yarn on bobbins and mounting these on bobbin-frames; (5) forming the strands; and (6) laying the strands into a rope. The heckling of hemp is done in the same way as the heckling of flax (see LINEN), the object being to remove the tow or short fibres and to place the long fibres called 'line' parallel to each other. Spinning in this process is done by hand, but either an iron whirl-hook, forming the spindle of a small pulley, or, what is of more recent introduction, a similar hook with a small cone upon it, is kept in motion for the spinner. Several of the former are mounted on a circular frame, and driven by hand or power; but a set of the latter, which automatically fall out of gear by weights when the spinning is interrupted, are arranged in a straight line, because they are driven by the friction of larger cones fixed on a shaft, and there may be twelve of either kind of hooks forming a set. The spinner wraps a quantity of the heckled hemp round his waist, and attaches some of the fibres to one of the hooks, which by its revolving motion twists them as he continues to pull out and regulate the supply of fibres with one hand, and press them into proper form with the fingers of the other. He carries in his right hand a piece of woollen cloth, with which he grasps the fibres, and walks backwards, while he spins, to the farther end of the long covered walk.



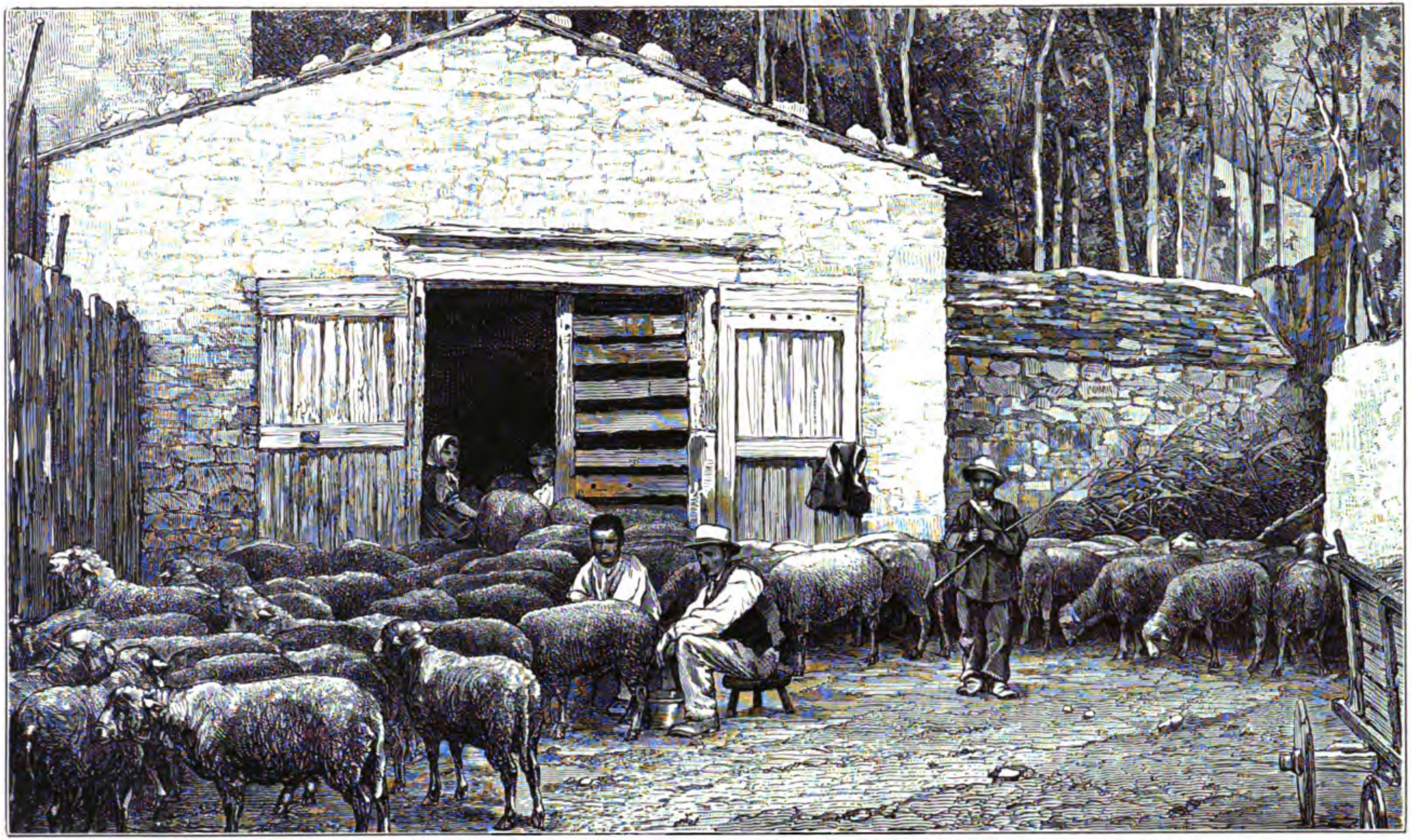
Rope-making Machine:
a, yarns; *b*, strands; *c*, laid rope; *d*, head-runners or register-plates; *d′*, section of head-runner.

The hauls of yarn are tarred by passing them through Archangel tar, heated to 240° F., a nipping apparatus being used to regulate the quantity taken up by the fibre. The next step is to wind the yarn on bobbins, which are then placed on a vertical frame. In order to form a strand of say ten yarns, one from each of ten bobbins is drawn through as many holes in a metal disc or register-plate, and immediately afterwards brought together and formed into a compact bundle of yarns by passing them through a stranding tube. On emerging from this the strand is fastened to the rotating hook of a forming machine on a travelling carriage, which, by means of proper gearing, is drawn along the walk, giving at the same time the proper twist to the strand. In this way three or more strands are formed at the same time by the machine. These are then laid into a three-stranded rope or 'hawser' by attaching them at one end to the centre hook of the machine, while the other extremities of the strands are attached to three hooks. At that end where they are hung together on one hook the three strands are kept equidistant by placing them into the three longitudinal grooves of a conical piece of wood, called a 'top.' The twisting of the strands is effected by the rotation of the hook, from which the top recedes as the rope is formed. As the twist of the laying is in the opposite direction to the twist of the strands, the single hook requires to be turned in a contrary direction to the other three. A hawser has either three or four strands, the latter being said to be 'shroud hawser laid.' It requires a core-piece, and is much used for trawling. A Cable (q.v.) is a thick rope with usually nine, sometimes twelve strands.

Rope-making by Machinery.—By this is understood the making of ropes by machines which do their work without the necessity of having a ropewalk. The heckling, the drawing, and the spinning frames for preparing rope yarns are the same in principle as the corresponding machines used for spinning linen yarn for weaving purposes. There is, however, some difference in detail, owing to the greater average weight of rope yarn, so that, for example, there are comparatively few bobbins on the spinning-frame proper. Separate machines are perhaps more generally used for making strands and for laying these into ropes than compound machines which perform both operations, especially for very thick ropes. All these are now made of different designs, and with a good deal of variety in their details. The annexed figure of Glover & Guiltinane's patent compound rope machine will give a fair idea of one of the newest forms of this kind of apparatus. It is constructed to make three-strand ropes up to 3¼ inches in diameter, there being in the one here figured six bobbins for each strand. It is furnished with change wheels, to enable either hard or soft laid ropes to be made. From a fuller description in *The Engineer* (7th March 1890) we extract the following: 'The yarns being wound round on the bobbins in suitable numbers, according to the size of the rope to be made, they are from each bobbin threaded through a head-runner (register-plate) of six holes, and gathered at a die, at which they are closed into strands, there being a separate die for each of the three strands. The strands being formed, they are then threaded through a main head-runner of the holes, and immediately closed at the main closing die into finished rope. The rope is drawn through the die by means of strong hauling-off drums, and ultimately wound on a storage creel.'—Wire-ropes (see under Wire) and textile fibre ropes are now largely employed for driving machinery instead of belting.

Roque (Lat. *Rochus*), ST, the patron saint of those sick of the plague, and the enemy of cattle-plague. He was born in Montpellier, about 1295, devoted himself to the care of persons suffering from the plague, especially in Italy, and died in 1327.

Roquefort, a village in the French department of Aveyron, situated on the western edge of the Causses plateau, 44 miles N. by W. of Béziers and 10 SW. of Millau, and celebrated since Roman times for its ewe-milk cheeses. Pop. 973.



MILKING THE FLOCK AT ROQUEFORT.

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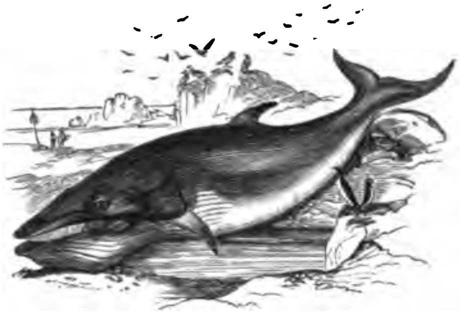
Roraima, an isolated, table-topped sandstone mountain, near the west border of British Guiana. First sloping gradually upwards 5000 feet above sea-level (2500 above the plain on which it stands), it next shoots up 2000 feet more in a perpendicular stupendous cliff, over which drop numerous waterfalls. It was first scaled by E. F. im Thurn on 18th December 1884.

Rorke's Drift, a station on the Tugela River, Zululand, South Africa, memorable for the heroic defence of Lieutenants Chard and Bromhead, with eighty men of the 24th Regiment, who had been left to guard the commissariat stores and the hospital of Lord Chelmsford's force, against 4000 Zulu warriors during the night of the 22-23d January 1879, the night after Isandula. The only defences of the British were an extemporised rampart of rice bags and biscuit boxes, yet they kept the enemy at bay, and six times in succession drove out parties who had got within the barricade.

Rorqual (*Balænoptera*), a kind of baleen whale, to which the names of *Fin-back*, *Finner*, and *Razor-back* are also applied. The genus includes the largest and some of the commonest whales, and is represented in all seas. The head is flat and pointed, the body is slender, the skin of the throat is deeply folded in longitudinal plaits, the whalebone is short and coarse, and there is not much blubber. The 'blue whale' (*B. sibbaldii*), the largest living animal, may attain a length of 80 or 85 feet. It seems to pass the winter in the open sea, and approaches the coast of Norway at the end of April or beginning of May, and is sometimes stranded on British coasts—for instance, in the Firth of Forth. The Common Rorqual (*B. musculus*) attains a length of 60 to 75 feet, and it often comes ashore on British coasts. Rudolphi's Whale, or Northern Rorqual (*B. borealis*), does not exceed 50 feet in length; and yet smaller is the Lesser Rorqual (*B. rostrata*), which measures about 30 feet. The former is not uncommon in the more northern seas, while the range of the latter extends from the Mediterranean to Davis Straits. The rorquals seem to feed on small crustaceans, and sometimes on small fishes. Though not nearly so valuable as species of Balæna, they are often captured by the whalers. See WHALE.



Northern Rorqual (*Balænoptera borealis*).

Rosa, CARL, whose real surname was ROSE, impresario, was born at Hamburg on 22d March 1842, and studied music at Leipzig and Paris. After conducting a concert and operatic tour in the United States in 1871-72, he came to England, his intention being to produce standard operas with an English text. But it was 1875 before he was able to carry out his intention. London gave him little encouragement; the prejudice against English opera was too strong. The provinces, however, welcomed the new undertaking and made it successful. Carl Rosa may be called the father of English opera in two senses: he not only produced the great operas of German, French, and Italian composers with English texts, but he encouraged native composers to write opera, by giving them commissions for works. It was in this way that such operas as Goring Thomas' *Esmeralda* and *Nadeshda*, Dr A. C. Mackenzie's *Colomba* and *Troubadour*, Dr V. Stanford's *Canterbury Pilgrims*, and others came to be written. In 1867 he married Madame Parepa, a distinguished vocalist. Died 30th April, 1889.

Rosa, MONTE. See MONTE ROSA.

Rosa, SALVATOR, was born at Arenella, in the neighbourhood of Naples, on 20th June (or 21st July) 1615. In his youth he got a little instruction from Falcone, a painter of battle-scenes, but spent most of his time wandering amongst the wild and romantic scenery of Southern Italy, copying from nature. Some of his landscapes attracted the notice of the painter Lanfranco, who encouraged the young artist to go to Rome (1635). The next three years he passed alternately in Naples and in Rome, and leaped into fame with a picture, 'Tityus tortured by the Vulture.' He then settled down in Rome, but seems to have been in Naples at the time of Masaniello's revolt (1647), though it is uncertain whether he bore arms in support of the Fisher Lad. (It seems not to be true that he lived with bandits in the mountains in his youth.) At Rome his social talents—he was a skilful musician, improvisatore, actor, and poet—his merry humour, his wit, and his princely generosity made him a great favourite. But he made powerful enemies by his satires, clever productions in verse, and withdrew to Florence, where he remained nearly nine years. After that he returned to Rome, and died there on March 15, 1673. Salvator has a great reputation as a painter; this he owes mainly to his landscapes, which, though in many respects faulty, are original in subject and treatment, being generally representations of wild and savage scenes, executed with considerable freedom and energy. His historical pictures are not so good, though they are those he himself thought most of. He executed numerous etchings, highly characteristic of his peculiar style. His *Satires* were published in 1719. See Life by Baldinucci (new ed. 1830) and by Cantu (1844). Lady Morgan's book (1824) is a blending of fact and romance.

Rosacea. See ACNE.

Rosaceæ, a natural order of exogenous plants, containing many species of great usefulness, and many that are in the highest esteem for their beauty and fruit. It contains trees, shrubs, and herbaceous plants, natives chiefly of cold and temperate regions, and far more abundant in the northern than in the southern hemisphere. Within the tropics they are chiefly but not exclusively found in elevated situations. The leaves are alternate, have stipules, and are either simple or compound. The flowers are generally hermaphrodite, but sometimes unisexual; the inflorescence various. The calyx is 4 to 5 lobed, generally 5-lobed; the petals as many as the divisions of the calyx, or occasionally wanting, perigynous. The stamens are few or many, arising from the throat of the calyx; the ovary is sometimes solitary, sometimes there are several ovaries, each one-celled, with a lateral style, or a number of ovaries are united into a many-celled pistil; the ovules generally two or more. The fruit is sometimes a drupe; sometimes a pome; sometimes follicular; sometimes a nut; sometimes a collection of nuts enclosed in the fleshy tube of the calyx; sometimes a collection of small drupes forming a head, as in the raspberry; and sometimes, as in the strawberry, it is an enlarged fleshy receptacle with the seeds imbedded on its surface. This natural order contains at least 1000 known species; but in some of the genera, as Rosa and Rubus, the determination of the species is attended with great difficulty, and varieties—sometimes reckoned species—are numerous. The order, as generally received, is divided into a number of sub-orders, several of which have by some botanists been elevated to the rank of distinct orders, as Amygdaleæ, Pomaceæ, Sanguisorbeæ. See also ROSE, RUBUS, STRAWBERRY, POTENTILLA, TORMENTIL, AGRIMONY, GEUM, SPIRÆA, CUSSO, &c.

Rosamond, FAIR. See CLIFFORD.

Rosaniline. See DYEING.

Rosario, the third city of the Argentine Republic, and the largest in Santa Fé, is on the west bank of the Paraná, 190 miles by rail NW. of Buenos Ayres, 210 miles by river. It has an excellent harbour, and carries on a large commerce direct with Europe; the exports exceed 3¾ and the imports 4½ millions sterling. The houses for the most part are of a single story; for the rest, the city is laid out on, a smaller scale, on the lines of Buenos Ayres, with narrow streets, ill paved, few and paltry plazas, and only one monument of note—a lofty marble shaft (1883) bearing a figure of Victory and surrounded by four statues. Tramways (with 6 miles of rails) run in every direction, and there is a telephone to Buenos Ayres. The city possesses an exchange, a theatre, a great bull-ring, two markets, hospitals, steam-elevators, a sugar-factory, &c. Rosario was founded in 1725. Pop. 60,000.

Rosary, a string of larger and smaller beads used by Catholics as an aid to memory in keeping account of the number of Paternosters and Ave Marias recited. There are various patterns in use; a very ordinary one is a rosary of fifty-five beads, fifty small ones for the Ave Marias, separated into groups of ten by five large ones to mark Paternosters. The custom of reciting the Lord's Prayer many times in succession dates from a very early period of the Christian church; the custom of keeping a note of the prayers recited by means of strings of beads was so common in the East amongst Hindus and Mohammedans that the use of the rosary for this purpose has been said to have been introduced into Christian Europe by the Crusaders. The name (Lat. *rosarium*, 'a garden of roses' or 'chaplet of roses') first occurs in the 13th century, and seems to be derived from *Rosa mystica*, a term given to the Virgin herself, or from a set of prayers being thought of as the Virgin's rose-garden; less probable is the suggestion that the name comes from the beads being originally made of rosewood. The beads are now of various material—berries, wood, stone, ivory, metal, &c., and are often of costly workmanship, and of considerable intrinsic value. They are blessed for the use of the people by the pope, by bishops and superiors of religious orders, and by others having special power for the purpose. The name is also given to a series of prayers ('Rosary of the Blessed Virgin') consisting of fifteen decades, comprising fifteen Paternosters and Doxologies, and 150 Ave Marias, divided into three parts. The Lesser Rosary consists of one of the three parts, comprising five decades or mysteries.

ROSARY SUNDAY, the first Sunday in October, is a feast instituted by Gregory XIII. for the Confraternity of the Rosary, and made of universal observance after the victory of the Emperor Charles VI. over the Turks, in gratitude to the Blessed Virgin. An impetus has been given to the devotion of the rosary by Leo. XIII., who enjoined its daily use in public during October. In London roses are blessed and distributed as souvenirs, and the rosary recited continually during the day.

Rosas, JUAN MANUEL, Argentine dictator, was born in Buenos Ayres, 30th March 1793, entered the army of Buenos Ayres in 1820, was appointed commander-in-chief in 1826, and was governor of the province from 1829 to 1832. Then, being disappointed of re-election, he headed a revolt, and in three years succeeded in obtaining office again, with extraordinary powers. From 1835 to 1852 he governed as dictator, not of Buenos Ayres alone, but practically of the interior also. His rule was a rule of terror and nearly constant bloodshed; one of his chief opponents published, so early as 1843, a detailed list of 22,405 victims of the relentless savagery with which he pursued his policy of extirpation against the Unitarians (the advocates of centralisation, that is to say, as opposed to the Federalists, for whose principles Rosas professed to contend). Many refugees found an asylum in Uruguay, and therefore Rosas willingly supported the attempt of his partisan, General Oribe, to make himself master of the neighbouring republic; and, after the fall of Oribe's government, Rosas in 1839 invaded Uruguay with 7000 men, was defeated, and in 1843 sent Oribe back with an army of 14,000 men to attack Montevideo. The long siege which followed led to the joint intervention, in 1845, of England and France, the blockade of Buenos Ayres (1845–47), and the temporary opening of the Paraná to free navigation. But the river provinces could not be induced to rise against Rosas, until in 1849 a treaty was signed by which he secured for Buenos Ayres the entire navigation of the Plate, the Uruguay, and the Paraná. This roused the other provinces, and in 1851 Urquiza, the governor of Entre Rios, supported by Brazil with both money and men, defeated Oribe in Uruguay, and won over his troops; then, with a force of 30,000, he marched against Rosas, and on 3d February 1852 routed him at Monte Caseros, near Buenos Ayres. Rosas escaped to England; and, although the Argentine congress in 1861 condemned him to death as a 'professional murderer and notorious robber,' specifying 2034 assassinations carried out by his personal orders, he lived comfortably in retirement near Southampton till his death, 14th March 1877.

Roscher, WILHELM, the most eminent expounder of the historical school of Political Economy (q.v.) in Germany, was born at Hanover on 21st October 1817. He studied at Göttingen and Berlin, and in 1843 was appointed professor of Political Economy at Göttingen, but in 1848 was called to fill the corresponding chair at Leipzig. His principal books are *System der Volkswirthschaft* (4 vols. 1854–86; 18th ed. of vol. i. 1887; Eng. trans. 2 vols. Chicago, 1879), *Die Nationalökonomie des Ackerbaues* (10th ed. 1882), *Grundlagen der Nationalökonomie* (17th ed. 1884), *Geschichte der Nationalökonomik in Deutschland* (1874), *Zur Geschichte der englischen Volkswirthschaftslehre* (1851–52), *Kolonien, Kolonialpolitik und Auswanderung* (3d ed. 1885). He died 3d June 1894.

Roscius, QUINTUS, was born at Solonium, a village near Lanuvium, and rose to be the greatest comic actor in Rome. So much was he admired that many of the Roman aristocracy befriended him, and the dictator Sulla, as a token of favour, presented him with a gold ring, the symbol of the equestrian order. Among his most admiring and affectionate patrons Roscius also numbered Cicero, who, at the commencement of his career, received lessons in the art of elocution from the great comedian, and even in later life used to make trials of skill with his instructor as to which of them rendered a thought most clearly and effectively—the orator by his diction, or the comedian by his gesticulation. So sensible was Roscius of the distinction he enjoyed in sharing the intimacy, and even the friendly emulation of the great orator, that he came to look upon his art as one of no small importance and dignity, and wrote a treatise on the comparative methods and merits of eloquence and acting. Cicero's friendship was of use to him in another way, for on his being sued at law by C. Fannius Chærea for the sum of 50,000 sesterces, Cicero defended him before the judex Piso (probably 68 B.C.) in his extant oration, *Pro Q. Roscio Comœdo*. He died 62 B.C., having attained such perfection in his peculiar art that to be a 'Roscius' became synonymous with pre-eminence in every profession, and leaving, like his famous contemporary, Æsopus the tragedian, an immense fortune, realised upon the stage. See Ribbeck, *Die Römische Tragödie* (Leip. 1875).—For the 'Young Roscius,' see BETTY.

Roscoe, WILLIAM, historian, was born at Liverpool on 8th March 1753, his father being a market-gardener. In 1769 he was articled to an attorney at Liverpool, and began to practise there on his own account in 1774. During this period he assiduously cultivated his mental powers, turning his attention especially to the Italian language and literature. In 1773 he first appeared in print as the author of a poem, *Mount Pleasant*, now forgotten; and in 1787–88 published *Wrongs of Africa*, a courageous protest against the slave-trade. But it was his *Life of Lorenzo de' Medici, called the Magnificent* (1796), which established his literary reputation; it went through several editions, and was translated into German, French, and Italian. In 1805 appeared his second important book, *Life and Pontificate of Leo X.* This, like the former, appeared in German, French, and Italian, and was received with much commendation, though its tone and spirit, especially with reference to the Reformation, were severely criticised. About the year 1800 he became partner in a Liverpool bank, a step which involved him eventually in great pecuniary embarrassment. From his pen came, besides the above-mentioned books, a collection of *Poems* (1857; new ed. 1891), but without his *Butterfly's Ball*, and a *Memoir of R. R. Jones* (1822). He issued an edition of Pope in 1825. Roscoe died at Liverpool, June 30, 1831. During the later years of his life he gave much attention to the study of botany, and wrote a monograph on Monandrian plants. See Life by his son Henry Roscoe (1833), and Espinasse's *Lancashire Worthies* (2d series, 1877).

SIR HENRY ENFIELD ROSCOE, chemist, born in London 7th January 1833, was a grandson of the above, and the son of Henry Roscoe, barrister. He was educated at the Liverpool High School, and later at University College, London, and at the university of Heidelberg. He was appointed professor of Chemistry in Owens College, Manchester, in 1858, and rendered valuable services towards the organisation of this institution. He was returned member of parliament for the south division of Manchester in 1885, was re-elected in 1886, and in the latter year he resigned his professorship. He has served on the Royal Commissions on Noxious Vapours and on Technical Education, and is a member of the Scottish Universities Commission. He was elected a Fellow of the Royal Society in 1863. He was president of the Chemical Society in 1880, of the Society of Chemical Industry in 1881, and of the British Association for the Advancement of Science at the Manchester meeting in 1887. Of his original contributions to chemical science the most important are researches on the measurement of the chemical activity of light, and on vanadium and its compounds. His published works include *Spectrum Analysis*, a course of lectures (1868) on the subject; his well-known *Lessons in Elementary Chemistry* (1870); and his *Treatise on Chemistry* (written in conjunction with Schorlemmer), in 3 vols. (1878–89; new ed. 1894 *et seq.*). He lost his seat in parliament in 1895.

Roscoff, a seaport on the north coast of the French department of Finistère (long the headquarters of smuggling into England), 33 miles NE. of Brest. The men are all sailors; the women grow vegetables. The place is resorted to for sea-bathing, and here is a marine zoological station. The garden of the Capuchin monastery contains a fig-tree whose branches, trained over scaffolding, could give shelter to 200 people. Pop. 1751. Here Mary Queen of Scots landed in 1548, and the Young Pretender after his escape from Scotland.

Roscommon, an inland county of Connaught, Ireland, is bounded on the E. by the Shannon, and on the W., in part, by the Suck; it is 62 miles long from north to south, by 35 miles from east to west. Area, 607,691 acres, of which barely one-fifth is under crops (hay, potatoes, oats); more than one-half is permanent grass; one-sixth is waste. It belongs to the central plain of Ireland, but rises in the north into the Curlew (800 feet) and Braulieve (1377 feet) Mountains. Several lakes occur, as Allen, Boderg, and Ree, expansions of the Shannon, and Key, Gara, and Glinn in the north-west. The soil in the central districts is in general light, but fertile, and affords some of the finest sheep-pasture in Ireland in the 'Plain of Boyle.' The chief industry is the feeding of sheep and cattle, especially the former. Coal and iron exist, but are not worked; there are no manufactures. The chief towns are Roscommon, Boyle, Castlerea, Elphin, and Strokestown. Pop. (1841) 254,551; (1861) 157,272; (1881) 132,490; (1891) 114,194, of whom 110,147 were Roman Catholics. Roscommon sends two members to parliament, one for each of the divisions. It possesses a number of Celtic antiquities, raths, &c., several remains of strong castles, and some fine ecclesiastical ruins.

ROSCOMMON, the county town, 96 miles W. by N. of Dublin, dates from the 13th century, when it arose around a Dominican abbey, founded by the O'Conor in 1257, and a castle built ten years later by Sir Robert de Ufford; the remains of both still exist. Roscommon, pop. 2117, has an important cattle-market.

Roscrea, a market-town of Tipperary, Ireland, 77 miles SW. of Dublin, is a very ancient town; here St Cronan built a church, and had a celebrated school in the 7th century. Considerable remains of a castle, a lofty round tower (80 feet high), and ruins of two abbeys exist. Pop. 2801.

Rose. The rose, the most lovely and fragrant of flowers, the favourite of poets and the national emblem of England, is a shrub or sometimes a tree, very widely distributed, and giving name to the large and comprehensive order Rosaceæ, to which some of our choicest fruits belong. Restricting ourselves to the genus Rosa, which alone we acknowledge as the rose, we find the characteristics thus: shrubby growth, stems generally prickly, leaves alternate, stipulate, flowers terminal, often corymbose, spreading with five petals, in colour white, yellow, pink, or red, stamens numerous, styles exserted, seeds (achenes) numerous, enclosed in a fleshy berry, globular or ovate, which is known as the hip or hep, and is in some sort edible. The calyx is generally five-lobed, and the lobes are more or less pinnatised, and sometimes (as in the moss rose) furnished with a beautiful process of filament.

(1) The wild rose is a native of the northern

hemisphere, found in all temperate climes, and even as far south as Abyssinia, the Indian Peninsula, and Mexico, extending also to the arctic zone, and of such diversity that more than 200 species were admitted by former botanists, which have now been reduced, however, to less than a fifth of that number. In Britain we find it indigenous as *Rosa spinosissima* (the Burnet-rose, from which descend the many varieties of Scotch rose); *Rosa canina* (the Dog-rose of our hedges, with several sub-varieties); *rubiginosa* and *micrantha*, well known as the Sweet Briers; *arvensis*, a prostrate and unfragrant kind; *tomentosa* and *villosa*, having downy foliage and deep-red blossoms. The recent tendency of botanists, gladly accepted by the gardener, has been to restrict the number of species and allow more scope to variety, so that the above list may soon be compressed.

(2) The cultivated rose is a fuller and generally larger form, obtained by the nurture and skill of the gardener, and still receiving improvement by skilful crossing and loving observance. In the *Gardener's Chronicle* of 1885 may be found Mr Baker's scientific classification of garden roses, which are marshalled into ten companies or groups, chiefly according to leaf and prickle. Mr William Paul, however, in the last edition of his great work, permits us to reduce these ten groups to six, which will be as follows: Simplicifoliæ, Systylæ, Banksianæ, Bracteatæ, Centifoliæ, and Caninæ. But the general grower may be well content with the arrangement in the catalogues of our leading nurserymen, as recognised by the National Rose Society, and observed in our chief exhibitions; though the principle of division is not botanical, neither is the broad line drawn between summer and 'perpetual' roses always justified by fact; so that many good rosarians now protest against the too popular neglect of a fragrant, lovely, and freer flowering class.

(*a*) Summer roses, thus ostracised by a hasty vote, are of many families, and bloom for the most part in June and July—the Boursault, the Scotch Rose, the Damask, the Provence, the Moss, the French and Hybrid French, the Bourbon and Chinese Hybrids, the Austrian and Sweet Brier, the Ayrshire, Evergreen, and Multiflora, the Polyantha, Prairie, and Banksian roses, as well as some few others. Many of these are of the greatest beauty—for instance, the Moss rose, perhaps the loveliest of all flowers; and some are the best of all for trellis or for pillar, and the hardiest in bad weather.

(*b*) The Perpetual, or *Remontant* rose, as the French more correctly term it, instead of making growth alone after the gorgeous summer show, affords a succession, more or less continuous according to variety and weather, of bud and bloom until the frosts forbid. Yet even with these it is rare to find the aftermath of beauty as free or as fine as the summer crop had been; and many of the so-called perpetuals retire as meekly as the summer rose, especially in dull seasons. Perpetual roses are chiefly as follows: the Chinese or Monthly, the Hybrid Perpetual, the Tea-scented, Bourbon, Noisette, Macartney, Rugosa, Microphylla, Lawrenceana, and Perpetual Scotch. The old Chinese, *Rosa Indica*, commonly called the Monthly Rose, is still popular as an early and abundant bloomer; so are the Bourbons and Noisettes. But the Hybrid Perpetual and Tea-scented are now the chief favourites of the rose-grower, and have almost engrossed his attention. Of these two classes the former has for many years been undoubtedly the leading rose, but the Tea begins more and more to vie with it in favour, and many rosarians now place it first, for its exquisite refinement, grace, and delicacy, bewitching modesty, and pensive charm. But the hybrid perpetual claims bolder brilliance, more velvety damask, and profundity of glow. And indeed it seems difficult to achieve or conceive more perfect beauty than has already been attained by loving ingenuity and persevering skill in many of the roses we now possess; though manifold gardeners are hankering still for a blue rose, which would not accord with the form and tint of the foliage if they got it.

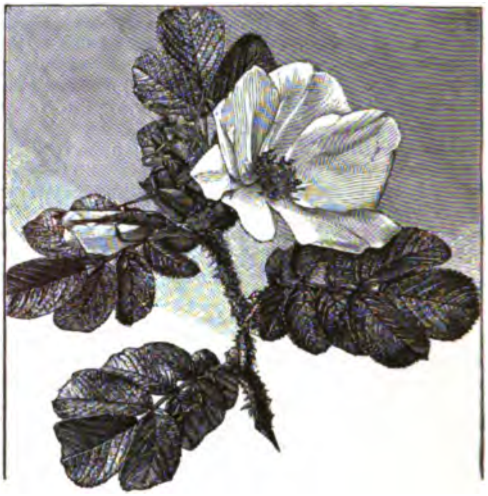


Fig. 1.—Rosa rugosa.

Roses are also divided, according to the form of flower, into globular, cupped, compact, and expanded, the last named often becoming reflexed in the later stage of bloom; and again, according to modes of culture, into standards, half-standards, pyramids, bushes, pendulous, pillar, and trellis form. The standards and half-standards, once so popular, are now in less demand, though still approved by those who plant for exhibition, or special effect at a distance; and the bush (the more natural and easy growth) becomes every year more general. For pillar and trellis work there are but few of the hybrid perpetuals and tea-scented sufficing in vigour and hardiness; though certain

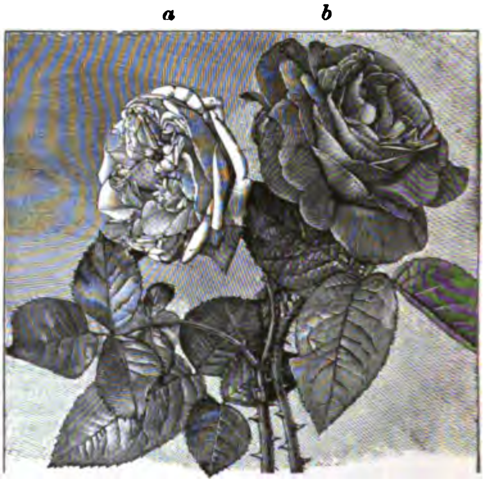


Fig. 2.
a, Tea-rose; *b*, Hybrid perpetual.

strains have been obtained of some of the leading favourites, such as *Jules Margottin* and *Devoniensis*, through 'sports' (as it is expressed) of the old kind, which serve the purpose fairly; and under glass or in a very snug spot that Coryphæus of yellow roses, *Maréchal Niel*, affords a grove of gold.

The question of stock must also be discussed, without acrimony if possible, though upon no other has there been so hot a war of roses. For any kind that is strong enough in constitution to support itself its own roots are the best feet and feeders, ousting all trouble of suckers, and often affording renewal by means of young shoots. But many of the fairest and sweetest, especially of the tea-scented class, require stouter sustenance, and must be budded or grafted on a more robust variety. The stocks chiefly used by our nurserymen are the Dog-rose, Manetti, and De la Grifferae; and the first is procured in three different ways—from its home in the hedges, or from cuttings, or from seed; and each way has its advocate. Others prefer the Manetti, a seedling Italian rose, as stock; and some, especially of the tea varieties, do best upon La Grifferae. But as a rule the Manetti is a treacherous foster-mother, affording brief vigour, and encroaching with deceptive suckers. Whatever stock may be chosen, the nobler rose is worked upon it, either by budding or grafting, and must engross the entire resources.

Again there are roses not a few, of delicate constitution or feeble habit, which should be grown in pots and sheltered through the winter. Many also of the stronger kinds are cultivated thus to bloom in the winter and spring, and some are of little value otherwise. But they must have plenty of air and light, and will not endure strong forcing. The Tea-rose, *Indica odorata*, descended from the Chinese blush and yellow, is grown most largely under glass, whether in pots or border, and being most lovely in the bud is especially fitted for bouquets. *Maréchal Niel* (perhaps more correctly classed as a Noisette of late), *Niphetos*, *Catherine Mermet*, and *Souvenir d'un Ami* are at present most popular for this sweet use.

New varieties of the rose are loudly heralded every year, and every season adds one or two lasting names to the lengthy catalogue. But old friends also pass out of date, and are no longer heard of; sometimes from a real advance upon them, sometimes from their own relapse. About 1860 nearly all new roses were the product of French nurserymen; but now we get many quite as good from the skill of our own rosarians. The crossing of the flowers is a process needing both judgment and dexterity. But the general grower will be content to cultivate the established kinds, which require no great trouble. Their abode must not be overhung, nor beset with stagnant water, the soil should be rich and deeply delved, and well-compressed round the neck of the plant. Plenty of water must be given in time of drought, and a mulching of good manure is welcome, and the growth of leaf and bud must be secured from countless enemies by daily and even nightly care. And the lover of the rose must not indulge his passion too profusely, but sternly nip three-quarters of the buds, when true discretion orders it. As soon as the first flush of bloom is past a little judicious pruning helps the prospect of a later crop, when beauty shows less bounty. Then for the winter there should not be much shortening of the branches, unless they are threatened by the wind; but the general pruning remains for March, or a little sooner or later, according to place, sort, and season.

Roses are most fair to see in summers neither hot nor cold. In a scorching year, such as 1868, the blossoms are often loose and flimsy, and the deep glow turns to tinder; whereas in the drip and chill of seasons like 1879 and 1888 the water-logged flower cannot expand. A showery summer, with some warm gleams, presents in full perfection the most perfect of all flowers. Then may we see why the rose has been with poets the type of all earthly bloom, sacred to Aphrodite, Eros, and Aurora, the symbol of youth and beauty; also why the Greeks and Romans placed it foremost in wreath and chaplet for holy rite or festival. And if the Egyptians were the first to cultivate it specially (as we have reason to believe), and devoted it to the god of silence—Horus, or Harpocrates—thus would the rose become the emblem of reserve and faithfulness.

Extracts of the rose are still in use medicinally; and the hips, which contain a pleasant acid, are employed as a mild astringent. Rose-water, distilled from the petals, affords a very refreshing fragrance; and the attar, or Otto (q.v.), is a choice and costly product of the East.

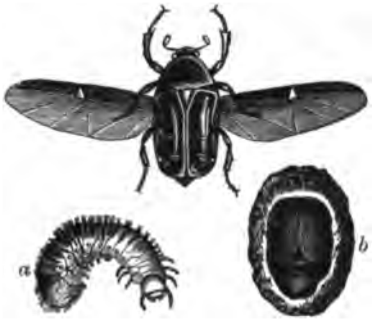
There are so many treatises on the rose, and so many classical references, that its lore is almost a literature; but of recent works the following are the most complete and instructive: W. Paul, *The Rose-garden* (9th ed. 1888, richly illustrated in colours, a noble and authoritative book); Jamain and Forney, *Les Roses* (1873); Max Singer, *Dictionnaire des Roses* (1885); J. G. Baker, *Classification of Garden-roses* (1885); H. B. Ellwanger, *The Rose* (New York); John Cranston, *Culture Directions for the Rose* (1875); Dean Hole, *A Book about Roses* (11th ed. 1891); T. Rivers, *Rose Amateur's Guide* (6th ed.); J. Lachaume, *Le Rosier*; Shirley Hibberd, *The Amateur's Rose-book*; E. V. B., *Ros Rosarum* (a poetical anthology, 1885); National Rose Society's Catalogue, &c.

Rose, a popular name for Erysipelas (q.v.).

Rose, SIR HUGH. See STRATHNAIRN.

Rosebery, ARCHIBALD PHILIP PRIMROSE, EARL OF, was born in London, 7th May 1847, had his education at Eton and at Christ Church, Oxford, and succeeded his grandfather as fifth earl in 1868. He entered parliament in 1871, acquired in unusual measure the goodwill of the democracy, and was everywhere welcomed as an effective and entertaining speaker. In 1874 he was chosen president of the Social Science Congress, and in 1878 he was elected Lord Rector of Aberdeen University, and in 1880 of Edinburgh. From 1881 to 1883 he was Under-secretary for the Home Department, and in 1884 became First Commissioner of Works. In Mr Gladstone's next short administration (1886) he was Secretary for Foreign Affairs, an office which he resumed in 1892, displaying, as on the former occasion, a tact and firmness that secured the approval of all parties in the state. In 1889 he was elected to the London County Council, and was successful and assiduous as its first chairman till he resigned in 1890; he was re-elected and acted for a few months in 1892. On the resignation of Mr Gladstone in 1894, Lord Rosebery became the head of the Liberal ministry. He was less successful than had been anticipated in securing perfect unanimity in his cabinet or in conciliating the hearty support of the various sections of his party. His government lost the confidence of the country, and soon after he resigned, a general election (July 1895) returned an overwhelming majority for the new Unionist government of Lord Salisbury. In 1887 Lord Rosebery married a daughter of Baron Meyer de Rothschild (died 1890). In 1891 he published a monograph on Pitt in the 'English Statesmen' series. In 1894 and 1895 the Premier won the Derby with his horses Ladas and Sir Visto. He is LL.D. (1888), K.G. (1892), and K.T. (1895).

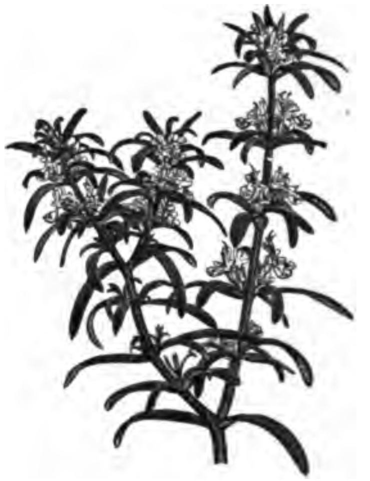
Rose-chafer (*Cetonia aurata*), an injurious beetle, whose grubs destroy the roots of strawberries and other plants, while the adults spoil the flowers of roses, strawberries, and seed-turnips. The eggs are laid in the ground; the full-grown grubs are whitish and about an inch and a half in length; after two or three years they pupate inside earthen cocoons. The adults, which are well able to fly from place to place, measure about an inch in length, are golden green above, coppery with a tint of rose beneath. Where they are likely to do harm the adults and grubs should be collected and destroyed, and recourse may be had to remedies similar to those used against cockchafers.—The 'rose-bug' of the eastern United States is another beetle (*Macrodactylus subspinosus*), a voracious pest which often appears in immense numbers and destroys the flowers of rosaceous plants.



Rose-chafer (*Cetonia aurata*):
a, larva; *b*, cocoon.

Rosecrans, William Starke, an American general, was born at Kingston, Ohio, 6th September 1819, graduated at West Point in 1842, and was employed as an engineer until 1854, when he resigned, became a civil engineer, and afterwards engaged in coal-mining and the manufacture of kerosene. In 1861 he volunteered as an aide to General McClellan, won an action at Rich Mountain in July, was commissioned brigadier-general in the United States army, and succeeded McClellan as head of the Department of the Ohio, and kept Lee out of western Virginia. In 1862 he commanded a division at the siege of Corinth, and after its capture was given the command of the Army of the Mississippi; on 19th September he defeated General Sterling Price at Iuka, and on 3d and 4th October he successfully defended Corinth against Price and Van Dorn. From October 1862 to October 1863 Rosecrans was in command of the Department of the Cumberland; in the battle at Stone River (December 31 and January 2), against Bragg, he by his personal exertions converted what nearly had been a defeat into a victory, after each side had lost over 9000 men; but at Chickamauga, September 19–20, 1863, he was defeated by Bragg, with a loss of 16,179, although he held Chattanooga, and the Confederates lost 17,804 men. Rosecrans was relieved of his command by General Grant; but in 1864 he was placed over the Department of the Missouri, and repelled Price's invasion of that state. He afterwards received the brevet of major-general, and resigned from the army in 1867. In 1868–69 he was minister to Mexico, in 1881–85 a member of congress, and in 1885 appointed registrar of the United States treasury.

Rosemary (*Rosmarinus*), a genus of plants of the natural order Labiatæ, and nearly allied to Sage (Salvia), from which it differs in its filaments having an awl-shaped tooth, directed downwards a little above the base. Only one species is known, *R. officinalis*, an evergreen erect shrub of 4 to 8 feet high, with linear leaves, and pale bluish flowers, growing in sunny places, on rocks, old walls, &c., in the countries around the Mediterranean Sea, and cultivated elsewhere as an ornamental and aromatic shrub. The leaves have a short whitish-gray down beneath, a penetrating camphor-like odour, and a pungent aromatic and bitter taste. They contain a large quantity of an essential oil, *Oil of Rosemary*, which is not unfrequently used as a stimulating liniment, to promote the growth of the hair, and as a perfume. *Spirit of Rosemary*, made by distillation of sprigs of rosemary with rectified spirit, is used to give a pleasant odour to lotions and liniments. Rosemary has been advantageously administered internally in cases of chronic diarrhœa, and of a relaxed state of the system.—Oil of Rosemary is a principal ingredient of the perfume called *Hungary Water*. The celebrated white honey of Narbonne owes its reputation to being collected from the flowers of rosemary. In some places, by a confusion of similar names, the totally distinct plant Costmary (q.v.) is called Rosemary. The name Wild Rosemary is given to *Ledum palustre*, a shrub with narcotic acrid properties.



Rosemary (*Rosmarinus officinalis*).
(Bentley and Trimen.)

Rosendale, a village of New York, by rail 8 miles SSW. of Kingston, or 53 S. of Albany, has a pop. of only some 600, but is noteworthy for its great manufacture of hydraulic cement. In 1886, when the United States produced 4,500,000 barrels (300 lb.) of cement, nearly one-half came from the Rosendale district, the rest being drawn from Pennsylvania, Kentucky, Illinois, Colorado, Indiana, Tennessee, and Alabama in varying proportions. Most of the American cement is derived from natural cement rock, as at Rosendale; less than 200,000 barrels (400 lb.) annually are 'artificial Portland.' In 1888 the product of the whole country was 6,253,295 barrels, valued at $4,533,639, Rosendale supplying about the same quantity as in 1886.

Rosenkranz, Karl, philosopher, a pupil of Hegel, was born at Magdeburg on 23d April 1805, studied in Berlin, Halle, and Heidelberg, taught at Halle as *privat-docent* (1828), and as professor of Philosophy (1831), in 1833 was called to the chair of Philosophy in Königsberg, and there he died, blind, on 14th June 1879. He was a man of wide culture and a voluminous writer, his works including *Encyclopädie der theologischen Wissenschaften* (2d ed. 1845), *Psychologie* (3d ed. 1863), *Kritische*

Erläuterungen des Hegelschen Systems (1840), criticisms of Schleiermacher's (1836) and Strauss's Doctrines of Belief (1845), *Meine Reform des Hegelschen Systems* (1852), and *Wissenschaft der logischen Idee* (1858–59) in philosophy, and books on the History of Poetry, *Diderot's Leben und Werke* (1866), *Leben Hegels* (1844), *Goethe und seine Werke* (2d ed. 1856) in literature. He also edited, with Schubert, *Kant's Werke* (12 vols. 1838–40).

See his autobiographical *Von Magdeburg nach Königsberg* (1873) and *Life* by Quäbicker (1879).

Rosenmüller, JOHANN GEORG, a German theologian and eloquent preacher, was born at Ummerstadt near Hildburghausen, 18th December 1736, studied in Altdorf, and filled chairs at Erlangen (1773), Giessen (1783), and Leipzig (1785), where he died, 14th March 1815. He published about 100 books of great popularity. Of these the most important was *Scholia in Novum Testamentum* (6th ed. by his son 1815–31).—ERNST FRIEDRICH KARL, eldest son of the foregoing, was a distinguished biblical critic and Orientalist. He was born at Hessberg near Hildburghausen, 10th December 1768, studied at Königsberg, Giessen, and Leipzig, became extra-ordinary professor of Oriental Literature at the last in 1795, ordinary professor in 1813, and died 17th September 1835. His *Institutiones ad fund. ling. Arab.* (1818) and *Analecta Arabica* (3 vols. 1824–27) were of great importance; his masterpiece, the *Scholia in Vetus Testamentum* (11 parts in 23 vols. 1788–1835), still retains no small part of its value. Other works are *Handbuch für bibl. Kritik und Exegese* (1797–1800), *Das alte und neue Morgenland* (1816–20), *Handbuch der biblischen Alterthumskunde* (4 vols. 1823–31).—A younger brother, JOHANN CHRISTIAN (1771–1820), was twenty years a professor of Anatomy and Surgery at Leipzig, and wrote on anatomy.

Rose-noble. See NOBLE.

Rose of Jericho (*Anastatica hierochuntica*), a plant of the natural order Cruciferæ, which grows in the sandy deserts of Arabia, and on rubbish, the roofs of houses, and other such situations in Syria and other parts of the East. It is a small, bushy, herbaceous plant, seldom more than six inches high, with small white flowers; and after it has flowered, the leaves fall off, and the branches become incurved towards the centre, so that the plant assumes an almost globular form, and in this state it is often blown about by the wind in the desert. When it happens to be blown into water the branches expand again, and the pods open and let out the seeds. Numerous superstitions are connected with this plant, which is called *Rosa Mariæ*, or *Rose of the Virgin*. If taken up before it is quite withered the plant retains for years its hygrometric property of contracting in drought and expanding in moisture.

Rose of Sharon, a name given to an ornamental malvaceous plant, the *Hibiscus syriacus* (see HIBISCUS). But the Rose of Sharon of the Bible was doubtless a bulbous plant, probably a kind of narcissus.

Rose'ola, or ROSE-RASH, is a name sometimes applied to the milder varieties of Erythema (q.v.), where the eruption consists merely of a reddening of the skin, with little or no swelling. Such an eruption sometimes occurs as an early symptom in smallpox, and during the stage of reaction in cholera; it is also one of the commonest of syphilitic eruptions. But it frequently appears independently of any such disease, and is then usually an indication of some slight disorder of digestion, or of some other internal source of irritation. It usually subsides in the course of two or three days at most, and causes very little constitutional disturbance. Occasionally it is attended by slight fever and sore throat, and may then be extremely difficult to distinguish from a mild case of scarlet fever. No treatment is usually required, but a mild saline laxative (e.g. a seidlitz powder) may be administered with advantage.

Roses, WARS OF THE, a disastrous dynastic struggle which desolated England during the 15th century, from the first battle of St Albans (1455) to that of Bosworth (1485). It was so called because the two factions into which the country was divided upheld the two several claims to the throne of the Houses of York and Lancaster, whose badges were the white and the red rose respectively. The Lancastrian claim to the crown came through John of Gaunt, third son of Edward III., created Duke of Lancaster in 1362, having married three years before the heiress of Henry, Duke of Lancaster. On John of Gaunt's death King Richard II. seized his lands, whereupon his son Bolingbroke, then in exile, returned to assert his rights, and, finding his cause exceedingly popular, was emboldened to claim the crown, which was granted him by the parliament after the deposition of his cousin Richard II. After the House of Lancaster had thus possessed the throne for three reigns (Henry IV., V., VI.), Richard, Duke of York, during the weakness of the last reign, began to advance, at first somewhat covertly, his claim to the throne. He was the son of Richard, Earl of Cambridge, by Anne, sister of Edmund Mortimer, the last Earl of March, and he was thus the nearest actual heir to Edward III. through his second son, Lionel, Duke of Clarence. The reigning family had become unpopular from its loss of France and its clericalism, but its strength was great in the north, where the power of the Percies was alone rivalled by that of the Nevilles. The Yorkist strength lay chiefly in the mercantile population of the southern counties. The effect of the war was the almost complete destruction of the old nobility, the weakening of the power of the church, and an enormous increase in the power of the crown, together with the great advance of the commercial classes and the large towns, destined a few generations later to measure strength with the crown itself. In 1454 Richard was appointed Protector of the realm during Henry's insanity, and on his recovery soon after took up arms against his rival Somerset, and crushed him at the first battle of St Albans (1455). A second period of insanity again gave him the protectorship, but the king recovered in 1456. His weak attempts at reconciliation proved failures, and in 1460 the Yorkist earls of Salisbury, Warwick, and March defeated and captured the king at Northampton (1460). The Lords now decided to grant the reversion of the crown to York, passing over Prince Edward. The queen refused assent, and fled to Scotland, returning only after the death of York at Wakefield (December 30, 1460); but York's son Edward quickly gained a victory at Mortimer's Cross (1461), though Warwick was defeated by the queen's main body in the second battle of St Albans (1461). But London rallied to young Edward, and in June he was crowned at Westminster after the great victory of Towton (1461). Next year Queen Margaret again appeared in the north, but in 1464 her forces were utterly routed by Warwick's brother Montague at Hedgeley Moor and Hexham. The estrangement of Warwick and his alliance with Queen Margaret's party drove Edward IV. from England and restored Henry VI. But Edward returned in the spring of 1471, defeated (and slew) Warwick at Barnet, and next the queen at Tewkesbury. The murder of Prince Edward after the battle, and the convenient death of Henry VI. in the Tower, cleared away his two chief dangers and left him to reign in peace. The accession of Henry VII. after the death of Richard III. on Bosworth field (1485), his marriage with Elizabeth, daughter of Edward IV. (1486), and the blending of the red and white rose in the Tudor badge, marked the termination of the Wars of the Roses, although the reign of Henry, whose own title was not good, was from time to time disturbed by the pretensions of Yorkist impostors.

Rosetta, a town of the Nile delta in Egypt, stands on the old Bolbitic arm of the river, 9 miles from its entrance into the Mediterranean and 44 miles by rail NE. of Alexandria. Two forts and a lighthouse stand near the mouth of the river. A bar of sand prevents large vessels from entering. Rosetta has been outstripped as a commercial port by Alexandria. In the time of the Crusades it was a place of great strength; and St Louis made it the basis of his crusading operations. Sultan Beybers, after that (in 1251) founded the present city farther inland. The Arabs call it *Raschid*, believing that Haroun al-Raschid founded the old city. Pop. (1882) 16,666. A few miles to the north of the town was discovered the Rosetta Stone, which gave the first clue to the interpretation of the Hieroglyphics (q.v.). At Rosetta too are barrage works for holding up the Nile water until it can be directed into the irrigation channels. These works, originally constructed by Mougel Bey (1843–61), were almost entirely rebuilt by Sir C. Scott Moncrieff in 1886–90. The barrage is 508 yards long, and has 61 arches.

Rose-water. See PERFUMERY.

Rose-window, a circular window with tracery, such as is shown in our illustrations to the articles Amiens and Paris.

Rosewood. The most valuable rosewood comes from Brazil. Two kinds, or two qualities, are known in commerce. These much resemble each other, the one, which is usually rather the better figured of the two, coming from Rio de Janeiro, and the other from Bahia. Although Brazilian rosewood has been used for making furniture in Europe for more than two hundred years, the species of tree or of trees which yield it are not known to European botanists. Mr Bentham, judging by the appearance of the wood and of the leaves of the tree, or of one of those rosewood trees, has assigned it to the genus Dalbergia. This view is probably correct. At all events there are three well-known Indian species of this genus called respectively *D. latifolia*, *D. sissoo*, and *D. cultrata*, all of which, except that they want the dark blotchy veining, closely resemble the Brazilian rosewoods. The cellular structure of the wood is similar in the whole of them. They are all rich in resinous colouring matter, and all except *D. latifolia*, which is slightly lighter, have a specific gravity ranging between ·900 and 1·000, so that they just float in water. Since at least 1830 the *D. latifolia* has been known in England as Indian rosewood. The South American and Indian kinds named above are all hard and durable, and take a fine polish. They are in every way excellent furniture woods, the Brazilian kinds being only more valuable because they are more beautifully figured. The Indian rosewood is often elaborately carved by native workmen, and for this purpose it is well suited. Of late years much of the furniture, even of a superior kind, made of mahogany in Great Britain, has been stained of a rosewood colour. An inferior kind of rosewood is brought from Honduras. The name is said to have been given because of a striking rose-like odour that the wood gives out when freshly cut.

Rosherville Gardens, 'the place to spend a happy day,' were formed near Gravesend by Mr Rosher, the original proprietor, in worked-out chalk-quarries. Music, a theatre, a zoological collection, as well as the pleasant neighbourhood, attract visitors.

Rosicrucians. The mystery which has surrounded this brotherhood of Hermetic philosophers has afforded a wide field to romantic fiction, and has much exaggerated their own pretensions. A German pamphlet, *Fama Fraternitatis of the Meritorious Order of the Rosy Cross*, published at Cassel in 1614, advertised for the first time the existence of such an association, which then claimed an antiquity of over 120 years. From subsequent publications it is inferred that the fraternity was established, on its own showing, by Christian Rosencreutz in 1459. On this point there is no evidence outside Rosicrucian manifestoes, and all that concerns the founder is of fabulous or allegorical character. If the society existed as a corporate body when the *Fama Fraternitatis* appeared, that date may be accepted as marking at least the beginning of its public history. The other documents which claim to have been issued by the Rosicrucians are *Confessio Fraternitatis R.C., addressed to the Learned of Europe* (Cassel, 1615); *Chymical Marriage of Christian Rosencreutz* (Strasburg, 1616); *Perfect and True Preparation of the Philosophical Stone, according to the Secret of the Brotherhoods of the Golden and Rosy Cross* (Breslau, 1710; contains the unabridged laws of the order); and *Secret Symbols of the Rosicrucians of the Sixteenth and Seventeenth Centuries* (Altona, 1785–88). Whether the later publications emanated from the original society it is not possible to say, but it has been supposed that associations in imitation of the fraternity, bearing its name and emblems, were formed soon after the appearance of the first manifestoes. By these documents the Rosicrucians are represented as adepts in Hermetic mysteries, including metallic transmutation, power over elemental spirits, and knowledge of magical signatures—the *signatura rerum* of Paracelsus. They aimed at a general reform in arts and sciences, especially alchemy and medicine, and posed chiefly as professors of the healing art. They invited all students of nature to join them; but, as they gave no clue to their whereabouts, the manifestoes were by some regarded as a laborious hoax, an opinion which does not seem justified by a review of the entire evidence. An immense controversy took place at the time in Germany, whose literary centres became a battle-ground for rival pamphleteers on the merits of Rosicrucian pretensions. The foremost defenders of the order were Michael Maier in Germany, Robert Fludd, Thomas Vaughan, and afterwards John Heydon, in England. Among its adverse critics were Andrew Libavius, who afterwards changed his standpoint, and Johann Valentin Andreä (q.v.). The authorship of the original manifestoes has, at the same time, been generally attributed to Andreä, and he certainly wrote the *Chymical Marriage of Christian Rosencreutz*. The question of the authorship offers a curious field for investigation, and has exercised the controversial skill of many ingenious critics; but no satisfactory solution has ever been reached. Rosicrucians flourished in France during the period of the Revolution; there was a lodge in Mauritius about 1794; and there are traces of such a fraternity at the beginning of the 19th century both in England and Germany. A *Societas Rosicruciana in Anglia* was formed as an offshoot of masonry by Robert Wentworth Little about 1857, which is to be distinguished from the original order, and from the Rose-cross degree in freemasonry. The latter, notwithstanding its name and symbolism, disclaims all connection with the objects and history of the alchemical brotherhood.

Among works to be consulted on the subject of the Rosicrucian mystery a first place should be given to

Solomon Semler's *Impartial Collections for the History of the Rosicrucians* (Leip. 1768). De Quincey's *Rosicrucians and Freemasons* is brilliant but misleading. A review of the whole controversy, with the documents that concern it, is contained in *The Real History of the Rosicrucians* (Lond. 1887), by A. E. Waite, the author of the present article. A MS. *Treatise of Rosie Crucian Secrets*, attributed to Dr John Dee, and preserved among the Harleian MSS. in the British Museum, is a forgery of the 18th century.

Roslin, a Midlothian village, near the wooded glen of the North Esk, 6½ miles S. of Edinburgh. Its castle, dating from the 14th century, was the seat of the St Clairs, Earls of Orkney from 1379 to 1471, and afterwards of Caithness, and hereditary grand-master masons of Scotland from 1455 to 1736. The exquisite 'chapel,' built about 1450, is really the choir of an intended collegiate church, and is only 70 feet long, 35 broad, and 42 high. Its beauty lies not in the outline, but in the profusion of stone-carving lavished on pinnacles, niches, vaulted roof, and clustered columns, and especially on the famous 'Prentice pillar.' The building, essentially Scottish, has often been wrongly ascribed to Spanish, at any rate to foreign, masons. Much damaged by an Edinburgh mob in 1688, it was restored by the third Earl of Rosslyn at a cost of £5000, and has served since 1862 as an Episcopal church. On Roslin Moor the Scots are said to have twice defeated the English in one day, 24th February 1303. Pop. 611. See articles by A. Kerr in *Procs. Soc. Ants. Scot.* for 1876–78.

Rosmini. Antonio Rosmini-Serbati, one of the most original philosophers of the 19th century, was born of noble family at Rovereto in the Italian Tyrol, 25th March 1797. He grew up a pure and beautiful child, and after a stainless youth of devotion and study decided for the priesthood against his parents' wishes, and began the course at Padua in 1817. Three years later his father's death gave him an ample estate. He was ordained priest in 1821, and devoted the next five years at home with a serene but profound enthusiasm to study, meditation, and prayer. He read widely in philosophy alike ancient and modern, and already revolved within his mind a comprehensive and coherent system to serve as a basis for the truths of revelation, while on the practical side he planned a new institution for the training of teachers and priests in wisdom and holiness. From 1826 to 1828 he lived mostly in Milan, next thought out the rule of his new Order in a period of retirement and severe mortification at Domodossola in the Piedmontese Alps, visited Rome, gained the approval of Pius VIII. both for his special studies and for the institution of his Order, and published his *New Essay on the Origin of Ideas* (4 vols. 1830), which at once carried his name over the Catholic world. After a few years of labour at Trent, hampered by the jealousy of the Austrian government, which feared his Italian patriotism and his papal sympathies, he settled in 1837 at Stresa on the western shore of Lago Maggiore, and two years later received from Gregory XVI. the formal approval of his Institute. The next few years were the happiest and most fruitful of his life. Surrounded by loving and devoted friends, he sent volume after volume to the press; overpowered by his logic noble opponents to his philosophy like Vincenzo Gioberti and Count Mamiani, as well as no less able writers from the rationalistic and anti-Catholic side; and foiled the restless intrigues of Jesuit enemies, who saw in his enterprise possible dangers to the supremacy of their Order. His dream in politics, as expressed in his *Constitution according to Social Justice* (1848), was a confederation of the states of Italy under the pope as perpetual president; but his heart sank within him when the pope declared his intention to take no part in the war of liberation against Austria.

For a brief period he basked in the papal favour, and was promised by Pius IX. a cardinal's hat; while for seven weeks he served as the envoy of Piedmont at the papal court, and it was he whom the Romans asked for as their Liberal minister in the period between the murder of Rossi and the pope's flight to Gaeta. He followed the pope, but now found his mind poisoned against him by the malign suspicions of Antonelli and the reactionary party, and never afterwards regained his confidence. His *Constitution* and *The Five Wounds of Holy Church* (Eng. trans. ed. by Canon Liddon, 1883) were next prohibited by an irregular meeting of the Congregation of the Index called at Naples. Rosmini submitted without a word of protest, and returned to Stresa to spend the remaining seven years of his life in even more absolute devotion than before to his Institute and to the composition of works intended to complete and consolidate his system of philosophy. His enemies still continued to pursue him with wicked calumnies and charges of heresy in doctrine and unfaithfulness to the Holy See. But their malignity overshot its mark, and at length the pope, his eyes opened to see how he had wronged Rosmini by his haste, granted him a fair hearing, first enjoining silence on his traducers, and next subjected his whole published works to a careful scrutiny, in relation to the more than three hundred charges brought against them. The process lasted nearly four years (1851–54), but at its close the Congregation of the Index, the pope presiding, declared Rosmini's writings to be entirely free from censure, and enjoined perpetual silence on all his accusers. But he did not long survive a triumph for which he had waited with saintly patience, dying at Stresa, not without suspicion of poison, 1st July 1855. It was only in 1888 that Rosmini's restless traducers succeeded in getting forty propositions from his *posthumous* works condemned by the Holy Office.

The 'Institute of the Brethren of Charity' survived its founder, and among the Rosminian Fathers, who are mostly Italians or Englishmen, are to be found at the present day some of the ablest and most devoted sons of the Roman Church. Its fundamental idea is the principle of passivity, its aim holiness or the moral perfection of the soul. Moral perfection consists in justice or the practical recognition of each being, seen in the idea, according to the *beingness* that is in it. The *elective* or contemplative part of the discipline prepares for the *assumptive* or active part, whose constant aim is the well-being of others. The brethren, who include both clerical and lay members, undergo a two years' novitiate and take the three ordinary vows, but wear no distinctive dress and conform to the laws of the country in which they happen to be. The Institute of Charity was a large-minded attempt to adapt the monastic system and Catholic Christianity generally to the needs of the present day, and its comparative lack of success is only due to the enormous force of interested opposition brought to bear against it by the obscurantist party in the church, whose chief end is despotic power for itself and blind obedience from the people. In England it has foundations at Ratcliffe, Loughborough, Cardiff, Wadhurst, Rugby, and established in 1876 its central House at St Etheldreda's, Holborn, once the domestic chapel of the palace of the Bishops of Ely.

The foundation of Rosmini's philosophy is *being* considered as the form of the intelligence—an elemental intuition of which is implanted by Nature herself. He begins by pointing out, as an essential characteristic of cognition, a distinction between the impersonal *object known* and the personal *subject* or *knower*. Human cognitions are intuitions and affirmations, and the former necessarily precede the latter, since they regard things in their possibility, rather than merely formulate assertions as to whether they subsist or do not subsist. Intuition then gives us possible objects—ideas; affirmation, things subsistent. Of ideas we may affirm (1) that they are not nothing; (2) that they are not ourselves; (3) that they have a mode of existence of their own, entirely different from that of real or subsistent things, and independent of the bodily sense. Their two essential characteristics are *universality* and *necessity;* for real objects and sensations are always particular, instead of being universal and generic, and every object which involves no contradiction is necessarily possible. These two characteristics involve two others, infinity and eternity; the origin of the ideas comes from God, for man does not receive them from the things themselves. The one *indeterminate* and wholly universal idea is that of *being* or existence; we cannot determine the subsistence of an object until we first have the idea of it, therefore perception involves the idea which is further isolated from all the other elements of the perception by the process of universalisation, through which it may be realised an indefinite number of times. When the ideas are all fully or perfectly determined, they are called *concrete;* when they remain to a certain extent indeterminate, they are *abstract*. The determinations of the ideas are sensations; these are merely the occasions of its discovery by the intelligence, which can admit that to be possible which the sensation represents as real. By the process of universalisation then we form those ideas which are completely determined; by abstraction, those which are determined only to a certain extent. It is this idea of being which makes intelligence possible: it is the necessary form of human reason, the indispensable condition given by nature herself, the parent idea which generates all others. It is cognisable by itself, as otherwise there is nothing else that could make it known; the idea of being gives us itself the essence of the thing. Herein is secured the *objectivity* of truth—the faculty of recognising the essence of things, the foundation of the divine *imperative* of duty in the conscience of man, the logical foundation on which faith and charity may be supernaturally built. *Being* is incorporeal, independent of space, spiritual, and therefore incorruptible and immortal. It is independent of time; as *being* in its essence is always *being*, and as it would be a contradiction in terms for being to cease to be being, it is eternal. But since it was united to the soul in time, it must have existed before it, and be independent of it. And thus we reach an Intelligence anterior to human intelligence—an Eternal Mind. This eternal mind is God's, and therefore God exists, and his existence and the immortality of the soul remain the true foundation of morals. But *being* as intuitively seen by nature merely gives the certainty that God exists; it cannot make God known to us until we are illumined by a new faculty—an influx of objective light, the Light of Grace. Thus a necessary place for revelation is found in the essential limitations of man's nature, and this revelation of God is contained in the Gospel of Jesus Christ, which alone can harmonise all the contradictions of the universe.

Rosmini's most important work was his contribution to Idealogy; his masterpiece is his *New Essay on the Origin of Ideas* (1830; Eng. trans. 3 vols. 1883–84) or his *Psychology* (1846–48; Eng. trans. 3 vols. 1884–88), both of which belong to the classics of philosophical literature. Death overtook him before he had completed his great projected work, the *Theosophy* (5 vols. 1859–74). A complete Bibliography of his writings, ninety-nine in number, is prefixed by Thomas Davidson to his admirable translation (1882) of the *Sistema Filosophico* (1845), grouped under the heads of Idealogy and Logic, Metaphysical Sciences, Philosophy of Morals and Right, Education and Methodology, Political Philosophy, Philosophy of the Supernatural, Ecclesiastical Prose, and Miscellaneous. The last section includes two volumes of Correspondence, but as many as 15,000 Letters are said to be still unprinted. In Mr Davidson's work will be found, besides a brief Life and a lucid Introduction, a list of books relating to Rosmini's Life and Philosophy. Here we may name the studies by Tommaseo (Turin, 1855), Franc. Paoli (Turin and Rovereto, 1880–84), and Father Lockhart (2d ed. complete, 2 vols. 1886). Rosmini's own *Sketch of Modern Philosophies and of his Own System* has been translated, with an admirable Introduction, by Father Lockhart (1882; 2d ed. 1890).

Rosoglio, a variety of liqueur, made in Italy, and flavoured with flowers or fruits, especially orange blossoms.

Ross, a Celtic word, meaning a headland, occurring as the name or part of the name of many places in the British Islands, and in other parts of Europe, as Roslin, Culross, Dunrossness, Montrose, Roxburgh, Ardrossan.

Ross, a market-town in Herefordshire, is finely situated on the left bank of the Wye, 14 miles SSE. of Hereford. In the parish church (1316), whose 'heaven-directed spire' is 208 feet high, is buried John Kyrle (q.v.), celebrated by Pope as the 'Man of Ross.' The town carries on a trade in cider, malt, and wool, has corn-mills and tanneries, and is much visited by tourists. Pop. (1881) 3724; (1891) 3575.

Ross, SIR JOHN, Arctic voyager, born June 24, 1777, was a son of the minister of Inch, Wigtownshire, and was little more than nine years old when he entered the navy, serving with distinction in the French wars. His most important services were rendered in the Arctic regions, whither in 1818 he proceeded with Parry as his second in command; the objects of the expedition were to explore Baffin Bay and attempt a North-west Passage. Ross published the results of his investigations in *A Voyage of Discovery* (1819). In May 1829 he commanded a fresh expedition to the Arctic regions (fitted out by Sir Felix Booth), and discovered the peninsula of 'Boothia Felix.' Ross received, on his return in 1833, the honour of knighthood. The results of this expedition were written down in *Narrative of a Second Voyage in Search of a North-west Passage* (1835). He made yet another voyage to the Polar regions—an unsuccessful attempt to find Sir John Franklin, in 1850. Ross wrote *Memoirs and Correspondence of Admiral Lord de Saumarez* (2 vols. 1838), a *Treatise on Navigation by Steam* (1828), and other works. He died in London, August 30, 1856.

SIR JAMES CLARK ROSS, his nephew, also distinguished himself as an Arctic navigator. He was born in London, April 15, 1800, entered the navy in his twelfth year, accompanied Sir John in his first and second Polar voyages, and in the interval between visited the same regions with Parry in his expeditions. He discovered in 1831 the North magnetic pole, and on his return was rewarded with a post-captaincy. After being employed by the Admiralty in a magnetic survey of Great Britain and Ireland, he was placed in command of the *Erebus* and *Terror* for an expedition to the Antarctic seas (1839), and approached within 160 miles of the South magnetic pole. He was knighted after his return home in 1843; and in 1847 published *Voyage of Discovery in Southern Regions, 1839–43* (2 vols. 1847). In 1848 he made a voyage in the *Enterprise* to Baffin Bay in search of Sir John Franklin. He died at Aylesbury, April 3, 1862. See Mackinder, *Ross and the Antarctic* (1892).

Rossall College, a large public school on the coast of Lancashire, 2¼ miles SSW. of Fleetwood, was founded in 1844 for the education of the sons of clergymen and others. It has twelve entrance scholarships, thirty masters, and over 350 boys. See the *Jubilee Sketch* by Canon Beechey (1894).

Ross and Cromarty, a Highland county, the third largest in Scotland, extends from the German Ocean to the Atlantic, and is bounded N. by Sutherland, S. by Inverness-shire. In 1890–91 it was finally formed into a single county by the boundary commissioners, who also added to it the small Ferintosh (detached) district of Nairnshire, and a much smaller fragment from Inverness-shire. Its mainland portion measures 75 by 67 miles, and the total area is 2,084,900 acres or 3260 sq. m., of which 103 are water and 736 belong to a dozen islands—the Lewis, Tanera, Ewe, &c. The east coast is indented by the Dornoch; Cromarty, and Moray Firths; the west coast by eight sea-lochs (Broom, Gruinard, Torridon, Carron, &c.). The chief of the innumerable streams are the Oykell, Alness, and Conon; the Falls of Glomach, on a head-water of the Elchaig, in the SW. are 370 feet high; and beautiful Loch Maree is the largest of nearly a hundred good-sized fresh-water lakes. Mam Sodhail (3862 feet), on the Inverness-shire border, is the highest of more than thirty summits exceeding 3200 feet above sea-level, others being Ben Dearg (3547), Benmore (3505), Ben Wyvis (3429), and Ben Attow (3383). The high grounds afford good pasture, and systematic sheep-farming dates from about 1764. It reached its zenith during 1860–70, when 400,000 sheep were grazed in the county. The glens and low grounds in the more favoured portions have a fertile soil, which, with the fine climate, especially in Easter Ross, bears crops of superior quality. Still, less than 7 per cent. of the entire area is arable, and less than 70 square miles is occupied by woods and plantations. Whisky is distilled, and the salmon and sea fisheries are very valuable. Montrose was defeated at Invercharron (1650), and a small Jacobite force in Glenshiel (1718). Sir Thomas Urquhart, Lord Lovat, and Hugh Miller were natives. The chief places are Dingwall, Tain, Stornoway, Fortrose, Cromarty, Strathpeffer, and Invergordon; and the county returns one member to parliament. Pop. (1801) 56,318; (1851) 82,707; (1881) 78,547; (1891) 77,751. See separate articles on Cromarty, Dingwall, Lewis, Maree, &c.; and an article by J. Macdonald in *Trans. Highland and Agric. Soc.* for 1877.

Rossbach, a village in Prussian Saxony, 22 miles W. by S. of Leipzig and 9 SW. of Merseburg, is celebrated for the victory gained here by the Prussians under Frederick the Great (q.v.) over the combined French and Austrian armies on 5th November 1757. The 'rout of Rossbach' remained for a long time a term of reproach in the French army. The Prussians lost 540 killed and wounded, while the loss of the allies was more than 2700 killed and wounded and 5000 prisoners, among whom were 5 generals and 300 officers, and nearly 70 cannon.

Rosse, WILLIAM PARSONS, third EARL OF, an astronomer, was born in York on 17th June 1800, and educated at Trinity College, Dublin, and Magdalen College, Oxford, where he graduated first-class in Mathematics in 1822. During the life of his father he sat in the House of Commons as Lord Oxmantown, representing King's County from 1821 to 1834; he succeeded to the peerage in 1841, and was elected a representative peer for Ireland in 1845. As early as 1826 he had commenced to make experiments in the construction of fluid lenses; but he subsequently devoted his powers to the construction of a speculum for the reflecting telescope. Certain defects had hitherto baffled opticians—namely, spherical aberration and absorption of light by specula, and in casting specula of large size cracking and warping of the surface on cooling; but Lord Rosse succeeded in obviating the last defect, and in counteracting in great part the other two. He began the construction of his great reflecting telescope in 1845; it weighed in all 12 tons, and was mounted in his park at Parsonstown at a cost of £30,000. The first addition to astronomical knowledge made by this telescope was the resolution of certain nebulæ into groups of stars; next came the discovery of numerous binary and trinary stars, and a description of the moon's surface. The telescope is described in the *Philosophical Transactions*, in which journal, and in the *Transactions of the Royal Society, Dublin*, most of his papers were published. Lord Rosse was president of the Royal Society from 1848 to 1854. He died on 31st October 1867, and a statue to his memory was erected in Parsonstown in 1876.

Rossendale, an electoral division of north-east Lancashire, in which is Haslingden (q.v.).

Rossetti, GABRIELE, an Italian poet and man of letters, particularly concerned in Dantesque criticism, was born on 28th February 1783 at Vasto, in Abruzzo Citeriore, then forming part of the kingdom of Naples. His father, Nicola Rossetti, was engaged in the iron-trade of the district; his mother was Maria Francesca Pietrocola. The parents were not in easy circumstances, and had a large family: besides Gabriele, two of the sons attained some eminence, Andrea becoming a canon in the church, and Domenico being well reputed in letters and antiquities. Gabriele gave early signs of more than common ability, and was placed by the local grandee, the Marchese del Vasto, to study in the university of Naples. He had a fine tenor voice, and was sometimes urged to try his success on the operatic stage; he drew with such precision that some of his extant pen-drawings with sepia-ink might readily be taken for steel-engravings; he composed poetry, both written and improvised, and became one of the most noted improvisatori in Naples. The boyhood and youth of Rossetti passed in a period of great political commotion, consequent upon the revolutionary and imperial wars of France. The Bourbon king of Naples, Ferdinand I., was ousted by the Parthenopean Republic, and again by King Joseph, the brother of Napoleon, and his successor King Joachim (Murat), the emperor's brother-in-law, and Ferdinand had to retire to Sicily. Rossetti obtained an appointment as Curator of Ancient Bronzes in the Museum of Naples, and also as librettist to the operatic theatre of San Carlo: he wrote the libretto of an opera, *Giulio Sabino*, was well received at the court of the Napoleonic sovereigns, and in 1813 acted as a member of the provisional government sent to Rome by Murat. After the restoration of Ferdinand to Naples in 1815 he continued his connection with liberal politicians, and joined the widely-diffused secret society of the Carbonari. In 1820 a military uprising compelled King Ferdinand to grant a constitution on the model of that which had recently been established in Spain. Rossetti saluted its advent in one of his most celebrated odes, beginning 'Sei pur bella cogli astri sul crine' ('Beautiful indeed art thou, with the stars in thine hair'). The good faith of the king was highly dubious from the first, and in 1821 he abrogated the constitution, and put it down with the aid of Austrian troops. The constitutionalists were proscribed and persecuted, Rossetti among them. Two verses in one of his lyrics are said to have given especial offence to the king—'Chè i Sandi ed i Luvelli Non sono morti ancor' ('For Sands and Louvels are not yet dead'—alluding to the assassination of Kotzebue and of the Duc de Berri). Rossetti had to escape from Naples with the kindly connivance of the British admiral, Sir Graham Moore, who shipped him off to Malta in the disguise of a British naval officer. In Malta he was treated with great liberality and distinction by the governor, Mr Hookham Frere; and towards 1824 he came over to London, with good recommendations, to follow the career of a teacher of Italian. In 1826 he married Frances Mary Lavinia Polidori, daughter of a Tuscan father and English mother; soon afterwards he was elected professor of Italian in King's College, London. They had four children: (1) Maria Francesca, born 1827, died 1876 (author of *A Shadow of Dante*, &c.); (2) Gabriel Charles Dante (see below); (3) William Michael, born 1829 (critical writer, and editor of Shelley); (4) Christina Georgina (see below). In London Rossetti lived a studious, laborious, and honourable life, greatly respected by his pupils, and by Italian residents and visitors; he was a man of strong and steady affections and vivacious temperament, earnest and single-minded in all his pursuits. In politics he was a vigorous liberal, but more inclined to a constitutional monarchy than a republic; in religion he was mainly a freethinker, but tending in his later years towards an undogmatic form of Christianity. Though totally opposed to the papal system and pretensions, he would not openly abjure, in a Protestant country, the Roman Catholic creed of his fathers. His health began to fail towards 1842, and his sight became dim, one eye being wholly lost. After some attacks of a paralytic character he died in Albany Street, London, on 26th April 1854. Besides some poems published in Italy, Rossetti produced the following works: *Dante*, *Commedia* (the *Inferno* only was published), with a commentary aiming to show that the poem is chiefly political and anti-papal in its inner meaning (1826); *Lo Spirito Antipapale che produsse la Riforma* ('The Anti-papal spirit which produced the Reformation'—an English translation also was published), reinforcing and greatly extending the same general views (1832); *Iddio e l'Uomo, Salterio* ('God and Man, a Psaltery'), poems (1833); *Il Mistero dell' Amor Platonico del Medio Evo* ('The Mysterious Platonic Love of the Middle Ages'), 5 vols., a book of daring and subtle speculation tending to develop the analogy between many illustrious writers as forming a secret society of anti-Catholic thought, and the doctrines of Gnosticism and freemasonry (1840); this book was printed and prepared for publication, but withheld as likely to be deemed rash and subversive; *La Beatrice di Dante*, contending that Dante's Beatrice was a symbolic personage, not a real woman (1842); *Il Veggente in Solitudine* ('The Seer in Solitude'), a speculative and partly autobiographical poem (1846); it circulated largely, though clandestinely, in Italy, and a medal of Rossetti was struck there in commemoration; *Versi* (miscellaneous poems), 1847; *L'Arpa Evangelica* ('The Evangelic Harp'), religious poems (1852). The views of Rossetti regarding Dante, along with Petrarca and many other Italian authors, excited a great deal of controversy, which still continues in various forms and with varying fortunes. His memory is much revered in his native place, where the house of his birth has been bought as public property, and a theatre and the chief square have been named after him.

Dante Gabriel Rossetti (or properly Gabriel Charles Dante), elder son of the foregoing, was born in Charlotte Street, Portland Place, London, on 12th May 1828. He was educated in King's College School, London; but, having from his earliest years evinced a wish to become a painter, he was taken from school in 1843 and commenced the study of art, entering soon afterwards the antique school of the Royal Academy. Here he associated with the young painters John Everett Millais and William Holman Hunt, and the sculptor Thomas Woolner; along with these three he founded the so-called Pre-Raphaelite Brotherhood, which was completed by the addition of three other members. The chief incentive to the foundation of this society, and of the school of art which it initiated, was the distaste and disrespect felt by the youthful artists for the poverty-stricken conceptions and slurred execution which marked most of the art then current in England, mingled with a sincere and reverent delight in those qualities of genuine and spontaneous invention, lofty feeling, and patient handiwork, which had been developed by the European schools of art preceding the culmination of Raphael and his followers. A natural result of this frame of mind was a disposition to realise objective details to the utmost, with a view to the thorough authenticity of the visible means through which ideas are conveyed; but it was a mistake of some observers, who noticed a scrupulous exactness and sometimes a plethora of details, to suppose that the main concern of the associated artists was really with the details, and not with the ideas. The English Pre-Raphaelites wished to exhibit true and high ideas through the medium of true and rightly elaborated details. Two other mistakes have been frequently repeated concerning these artists; first, that they were an offshoot of the 'Tractarian' movement, guided by religious pietism; and second, that they were set going by Mr Ruskin. Rossetti's earliest oil-picture, exhibited in 1849, was 'The Girlhood of Mary Virgin;' his next (1850), now in the National Gallery, 'The Annunciation.' After this he withdrew from exhibiting almost entirely, and his art developed through other phases, in which the sense of human beauty, intensity of abstract expression, and richness of colour were leading elements. He produced numerous water-colours of a legendary or romantic cast, several of them being from the poems of Dante, others from the Arthurian tradition. Among his principal oil-pictures are the Triptych for Llandaff Cathedral, of the 'Infant Christ adored by a Shepherd and a King,' 'The Beloved' (the Bride of the Canticles), 'Dante's Dream' (now in the Walker Gallery, Liverpool), 'Beata Beatrix' (National Gallery), 'Pandora,' 'Proserpine,' 'The Blessed Damozel' (from one of his own poems), 'The Roman Widow,' 'La Ghirlandata,' 'Venus Astarte,' 'The Day-dream.' He designed several large compositions, such as the 'Magdalene at the door of Simon the Pharisee,' 'Giotto Painting Dante's Portrait,' 'Cassandra,' and the 'Boat of Love' (from a sonnet by Dante); but these he failed to carry out as pictures on an adequate scale, partly owing to his receiving constant commissions to execute smaller works, consisting mostly of female half-figures ideal in invention or feeling, and executed in life-size. The early studies of Rossetti in art had not been so steady or systematic as might have been wished. Afterwards, beginning in 1848, he had the advantage of some friendly training from his constant intimate, Mr Ford Madox Brown, the historical painter; but, notwithstanding his passionate impulse as an inventive artist, and his impressive realisation of beauty in countenance and colour, some shortcomings in severe draughtsmanship and in technical method, and some degree of mannerism in form and treatment, have often, and not unjustly, been laid to his charge. Rossetti began writing poetry about the same time that he took definitely to the study of painting. Besides some juvenile work, and some translations from the German (that of *Henry the Leper*, by the mediæval poet, Hartmann von der Aue, is preserved), he executed a number of translations from Dante and other Italians, published in 1861 as *The Early Italian Poets*, and again in 1874 as *Dante and his Circle*. Two of his best-known original poems, *The Portrait* and *The Blessed Damozel*, were written in his nineteenth year, and many others followed. These were about to be published in 1862 in a volume (some of them having been previously printed in magazines —chiefly in *The Germ*, 1850, and *The Oxford and Cambridge Magazine*, 1856), but a domestic calamity intervened, and all idea of publication was set aside for some years. Rossetti had fallen in love towards 1851 with a very beautiful girl, a dressmaker's assistant, named Elizabeth Eleanor Siddal; he married her in 1860, but she died suddenly in February 1862. In the first impulse of desperation he buried his MSS. in her coffin. In 1869 he thought fit to recover them, and in 1870 he issued his volume named *Poems*, containing the bulk of those compositions and several others written not long before the date of publication. This volume was a success with poetical readers, and was reviewed with great admiration and even enthusiasm by some leading critics. Late in 1871, however, Mr Robert Buchanan, writing in the *Contemporary Review* under the pseudonym of Thomas Maitland, attacked the book on literary, and more especially on moral grounds, and soon afterwards he republished his article, *The Fleshly School of Poetry*, as a pamphlet. Rossetti was now in a depressed state of health, suffering much from insomnia, from an abuse of chloral as a palliative, and from weakened eyesight (he often thought he would become blind, as his father had very nearly been). The literary detraction, conspiring with physical malady, produced a strong and exaggerated effect upon him; and from about the middle of 1872 he became morbidly sensitive and gloomy, and very recluse in his habits of life, though his naturally strong sense, and his turn of mind, in which a good deal of humour and practicality was blended with idealism, continued to form a substantial counterbalance. In 1881 he published a second volume of poems named *Ballads and Sonnets* (containing some of his finest work, 'Rose Mary,' 'The White Ship,' 'The King's Tragedy,' and the completed sonnet-sequence, 'The House of Life'), and at the same time he re-issued, with some omissions and interpolations, the *Poems* of 1870. His health was by this time extremely shattered. A touch of paralysis affected him towards the end of 1881, and, retiring in the hope of some improvement to Birchington-on-Sea, near Margate, he died there of uræmia on 9th April 1882. The poetry of Rossetti is intense in feeling, exalted in tone, highly individual in personal gift, picturesque and sometimes pictorial in treatment, and elaborately wrought in literary form. These characteristics are sometimes made consistent with simplicity, but more generally with subtlety, of emotion or of thought. As in his paintings, there is a strong mediæval tendency. It is now generally allowed that Mr Buchanan's charges of immorality against the writings were wide of the mark; indeed, he himself has admitted and proclaimed as much. Rossetti was intimate at one or other period of his life with many of the best men of the day. In politics he took no part. His religious views were vague—at times negative enough; but he had a strong sense of reverence, and a tendency to superstition rather than distinct faith. In person he was of middling height, with a handsome, expressive physiognomy, more Italian than English. His portrait, a pencil-drawing executed by himself towards the age of eighteen, is in the National Portrait Gallery. He was generous, unthrifty, warm-tempered, clear-headed but not discursive in habit of mind, very natural and unaffected in manner, concentrated in aims and modes of work. In almost all companies in which he mixed he assumed and preserved a marked ascendency, due to his exceptional faculty and uncompromising tone of mind and character.

Christina Georgina Rossetti, younger daughter of Gabriele and Frances Rossetti, was born in Charlotte Street, Portland Place, London, on 5th December 1830. She was brought up entirely at home under her mother's tuition, as a member of the Anglican Church. She began writing verse in early girlhood. Before she was seventeen a little volume of her poetry was privately printed by her maternal grandfather, Gaetano Polidori, who kept a printing-press for his own convenience at his residence in London. Her publications are *Goblin-Market and other Poems* (1862), *The Prince's Progress and other Poems* (1866), *Singsong* (1872), *A Pageant and other Poems* (1881); and, in prose, *Commonplace and other Stories* (1870), *Speaking Likenesses* (1874), *Verses* (1893), and a few devotional volumes, among them *Time Flies, a Reading Diary* (with verses, 1885), and *The Face of the Deep* (on the Apocalypse, 1892). Most of her poems were re-issued in 1890; and after her death, her brother William undertook a complete edition of her works. Miss Rossetti, whose health was weak, died 29th December 1894. She had lived a very secluded life, divided between devoted attention to her mother (who died at a very advanced age in 1886), and earnest religious thought and practice. In direct poetic gift and intrinsic quality of poetry she may be regarded as fully equal to her brother Dante Gabriel, although the outcome is of a less conspicuous kind. Her poems have a singular degree of grace, delicacy, and spontaneity, deep in feeling, sensitive and certain in touch, and marked by great purity of emotional thought, and by an unfailing instinct of style. Several of her lyrics have been set to music, and cantatas for two of the longer poems—*Goblin-Market* and *Songs in a Cornfield*—have been composed by Mr Aguilar and Professor Macfarren.

As to Gabriele Rossetti, various critical articles regarding him, more especially discussing or confuting his views concerning Dante, &c., will be found in contemporary periodicals, and in some volumes; the work of Aroux, entitled *Dante Hérétique, Révolutionnaire, et Socialiste* (1854), is founded chiefly on Rossetti's researches, which it presents in an exaggerated form. As to Dante Gabriel Rossetti, see William Sharp, *Dante Gabriel Rossetti, a Record and Study* (1882); Hall Caine, *Recollections* (1882); Joseph Knight, *Life of Dante Gabriel Rossetti* (1887; 'Great Writers' series); William Rossetti, *Dante Gabriel Rossetti as Designer and Writer* (1889); the article by Theodore Watts in the *Encyclopædia Britannica;* and the monograph in the *Portfolio* by F. G. Stephens (1894). There is also a work by Miss Esther Wood. In 1895 his brother William was engaged on a Life, with letters and other memorials. The younger brother, William Michael, has published the following books: *Dante's Comedy, the Hell*, blank verse translation (1865); *Fine Art, chiefly Contemporary* (1867); *Lives of Famous Poets* (1878); *Life of John Keats* (1887); *Shelley's Adonais, with Notes, &c.* (Clarendon Press, 1891); annotated editions of Shelley and of Dante Gabriel Rossetti (2 vols. 1886), and other writings.

Rossi, Pellegrino, was born of a noble family at Carrara, 13th July 1787. He studied at Bologna, and was made professor of Law there at twenty-five. Exiled after the fall of Murat, he obtained a chair at Geneva, and there wrote his *Traité de Droit Pénal*. In 1833 Louis-Philippe called him to Paris, and appointed him professor of Political

Economy at the Collège de France. For his *Cours de Droit Constitutionnel* (1836) he was naturalised and made a member of the Chamber of Peers. He was sent to Rome as ambassador in 1845, and there witnessed all the events of 1848, having again become an Italian subject after the fall of Louis-Philippe. When called to the ministry by Pius IX. Rossi strove to oppose the party favourable to the House of Savoy, and devised an alliance with Naples, his object being a confederation of Italian princes with the pope as president. This roused the hatred of the Romans, and Rossi was stabbed to death by an unknown hand on the 15th November 1848.

Rossini, Gioacchino Antonio, Italian operatic composer, was born at Pesaro, on the Adriatic, February 29, 1792, and was the only child of Giuseppe Rossini, town trumpeter and inspector of slaughter-houses, from whom he inherited his brightness and humour. From the age of seven he studied music and singing at Bologna under various masters, till in 1807, after having appeared as conductor of the local Accademia dei Concordi, he entered the Bologna *Liceo*, or conservatorium. He soon became known in neighbouring towns as accompanist at the theatres, travelling along with his father, now a horn-player. Numerous operatic works, mostly successful, were written for the theatres at Venice, Bologna, Rome, &c.; at Milan, in 1812, *La Pietra di Paragone* made a great impression, and gained the composer exemption from the French conscription. Next year *Tancredi*, at Venice, created the wildest excitement, which soon spread over Italy. After producing several other works, now mostly forgotten, he was engaged as musical director of the San Carlo and Del Fondo theatres at Naples. On February 5, 1816, was brought out at the Argentino theatre in Rome *Il Barbiere di Seviglia*, founded on Beaumarchais' play, and written in thirteen days. From the predilection of the Romans for the aged Paesiello, who had written an opera on the same play, and from a series of ludicrous accidents, it resulted on the first night in a complete fiasco; but next night, after the first act had been fairly heard, the public in their enthusiasm proceeded to Rossini's house, and conducted him to the theatre in triumph; and its popularity increased with each succeeding representation. Of all his works it has the prospect of most lasting vitality, and in its complete accord with the libretto is the most perfect as a whole. *Otello* next came out in Naples, and marked an advance in the style of serious opera, but was not at first successful; the tragedy was too sombre. The comic *Cenerentola*, in 1817, was favourably received in Rome, and immediately thereafter *La Gazza Ladra* obtained a triumph at Milan. These were rapidly followed at Naples by *Armida* and *Mosè in Egitto* (1818), *La Donna del Lago* (1819), and *Maometto Secondo* (1820). In 1821 he married Isabella Colbran, who had sung frequently in his operas, and the two proceeded to Vienna, where his music and his attractive personality carried all before him, in spite of some bitter opposition. After his return to Bologna, *Semiramide* was written in 1823 for the Fenice Theatre, Venice; but though the greatest, or at least the most advanced, of his Italian works, it had only a lukewarm reception—it was too heavy for the Venetians. Invited to London, he and his wife on their way thither paid their first visit to Paris, where he had so cordial a reception that he resolved to return. In England he was welcomed with the greatest favour by the king and the aristocracy, but produced no new work, though much was said of an opera intended for the King's Theatre.

On his return to Paris he entered on the duties of director of the Théâtre Italien for eighteen months; and, though not exactly the man for such a post, he had the credit of engaging several famous singers, and produced some of his already written operas, as well as Meyerbeer's *Crociato*. Retained in the service of the king, he went on to adapt several of his works to French taste: *Maometto*, appearing in its new shape as *Le Siège de Corinth*; *Moïse*; and *Le Comte d'Ory*, new, but worked up from old material. After an interval of a year, spent in retirement and study, there appeared at the Académie, on August 3, 1829, his greatest work, *Guillaume Tell*, conceived and written in a style entirely different from and superior to that of his Italian operas, and more nearly conforming to modern dramatic ideas. Its success was immediate and immense, but, chiefly owing to the wretched libretto, not lasting. From this period till his death his pen was scarcely more than once again resumed; except a few trifles, its only product was the *Stabat Mater*, first given in 1841, highly attractive and always popular, but little in keeping with the majestic sadness of the subject. After the decision, in his favour, of a tedious lawsuit, he retired in 1836 to Bologna, to comfort the last years of his father, and to bestow the utmost care on the *Liceo*, which he raised to a high position as a school of music. His wife died in 1845, and in 1847, after he had married again, revolutionary disturbances drove him from Bologna to Florence. In 1855 he returned to Paris, and in his villa at Passy became one of the most noted and attractive personalities of the capital. He died there, November 13, 1868. He stands at the head of Italian composers for the stage, though Verdi has now far wider popularity and greater dramatic force and passion, and though only a few of his operas still hold the field—above all, the *Barber*, *Semiramide*, and *William Tell*. His early works would now sound strangely old-fashioned, but he led the way in reform and progress up to modern ideas. While all his improvements had been elsewhere anticipated by Mozart, and some of his devices were very transparent and soon became hackneyed, the taste of the audiences for whom he wrote must not be forgotten in estimating his music. The greatest of his varied gifts was an inexhaustible facility in creating melodies which at once delight the ear—an unacquirable possession, and the first requisite of a great composer; and though he did not use all the means available in his art, the splendid results he obtained are perhaps on that account even the more remarkable.

See the biography by H. S. Edwards (1869), the same author's shorter Life in the 'Great Musicians' series (1881), and the more extensive French work of M. Azevedo (1865). There are also works on Rossini by Montrond, Zanolini (1875), and Sittard (1882).

Rosso Antico. See Porphyry.

Ross-shire. See Ross and Cromarty.

Roster (corrupted from Register) is a list of individuals, or corps, kept by the various staff officers of the army to ensure the allotment of duties in proper rotation. Thus officers are detailed in turn for guard, court-martial, or other duties, according to the district, garrison, or regimental roster. Regiments, battalions, and batteries take their turn of foreign service according to the adjutant-general's roster.

Rostock, the most important town of Mecklenburg-Schwerin, and one of the busiest ports on the Baltic, stands on the Warnow, 7 miles from its mouth and 60 miles by rail NE. of Schwerin. It consists of the city proper, surrounded by promenades on the site of the old fortifications, and suburbs which have grown up beyond them. It has busy fairs for wool, horses, and cattle; imports coal, wine, herrings, petroleum, groceries, timber,

&c.; exports grain, wool, flax, and cattle; owns a mercantile fleet of 750 vessels of some 150,000 tons; and is entered annually by more than 900 vessels of about 120,000 tons. Vessels above 200 tons unload in part at Warnemünde, at the mouth of the river. The industries are very varied, the most important being shipbuilding, the making of machinery, tanning, brewing, distilling, the manufacture of hats, tobacco, &c. The university, founded in 1418, but rebuilt in 1867, is the chief of the public institutions; it has 40 teachers, 360 students, a library of 140,000 volumes, an observatory, and an experimental agricultural colony. Amongst the churches are St Mary's (1398–1472), one of the finest Gothic churches of north Germany, in which is a monument of Grotius, and St Peter's, with a tower 414 feet high. The ducal palace (1702) and the 14th-century Gothic town-house also deserve mention. There is a handsome public park. The statue of Blücher, a native of the town, adorns one of the squares. Pop. (1875) 34,172; (1890) 44,388. Rostock, an ancient Slav town, was burned to the ground by Waldemar of Denmark in 1161. In 1314 it came to Mecklenburg. About this time it enjoyed great repute as a powerful member of the Hanseatic League, and secured important rights of self-government. It still possesses a thoroughly republican municipal constitution, and forms a separate estate in the Mecklenburg Assembly. See history by Koppmann (Rostock, 1887).

Rostoff, (1) a town of south Russia, stands at the head of the delta of the Don and on the railway (1875) from Moscow to the Caucasus. It owes its origin to the foundation of a fortress here in 1761, since which time the progress of the town, owing to its advantageous situation, has been remarkable. Pop. (1881) 44,500; (1885) 61,256. It exports corn, linen, and wool to the value of £3,000,000 a year; its imports only reach £30,000. The manufactures are growing rapidly, the principal articles produced being ropes, tobacco, macaroni, soap, and leather; but there are also shipbuilding-yards, wool-cleansing establishments, and caviare-factories. Two important fairs are held here every year.—(2) One of the oldest towns of Russia, stands on a small lake, 129 miles by rail NNE. of Moscow, and has celebrated market-gardens, a large fair, an extensive trade, tallow-works, and coarse linen manufactures. Pop. 11,898.

Rostopchine, FEODOR VASSILIEVICH, COUNT, a Russian general, was born in the government of Orel, March 23, 1763, and entered the Russian military service as a lieutenant in the Imperial Guard. He won great influence over the weak mind of the Emperor Paul, who promoted him to various offices in rapid succession. In May 1812 the Emperor Alexander appointed him governor of Moscow. He it was, according to the French writers, who planned and began with his own hand the burning of Moscow. But in 1823 he published *La Vérité sur l'Incendie de Moscou* (Paris, 1823), in which he rebuts the charge, affirming that this action was due in part to a few of the inhabitants, and in part to the violence and negligence of the French. Nevertheless, he subsequently recalled this denial and admitted his share in the burning, in that he at least set fire to his own mansion-house. He died at Moscow, January 30, 1826. His works, which include a number of historical memoirs, two comedies, &c., in Russian and French, were published at St Petersburg in 1853. See life by Schnitzler (Paris, 1863) and by Ségur (Paris, 1872).

Roswitha, or HROTSWITHA. See DRAMA, Vol. IV. p. 83.

Rot. See FLUKE, DRY ROT.

Rotation. When all points of a body are moving with the same Velocity (q.v.) the motion is one of pure translation, and is easy to comprehend. When, however, this condition is not fulfilled there must exist the kind of motion known as rotation. As simple examples, take the whirling of a flywheel or the motion of the hands of a watch. In such cases we readily see that there is, in the rotating body, a row of points which does not itself move. This row of points is called the axis of rotation, and every other point in the body describes a circle about it. To specify the motion completely we must know not only the position of this axis, but also the rate of rotation and the sense, clockwise or counterclockwise, with which the body is rotating about the axis. The rate of rotation may be measured by the number of revolutions made in a chosen time. It is more scientific, however, to measure it in terms of the angular speed. If the body is rotating uniformly the angular speed is the angle described in unit time by any plane drawn in the body parallel to or containing the axis of rotation: e.g. with the unit of time one sidereal day, the earth's angular speed about its axis is 2π or 360°; but with the second as the unit of time the angular speed is a quarter of a minute of arc, or ·000073 in radians.

In a simple geometric way a given rotation may be represented by a directed line taken of length numerically equal to the angular speed, and drawn along the axis of rotation in that direction which is related to the sense of rotation exactly as the to-and-fro motion of a right-handed screw is to the rotational motion of the screw. Such a directed quantity of definite length and of definite line position is called by Clifford a *rotor*. It is a Vector (q.v.) under the restriction that its lie in space is limited to a particular straight line.

So long as the axis of rotation is fixed with reference to lines which appear steady to us, there is no difficulty in apprehending the character of the motion. Take, however, the case of a carriage wheel or boy's hoop rolling along the road. Here we may regard the wheel as rotating about an axis drawn through the centre, while the axis is at the same time travelling forward with a definite linear speed—i.e. we may regard the motion as a combination of translation and rotation. In this particular case we may, however, represent the motion at each instant as one of pure rotation about an axis coinciding with the instantaneous line of contact of the wheel with the road. For, with rolling and no slipping, this line of contact with the road is for the moment at rest. And it is almost self-evident that, if at any instant there exists in rigid connection with a moving body an axis momentarily at rest, the instantaneous motion must be of the character of a rotation about this axis. The above is a simple example of what holds generally in uniplanar motion—i.e. motion in which every point of the body moves in a plane perpendicular to a fixed direction. The general theorem is that any uniplanar displacement whatever (which is not a pure translation) can be effected by a pure rotation about a determinate axis. Since any given motion may be regarded as consisting of a succession of displacements, it follows that any such uniplanar motion can be effected by a succession of rotations about instantaneous axes whose successive positions in space and in the body are determinate.

In uniplanar motions generally it is clear that the instantaneous axis of rotation, however much it may move both in space and in the body, must always remain parallel to the same direction. If discontinuous motion be excluded—and all natural motions are continuous—this instantaneous axis will pass continuously from position to position. It will trace out cylindrical surfaces, one in space and one in the body; and at any given instant these surfaces will touch along the line which is for the moment the instantaneous axis. It is not difficult to show that the complete motion of the body may be represented by the rolling of one of these surfaces upon the other. In the simple case of the carriage wheel the rolling surfaces are evidently the circumference of the wheel and the plane of the road. These theorems in uniplanar motion have many interesting applications in the kinematics of machinery (see Minchin's *Uniplanar Kinematics*, Clarendon Press, 1882).

If the motion is not uniplanar it is no longer possible in general to represent it by a succession of pure rotations. There is, however, a very remarkable theorem, which can be proved without difficulty, but which is hard of apprehension and even of acceptation. It is that after any displacement whatever of a body in space there is, in the body or rigidly connected with it, a line of points which is simply shifted along its own line in space. The whole displacement may then be effected by means of a sliding along this line together with a pure rotation about it—in other words, by a definite screw motion with reference to this line as axis (see SCREW). Even in the simpler case, when by fixing one point of a body we quite exclude translation, it is not easy to grasp the significance of the fact that after any displacement there is always one row of points which occupy exactly the same positions as before the displacement. From this theorem it follows that, however such a body may be moving, there is momentarily a line which is at rest. This line is the instantaneous axis of rotation. It always passes through the fixed point, and will as it shifts in time describe two conical surfaces, one in space and the other in the body. Any given continuous motion can then be effected by the rolling of one determinate conical surface fixed in the body upon another fixed in space. As a familiar example take an ordinary spinning-top. Here to the eye there is in general a rotation of the top about its axis of figure, while at the same time the top executes a conical motion about a vertical line through the point of support. In reality, however, at any instant of time the top is subject to *one* rotation about an instantaneous axis, which coincides neither with the axis of figure nor with the vertical line. This instantaneous axis executes a definite conical motion, both in the body and in space. Clerk-Maxwell (see his collected papers) devised a very ingenious and simple optical method for observing the position of the instantaneous axis, and so studying experimentally its motions with reference to the top. It should be mentioned in conclusion that infinitely small rotations are resolved and compounded according to the same laws as velocities and forces, so that we may regard the instantaneous angular velocity of a rotating body as made up of component angular velocities about any three chosen axes. It is thus that the subject is usually treated analytically. Such a treatment, however, is essentially artificial; and for a natural treatment we must go to geometry or to the Calculus of Quaternions (q.v.).

Rotation of Crops. In successful tillage-farming it is a fundamental principle that the various crops shall be grown in a well-considered rotation. There are solid reasons for this. The plants, like the animals, of the farm differ much in their habits and in the different sorts of food upon which they subsist. Although all plants tend to exhaust the soil, they do so in widely different degrees; they withdraw from the soil different kinds and quantities of ingredients. Some of the farm crops have long, penetrating roots, which draw nourishment from the deeper layers of the soil; others have short or spreading roots, which ramify near the surface. Certain crops occupy the ground for a much longer period than others; some encourage the growth of weeds or interfere with the proper cleaning of the land; others facilitate the work of eradicating weeds; and finally, the 'crop residues' of the various plants of the farm differ greatly. A glance at the following figures, giving the average weight of the principal ingredients removed (per acre in lbs.) from the soil by the leading farm crops, will show the importance of growing these crops upon a carefully-considered system of rotation.

	Nitrogen.	Potash.	Lime.	Phosphoric Acid.	Silica.
Wheat (30 bushels)......	48	28·8	9·2	21·1	96·9
Barley (40 bushels)......	48	35·7	9·2	20·7	68·6
Oats (45 bushels)........	55	46·1	11·6	19·4	85·3
Swedes (21 tons)........	153	118·5	63·6	32·5	10·0
Turnips (17 tons)........	112	148·8	74·0	33·1	7·7
Mangolds (22 tons).......	147	300·7	42·9	52·9	17·9
Potatoes (6 tons)........	47	76·5	3·4	21·5	2·6
Beans (30 bushels)......	99	67·1	29·2	29·1	7·3
Clover hay (2 tons)......	102	83·4	90·1	24·9	7·0
Meadow hay (1½ tons)..	49	50·9	32·1	12·3	56·9

It is thus obvious that by alternating the root, the cereal, and the grass and clover crops the producing power of the soil is more easily maintained, and its exhaustion longer deferred. With the fuller knowledge which is now available both as to the wants of the plants and the means of supplying these wants, it is possible, and in certain cases also practicable, for the farmer to grow with success the same kind of crop on the same land year after year for almost any length of time. A more economical method, however, is to alternate the crops, so that the natural resources of the soil and the repairing influences incident to a judicious rotation may be utilised to full advantage. It was long ago demonstrated in practice that when land lies for a few years under grass and clover it becomes enriched with ash constituents and nitrogen. The grasses and clovers not only increase the quantity of nitrogen in the surface soil by drawing supplies of it from the subsoil and from the atmosphere, but they have also the power of conserving that accumulated nitrogen in a form in which it is easily made available to a crop of grain. Points often insufficiently considered in tillage-farming are the period of growth and the season of the year during which the crop occupies the ground. Judging from the table given above, one would imagine that turnips would require in the form of manure far more nitrogen than is required for wheat. In practice, however, it is well known that exactly the reverse is the case. The difference in the points just mentioned, that is in the period and season of the growth of the two crops, is responsible for this important peculiarity. Nitrification (q.v.), or the formation of nitrates in the soil, is most active during summer and autumn, and the cereal crops thus occupy the ground at the time when the soil is comparatively deficient in nitrates. The root-crop on the other hand is in full growth in the autumn, when the supply of nitrates in the soil is at the maximum. Root-crops consumed on the farm are therefore a good preparation for succeeding crops of cereals. The precise form of rotation most suitable for particular farms varies greatly, depending upon various circumstances, and especially the nature of the soil, climate, markets, available supplies of extra manures, amount of live-stock kept, &c. That course of cropping is evidently the most desirable which will economically secure, with thorough cleanness of the soil, a high and increasing state of fertility.

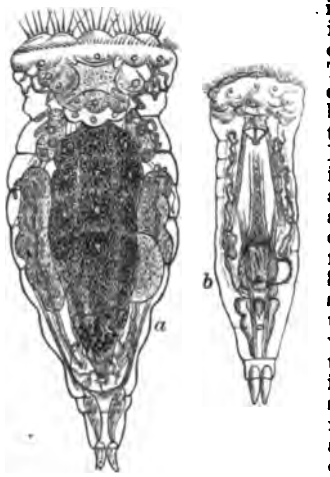
Many rotations are based upon the Norfolk or four-course system, which consists of (1) clover or mixed grass seeds; (2) wheat or, in many parts of Scotland, oats; (3) turnips, swedes, mangolds, potatoes, or bare fallow; (4) barley. The details of this system are generally as follows. The clovers or grasses are mown or grazed; when cut they are either used green or are dried for hay; the second crop is carted home for the cattle or horses; near towns it is sold off; or it is consumed on the ground in racks by sheep, which on most highly cultivated farms receive besides a daily allowance of cake or corn. In districts where the town-manure can be obtained a top dressing is applied as soon as the first crop of grass is cut. On the poor and worse cultivated soils the grass-crop occasionally remains down for two, or even three years, thus extending a four into a five or six years' rotation. The clovers or mixed seeds are ploughed up in autumn, and followed generally in England by wheat, and in Scotland by oats. These crops are now often drilled, to admit of horse and hand hoeing. After harvest the stubble is, if possible, cleaned by the scarifier, grubber, or plough and harrows; or, where the management for several years has been good, any patches of couch-grass or other weeds are best forked out by hand. The land, especially if heavy, or intended for mangolds drilled on the flat, as practised in the drier parts of England, may then be manured and deeply ploughed: the grubber and harrows, in April or May, suffice to prepare for the drilling of mangolds or swedes. Heavy land, intended either for roots or barley, should, in spring, be disturbed as little as possible. In Scotland, and the cooler moist climates of the north and west of England, turnips and potatoes are grown on raised drills or balks, in which the manure lies immediately underneath the plant. Frequent horse and hand hoeings should ensure the thorough cleaning of the crop. Unless in the neighbourhood of towns, where it is greatly more profitable to sell off the whole of the root-crop, part of the swede or mangold crop is taken home for the cattle, and the remainder consumed by sheep in the field. After the fallow or cleaning crop another cereal crop is grown; under the Norfolk system this is generally barley, with which the clovers or seeds are sown out. Where sewage or tank water is available Italian rye-grass is often used, and on land in high condition early large and repeated cuttings are obtained; but rye-grass has the disadvantage of being a worse preparation than clover for the wheat-crop which usually follows. The chief failing of the four-course system consists in the frequent recurrence of clover, which cannot be successfully grown oftener than once in six or eight years. To obviate this difficulty one-half of the clover quarter is now often put under beans, peas, or vetches, thus keeping the grass or clover seeds eight years apart.

The Norfolk four-course system is unsuitable for heavy land, where a large breadth of roots cannot be profitably grown, and where their place, as a cleaning crop, is taken by bare fallow, vetches, or pulse. Bare fallows are, however, much less frequent than formerly, being now confined to the most refractory of clays, or to subjects that are so hopelessly full of weeds as to require for their extirpation several weeks of summer weather, and the repeated use of the steam or horse ploughs, the scarifier, grubber, and harrows. In such circumstances winter vetches are often put in during September or October, are eaten off by sheep and horses in June or July, and the land afterwards cleaned: this practice is extensively pursued on the heavier lands in the midland and southern counties of England. In such localities the following system is approved of: (1) The clover leas are seeded with (2) wheat; then come (3) beans, pulse, or vetches, manured, horse or hand hoed; (4) on good land wheat succeeds; (5) oats or barley often follow, but, to prevent undue exhaustion of plant-food, this system requires considerable outlay in artificial manures, cake, and corn; (6) a fallow, or fallow crop, deeply and thoroughly cultivated, and well manured, comes to restore cleanness and fertility; (7) barley or wheat is drilled, and amongst this the clover-seeds are sown. On the heavier carse-lands in Scotland the following plan of cropping is practised: (1) Clover; (2) oats; (3) beans; (4) wheat; (5) root-crop, usually including a considerable breadth of potatoes; (6) wheat; (7) barley, with which the clovers or mixed grasses are sown. Under this system it is difficult, with so few cleaning crops, to keep the land clean; roots, besides, are not produced in quantities sufficient properly to supply either cattle or sheep during the winter. To remedy these defects roots may be introduced after the oats, and would be followed either by wheat or barley. This extends the rotation from seven to nine years.

In most well-cultivated districts, whether of heavy or light land, stock-farming is extending, and a more vigorous effort is being made to raise the fertility of the land. Root-crops are accordingly more largely grown; indeed, it is sometimes found profitable to grow two root-crops consecutively; thus, after turnips, swedes, cabbages, or mangolds, well manured from the town or farmyard, and eaten off by sheep, potatoes of superior quality are produced with one ploughing and a dose of portable manure. Specialities of management occur in almost every locality. Near London, and in other southern districts, early potatoes or peas are grown for market, and are immediately followed by turnips. In many parts of England, where the soil and climate are good, rye or vetches sown in autumn are consumed in early summer, and a root-crop then put in.

Good rotations do not necessarily ensure good farming; they are merely means to an end. And as agricultural education and enterprise extend fixed rotations will be less regarded. The market-gardener, who extracts a great deal more from his land than the farmer has hitherto been able to do, does not adhere to any definite system of cropping. If the farm is kept clean and in improving condition there can be no harm in growing whatever crops it is adapted to produce. Cropping clauses are requisite during only the three or four last years of a tenancy. The restrictions found in some agreements, preventing the growth of clover for seed, flax, and even potatoes, are inadmissible. Equally objectionable are clauses against the sale of particular sorts of produce, such as hay or roots. The farmer, if he is fit to be entrusted with the use of the land, ought to be permitted to grow or sell off any crop he pleases, provided an equivalent in manure be brought back. On well-cultivated land, in good condition, it is now the practice of the best farmers to take oats or barley after wheat; indeed, some of the best malting barley in Essex, on the Scottish carse-lands, and elsewhere is now grown after wheat. The frequent growth of cereals, and the heaviest of hay and root crops, even when removed from the farm, may be fairly compensated for by judicious and liberal treatment with town-dung, sewage, or artificial manures. The plant-food disposed of in the more ordinary sales of the farm is economically restored by the use of bones or superphosphate, guano, or nitrate of soda, or by keeping plenty of stock on the farm, and supplying them liberally with cake and corn. See also the articles AGRICULTURE, FALLOW, MANURE, SOILS, and those on the various crops.

Rotatoria, or ROTIFERA, a class of minute aquatic animals, popularly called wheel-animalcules. Most of them are microscopic, very transparent, and exceedingly active. The body is unsegmented, and almost always bears a posterior ventral 'foot,' and an anterior equipment of cilia, whose movements suggest a rapidly rotating wheel. Another characteristic structure is the masticating mill in the pharynx, a complex apparatus consisting in part of two hammers, which work against an anvil. The food seems to consist of yet smaller organisms and of organic debris. The nervous system consists of a single dorsal ganglion. There is a body-cavity containing fluid, and there are muscles retracting and extending the ciliated disc and the foot. There are no circulatory organs, but two excretory tubes are present. Rotifers live both in fresh waters and in the sea, and sometimes in damp moss. A few are parasitic. Some are able to survive desiccation, and may be wafted about by the wind, but it is likely that in some cases the regeneration after prolonged drought is due not to a revivification of the adults, but to the development of the eggs, which can remain for a long time quiescent. There are three kinds of eggs: small ova, which develop into males; thin-shelled summer ova; and thick-shelled resting or winter ova. And it is said that a given female produces only one kind. Sometimes they are laid in the water, or attached to water-plants; sometimes they are hatched within the mother. In most, if not all cases, the eggs are parthenogenetic, developing without fertilisation. For in one series of rotifers (Philodinadæ) the males have never been found; while in other cases the males, which are usually smaller and simpler than the females, do not succeed in fertilising the eggs. As representative rotifers the following may be mentioned: *Rotifer vulgaris*, very common in stagnant fresh-water pools; *Hydatina senta*, with exceedingly rapid development; Melicerta, which forms an ensheathing case of disgorged pellets; the parasitic Seison, Albertia, Balatro, which have lost, or almost lost, the characteristic ciliated wheel; Floscularia, living in a gelatinous case; the exceedingly beautiful Stephanoceros; *Pedalion mira*, a unique jumping rotifer, with six hollow leg-like appendages. The zoological position of rotifers is uncertain, but some regard them as remotely allied to Chætopod worms.



Hydatina senta:
a, female dorsal view; *b*, male ditto.
(*The Rotifera*, Hudson and Gosse.)

See Hudson and Gosse, *The Rotifera* (1889); Plate, in *Jenaische Zeitschr. f. Naturwiss.* (xix. 1886).

Rotche, or LITTLE AUK. See AUK.

Rothamsted, or ROTHAMSTEAD PARK, 4 miles NW. of St Albans, is noted as the scene of the agricultural experiments of Sir J. Bennet Lawes. See AGRICULTURE, Vol. I. p. 103.

Rothe, RICHARD, one of the greatest speculative theologians of Germany, was born at Posen, 28th January 1799. At the universities of Heidelberg and Berlin he had among his teachers Daub, Hegel, Schleiermacher, and Neander. After a two years' course in the clerical seminary at Wittenberg and a short period of lecturing as *privat-docent* at Breslau he set out for Rome in December 1823 as chaplain to Bunsen's embassy. In 1828 he accepted a professorship in the Wittenberg seminary, whence in 1839 he migrated to fill a similar position at Heidelberg. In 1849 he obeyed a call to Bonn as professor and university preacher, but in 1854 he returned to Heidelberg as professor of Theology and member of the Oberkirchenrath, and here he died, August 20, 1867. Rothe was one of the noblest types of the theologian that Germany has produced, in his rare combination of simple inward piety with fearless boldness of thought. The patient care he lavished on a wife afflicted with a mental malady, the great personal influence he exerted over his students, his humility, charity, and that magnificent prophetic optimism that already saw the whole universe aglow with the glory of the Redeemer, all testify alike to the beauty and elevation of his character. His conception of the kingdom of God founded by Jesus reminds an English reader of the grand scheme of Hooker in its identification of the religious and moral functions of church and state, in a kind of refined and glorified Erastianism. Indeed the special function of the church will come to an end as soon as the state has become permeated with the religious idea, its purpose being merely that of a temporary instrument in the realisation of this ultimate ideal. The real end of Christianity is to create no hierarchical theocracy, but a spiritualised community with all its social and political functions harmonised with the divine morality. Profane and sacred sciences will at length coalesce, all education will become religious, and the instinct of worship will find nourishment in a regenerated theatre and an elevated art. The work of the church meantime is essentially educative and preparatory—itself a means and not an end—and all its efforts to realise itself as a distinct society are an unfaithfulness to its real principle. The Catholicism of the middle ages was a grand attempt to realise a visible church, but frustrated its highest end because it denaturalised the true social relations when it gave itself a purpose and a policy antagonistic to the state. The Reformation conception of the *invisible* church was an attempt to avoid the difficulty of the Catholic theory, but it created a purely spiritual community, separated from the ordinary interests of social and national life, and with a fatal tendency to the error of a divorce between religion and morality, the former emphasising the interests of the individual for eternity, the latter relating merely to his social duties here—in themselves considered as of no religious value.

Rothe's theory deals a deathblow to clericalism and all exaggeration of the importance of the external organisation. It may be that it will be for ages yet to come nothing beyond a devout imagination, but at least it is a splendid attempt to realise the Christian dream of the kingdom of God, to carry into effect Christ's distinction between mere outward form and inward spirit, and the eternal fact that it is in life as God Himself has made it that the power and spirit of the gospel ought to manifest itself. This speculative theory is worked out in the first of the three books of Rothe's unfinished work, *Die Anfänge der Christlichen Kirche* (1837)—the second and third books are historical. His greatest work is his *Theologische Ethik* (3 vols. 1845–48; 2d ed. completed by Holtzmann from his papers, 5 vols. 1869–71), which supplements the preceding book, being based on the same fundamental identity between religion and morality, the starting-point being the idea of God involved in consciousness, and considered in relation to the world and to man. Here in his pursuit of analogies into the world of science Rothe too often leaves behind him the solid earth of reality, and ventures on hypotheses that are little better than visionary, and, moreover, his style is not seldom abrupt, obscure, and perplexing. His *Dogmatik*, posthumously edited by Schenkel (3 vols. 1870–71), completes his ethics. Here he distinguishes sharply between Revelation itself and the Bible—its documentary record. The former is not so much a supernatural communication of a religious doctrine as a particular form of God's redemptive activity, strengthening and rectifying the religious consciousness of man disturbed by sin. The true object of Revelation is the knowledge of God; its mode of operation is not magical, but is accompanied by an internal action on the consciousness producing a special receptivity by means of which the external manifestations in history and nature may be understood. It is supernatural in its cause, but natural in its method, although admitting alike of inspiration, of miracle, and of prophecy—not contradictions of nature, but rather inherently constituent elements of a Revelation, subserving higher laws of nature unknown to man's limited faculties, but perfectly homogeneous with a divine order.

During his last ten years, after the formation of the Protestantenverein, Rothe took an active part in ecclesiastical affairs, as a leader in the School of Conciliation. He was an admirable preacher, but with characteristic modesty could hardly be induced to publish his sermons. Schenkel edited three volumes in 1869, but took unwarrantable liberties with the text, in the way of modifying the supernaturalism. A fourth and reliable volume was edited by W. Hübbe in 1872.

The Prolegomena which Rothe had contributed to *Studien und Kritiken* he collected under the title *Zur Dogmatik* (1863). After his death, besides the books already named, there were edited from his papers *Vorlesungen über Kirchengeschichte*, by Weingarten (2 vols. 1875–76); *Abendandachten über die Pastoralbriefe*, by Palmié (2 vols. 1876–77); *Der erste Brief Johannis*, by Mühlhäusser (1878); *Theologische Encyklopädie*, by Ruppelius (1880); *Geschichte der Predigt*, by Trümpelmann (1881); *Gesammelte Vorträge u. Abhandlungen*, by Nippold (1886). Nippold also edited the *Stille Stunden* (1872; Eng. trans. 1886) and wrote his Life (2 vols. 1873–74).

Rothenburg, a town of Bavaria, on the Tauber, 36 miles W. by S. of Nuremberg, preserves its mediæval character in great part unaltered. Pop. 6221. The town produces a periodic procession and historic play in memory of its escape from being sacked in the Thirty Years' War, during which the town (then a place of 18,000 inhabitants) was repeatedly taken and retaken.

Rotherham, a busy manufacturing town in the West Riding of Yorkshire, on the right bank of the Don, here joined by the Rother, 5 miles ENE. of Sheffield by a railway opened in 1838. Its chief glory is the magnificent cruciform church, Perpendicular in style, with crocketted spire and fine west front. It is probably somewhat earlier than its reputed founder, Thomas de Rotherham, Archbishop of York (1423–1500); in 1875 it was restored by Sir G. G. Scott at a cost of £9000. A handsome edifice in the Collegiate Gothic style, built for an Independent College in 1875 at a cost of £26,000, has been bought for £8000, and applied to the purpose of a grammar-school (1483), at which Bishop Sanderson was educated. There are also a mechanics' institute (1853); a free library (1881); an infirmary (1870); a covered market (1879); public baths (1887); a park (1876) of 20 acres, 300 feet above the town; and the Clifton Park of 57 acres, which, costing £25,000, contains a fine mansion-house, and was opened by the Prince of Wales on 25th June 1891. The manufactures include stoves, grates, chemicals, pottery, glass, railway-carriages, &c. Ebenezer Elliott was a native of the suburb of Masborough, which is included within the municipal boundary, incorporated in 1871. Roche Abbey, a ruin, 8 miles ESE., was a Cistercian foundation (1147); and 8 miles NE. is Conisborough Castle, noticed at DONCASTER. Pop. (1851) 6325; (1871) 25,892; (1881) 34,782; (1891) 42,050. See John Guest's huge *Historical Notices of Rotherham* (1879).

Rothesay, a favourite Scotch watering-place, the capital of Buteshire, is beautifully situated on the north-east shore of the island of Bute (q.v.), 40 miles by water W. of Glasgow and 19 SSW. of Greenock. 'Sweet Rothesay Bay,' rimmed by hills 400 to 530 feet high, offers safe anchorage in any wind, and is spacious enough to contain the largest fleet. Its charming scenery, its bathing facilities, its sheltered position, and the extreme mildness of its climate have rendered Rothesay a resort alike of holiday-makers and of invalids, especially those affected with pulmonary disease. Its linen and cotton manufactures, tanning, and boat-building are almost or quite extinct; and the herring-fishery is now the principal industry. A score of the Clyde steamers touch regularly at Rothesay, whose commodious harbour was constructed (1822–84) at a cost of over £30,000. An esplanade was formed in 1870; and among the chief edifices are the county buildings (1832–67), public hall (1879), aquarium (1876), academy (1869), and Glenburn hydropathic (1843; burned down in 1891, and rebuilt). In the middle of the town are the ruins of Rothesay Castle, founded about 1098, taken by Haco of Norway (1263), the death-place of Robert III. (1406), reduced to ruin (1685), and repaired in 1871–77 by the Marquis of Bute, at a cost of £8000. Rothesay since 1398 has given the title of duke to the eldest son of the Scottish sovereign. Created a royal burgh in 1400, it returned a member from the Union till 1832. Pop. (1821) 4107); (1881) 8329; (1891) 9034. See books by J. Wilson (1848) and Thoms (1870).

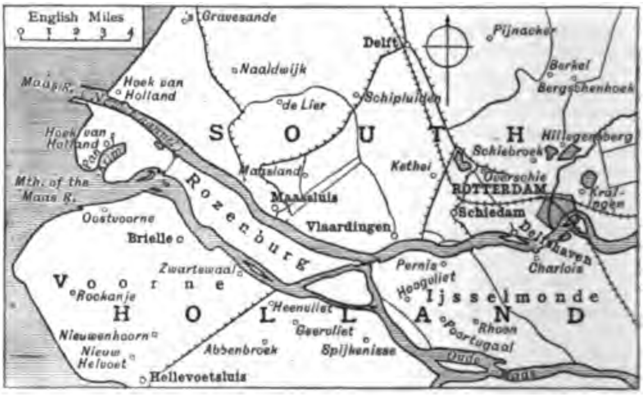
Rothschilds, the well-known family of bankers, take their name from the sign of the house ('Zum Rothen Schilde,' or 'red shield'), in the Jews' quarter of Frankfort, in which their ancestors lived. The real founder of the family as financial magnates was MEYER AMSCHEL ROTHSCHILD, who was born at Frankfort in 1743. Although educated for a rabbi, he embarked in the banking business at Hanover, and, having saved a little money, started for himself as a money-lender and dealer in old coins in the family home at Frankfort. He won the confidence of the landgrave of Hesse, who entrusted his finances to the Jew's management. The current story, that he successfully hid the fortune of the landgrave from the French invaders in 1806, and was through his patron's gratitude allowed to have the almost free use of it for some years, and so by this means laid the foundation of a large fortune, is extremely doubtful. The beginnings of his fortune were in all probability less romantic: the Rothschild house got a heavy commission for transmitting money from the English government to Wellington in Spain during the eight years of the Peninsular war; they managed the large private fortune of the landgrave; through them the British government made its payments of subsidies to continental princes; they negotiated large loans for Denmark between 1804 and 1812. At his death, on 13th September 1812, Meyer Amschel Rothschild left five sons, all of whom were made barons of the Austrian empire in 1822. ANSELM MEYER, the eldest son, born in 1773, died 1855, succeeded as head of the firm at Frankfort.

SOLOMON (1774–1855) established a branch at Vienna; NATHAN MEYER (1777–1836), a branch in 1798 at London; CHARLES (1788–1855), a branch at Naples (discontinued about 1861); and JAMES (1792–1868), a branch at Paris. Apart from their very extensive private banking business these houses have been deeply concerned in negotiating many of the large government loans of the 19th century. The cleverest man of the five was Nathan, who really lifted the house into its position as first amongst the banking-houses of the world. He pinned his faith and staked his fortunes on the success of Britain in her great duel with Napoleon, and is said to have been present himself at the battle of Waterloo, from which he hastened home to London, where, before the result of the battle became known, he had sold and bought stock that brought him one million sterling clear profit. He was succeeded by his son LIONEL (1808–79), who distinguished himself by his efforts to effect the civil and political emancipation of the Jews in Great Britain. The present head of the London branch is Lionel's son, SIR NATHAN (born 1840), who succeeded to the baronetcy conferred in 1847 on his uncle Anthony. He was raised to the peerage as Baron Rothschild in 1885. His niece Hannah (1851–90) was in 1878 married to the Earl of Rosebery. See Reeves, *The Rothschilds* (1887), and *Das Haus Rothschild* (Prague, 1857).

Rotifera. See ROTATORIA.

Rotomahana. See NEW ZEALAND, p. 487.

Rotrou, JEAN DE, a French tragic poet, second only to his friend and contemporary Corneille, was born at Dreux, August 21, 1609, went early to Paris, and became a busy playwright, as well as one of the five poets—the others were Corneille, Colletet, Bois-Robert, and L'Etoile—who worked up into dramatic form the ideas of Richelieu. His first piece, *L'Hypocondriaque*, was followed by *La Bague de l'Oubli*, imitated from Lope de Vega, and that by *Cleagénor et Doristée*, *Diane*, *Les Occasions Perdues*, *L'Heureuse Constance*, all in the Spanish romantic style. Next followed a busy period of classical influence, culminating in his last years with three masterpieces, *Le Véritable Saint Genest*, a tragedy of Christian martyrdom under Diocletian; *Don Bertrand*, a capital comedy; and *Venceslas*, which kept the stage almost down to our own day. Tradition tells that Rotrou led a dissipated life in Paris, and further was inordinately addicted to gambling; more honourable is the authentic history of his death. He held an official post at Dreux, and when he heard that the plague had broken out there, and that the mayor had fled like Montaigne in the same circumstances from Bordeaux, he hastened to the town to preserve order, caught the pestilence, and died a few hours after, June 28, 1650.

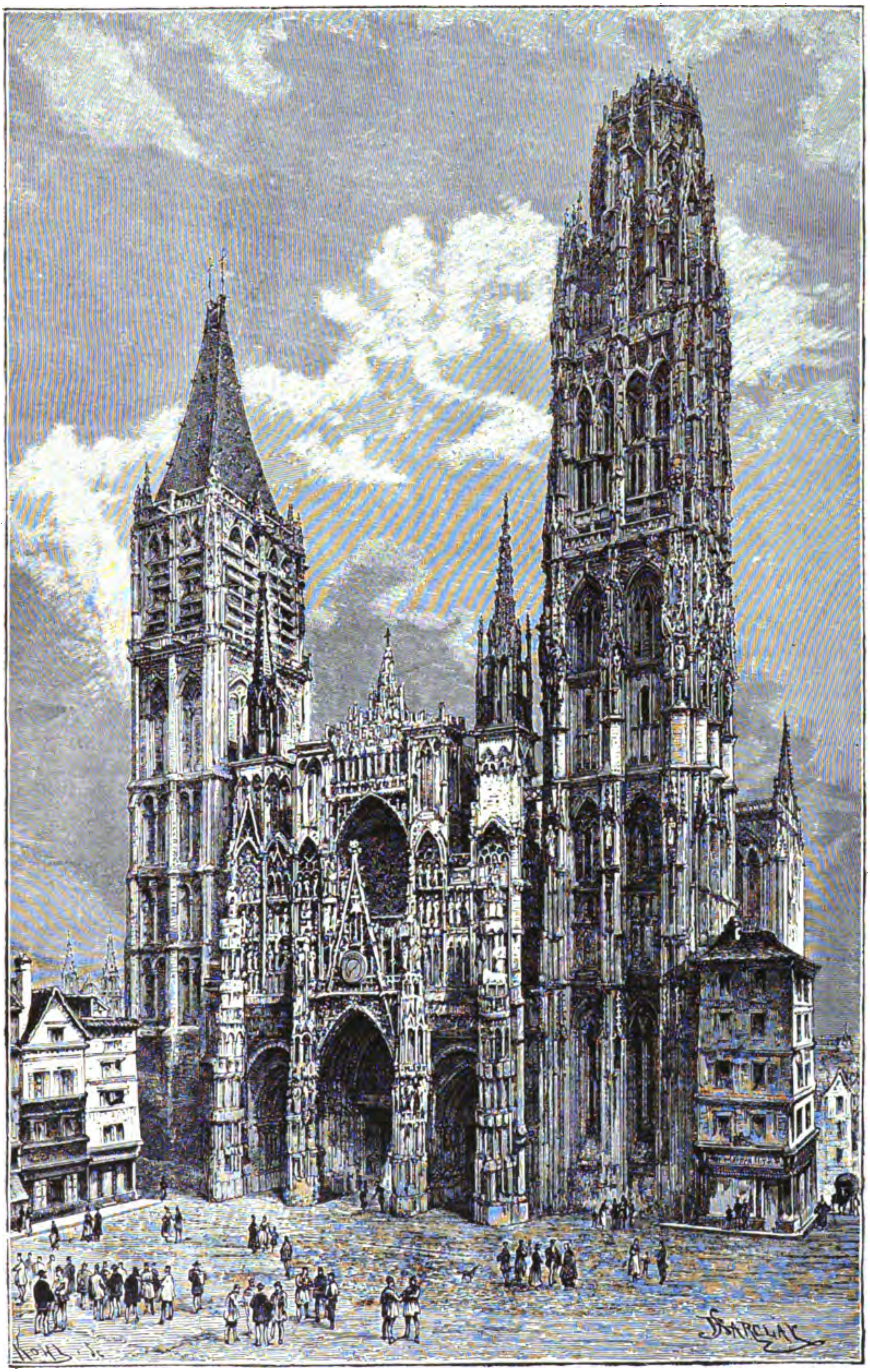


As many as thirty-five of his plays are still extant, but many more are lost. A complete edition was edited by Viollet-le-Duc (5 vols. 1820–22); six of the plays, by M. de Ronchaud (2 vols. 1882). See Jarry's *Essai* (1868), the works by Person on *Saint-Genest* (1882) and *Venceslas* (1882), and G. Steffens, *Rotrou-Studien* (i. 1891).

Rottenburg, an episcopal town in Würtemberg, 6 miles SW. of Tübingen, on the Neckar, has an old castle, now a prison, and a cathedral, and trade in hops and timber. Pop. 7310.

Rottenstone, a soft and earthy stone, consisting chiefly of alumina, with about 10 per cent. of carbonaceous matter and a little silica. It is supposed to be formed by decomposition of shale or siliceous limestone. It is found in Derbyshire, England, in Wales, and near Albany, in the state of New York. It is brown—either grayish, reddish, or blackish. It is soft and easily scraped to powder, and is well known to housewives, being much used for cleaning and polishing brass and other metals.

Rotterdam, the busiest port of Holland, stands on both sides of the Maas, 19 miles from its mouth, and 16 miles by rail SE. of the Hague and 45 SW. of Amsterdam. Since Holland was separated from Belgium, the trade of Rotterdam has grown at an extraordinarily rapid rate, especially since the middle of the century. New wharves and quays and new docks have been built almost every year since 1847. In 1888 the quays measured 15 miles in length and the docks covered an area of 190 acres; and since then two new docks have been made and the (separate) petroleum wharves have been extended. Since 1872 sea-going vessels have ceased to approach Rotterdam by the old channel of Brill (Brielle); they have used instead the New Waterway—i.e. the Maas and the Scheur, the latter of which has been connected with the sea by a canal cut through the Point (Hoek) of Holland. Every effort has been made to render this new waterway available for large ocean-going steamers, and the work of improvement has been constantly going on ever since it was opened, until in 1890 it had a depth never less than 22 feet at low tide, and big ships were able to reach the sea in two hours from Rotterdam. Taking all the vessels that enter all the ports of Holland from abroad, more than 53 per cent. (estimating by tonnage) enter at Rotterdam. The net tonnage of the vessels (which numbered 4535 in 1890) so entering doubled between 1875 and 1890, and was in the latter quoted year eight times what it was in 1850—viz. 2,918,425 tons in 1890 as against 1,411,828 in 1875, and 346,186 in 1850. To this foreign trade must be added 84 per cent. of the total trade between Germany and Holland by way of the river Rhine, or (in 1890) some 2,582,800 tons, and a traffic of 6,850,000 tons carried on on the inland canals and streams. If all these items be put together the total tonnage of vessels entering Rotterdam amounts to nearly 12½ million tons, a figure that is only exceeded by London amongst European ports. But, on the other hand, it must be remembered that the bulk of the inland traffic would in other countries be counted amongst the statistics of goods brought by railway. The figures quoted do not include the returns of the fishing fleet, which sold in Rotterdam in 1890 fish (chiefly herring, cod, &c.) to the value of £19,000. The merchant fleet of Rotterdam itself numbered, in 1890, 86 vessels of 117,208 tons. The imports consist principally of mineral ores and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THE CATHEDRAL, ROUEN.

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metals, grain (wheat, rye, oats, maize), coal, oil (petroleum chiefly), seeds, tallow and similar greasy substances, sugar, rice, tobacco, hides, indigo, &c.; whilst the more important exports are linen, flax, butter, cheese, cattle, and spirits (gin, &c.). From this port there sail every year between 5200 (1885) and 15,200 (1889) emigrants from various parts of Europe, most of whom go to the United States. There are flourishing industries, as iron and other metal works, shipbuilding, distilling, sugar-refining, and the manufacture of tobacco, chemicals, &c.

The town is intersected by canals, which communicate with the Maas, whilst their banks serve as wharves. On the south side of the river, opposite the city proper, are the busy ironworks and shipbuilding-yards of the island of Fijenoord, besides some of the largest docks. This island is connected with the other bank by two lofty bridges (one a railway bridge). In the city the more important buildings are the Gothic church of St Lawrence (15th century), with a very large organ, the monumental tombs of the Dutch admirals Witt, Cortenaer, Van Brakel, Van Liefde, and others, and a lofty tower (295 feet high); the Boymans Museum (1847), with a fine collection of paintings by Dutch masters; the yacht club-house, containing an ethnological collection; the town-house, exchange, and similar public buildings. The public institutions include an academy of art and science (nearly 1100 pupils), schools of music, navigation, and the technical arts, and an excellent zoological garden. Pop. (1890) 203,472, with which compare the figures for earlier years—72,300 in 1830, and 104,724 in 1858. Rotterdam counts as her most illustrious sons Erasmus and the poet Tollens; James, Duke of Monmouth, and Grinling Gibbons, the English wood-carver, were also born here. The history of the place is marked by very few notable events, except its capture by Francis of Brederode in 1488, who lost it to the Austrians in the following year, and the occupation by the Spaniards in 1572.

Rotti, an island in the Indian Archipelago, belonging to the Dutch, lies to the south-west of Timor. It is 36 miles in length (655 sq. m.), and has a pop. of 60,000. The surface, though hilly, is nowhere more than 800 feet above the sea, and the fertile soil produces a rich vegetation.

Rottlera, a genus of trees of the natural order Euphorbiaceæ, found in India and other parts of tropical Asia. The most important species is *Rottlera tinctoria* (Roxburgh), subsequently called by Müller *Mallotus philippinensis.* It is a small tree, the wood of which is only fit for fuel, but its bark is employed for tanning, and the crimson powder which covers the ripe fruit is used for dyeing silk, and also as a purgative and anthelmintic. The *R. tetracocca* and *R. peltata* of Roxburgh have also been included in the genus Mallotus by Müller under the names *M. albus* and *M. roxburghianus.*

Rottweil, a town of Würtemberg, on the Neckar, 68 miles by rail S. by W. of Stuttgart, has manufactures of gunpowder and silk and cotton fabrics, and railway workshops. Near by, on the site of an ancient Roman colony, a number of antiquities, including a valuable piece of mosaic work, have been discovered. Pop 6052.

Rotumah, an island in the south Pacific, annexed to the Fiji Islands by Great Britain in 1880, is distant about 300 miles NNW. from the nearest island of that group, of which it is a dependency. Area, 14 sq. m.; pop. 2300, all Christians.

Roturier (according to Littré from *ruptura,* Low Latin for ground *broken* by the plough), under feudalism, when the feudal theory of knight's-service was recognised as the only principle of gentle tenure, one who continued to hold by the older or allodial tenure, and was accordingly regarded as ignoble. See Feudalism, Allodium.

Roubaix, a town in the north of France (dept. Nord), 6 miles by rail NE. of Lille. It rose into importance during the 19th century. Here cloth for men's clothing, shawls, stuffs for furniture and ladies' dresses, velvet and similar textiles, chiefly of wool, cotton, and silk, are manufactured to the annual value of £16,000,000. Besides these things, thread, sugar, beer, spirits, machinery, &c. are produced, and there is a very active trade in these manufactured goods. Pop. (1810) 9000; (1876) 74,946; (1891) 115,000.

Roubillac, Louis-Francois, sculptor, was born at Lyons in 1695, studied mainly at Paris, where in 1730 he obtained the second Grand Prix, and shortly thereafter settled in London. In England he spelt his name *Roubiliac.* He visited Rome in 1745. His statue of Handel for Vauxhall Gardens in 1738 first made him popular. His other most famous statues are those of Shakespeare (executed for Garrick, and now in the British Museum), of Sir Isaac Newton at Cambridge, and another of Handel in Westminster Abbey. The monuments of the Duke of Argyll and of General Wade in the Abbey are also well known. He contributed greatly to the improvement of British taste in sculpture, though his own work is by no means so perfect as his contemporaries imagined; he has been called 'an exquisite executant but poor designer.' He died in London, 11th January 1762. See the Life by Le Roy de Sainte Croix (Paris, 1882); A. Dobson in *Eighteenth Century Vignettes* (1894).

Rouble, the unit of the Russian money system. The present silver rouble is equivalent to 3s. 2d. Half and quarter roubles are coined in silver, also gold coins of nominally five roubles (demi-imperials) and three roubles (imperial ducats). There is, however, little coined money in circulation; it is nearly all paper, notes of the values of 1, 3, 5, 10, 25, and 100 roubles. A paper rouble is worth about 2s., strictly between 21·3d. (1887) and 25·7d. (1877). In February 1888, however, it fell to 1s. 7d., the lowest value since its first issue fifty years before. The rouble is divided into 100 kopeks.

Rouen (Lat. *Rotomagus*), formerly the capital of Normandy, and now the chief town of the department of Seine-Inférieure, and after Lyons perhaps the principal manufacturing city of France, is situated on the right bank of the Seine, 87 miles NW. of Paris by railway. The ramparts have been converted into spacious boulevards, little inferior to those of Paris. The modern streets are well and regularly built, with good stone houses; but a considerable part of old Rouen still remains, consisting of ill-built picturesque streets and squares, with tall, narrow, quaintly carved, wood-framed and gabled houses. The Seine, upwards of 300 yards broad, makes Rouen, although 80 miles from the sea, the fourth shipping port of France; and extensive operations, in the way of deepening the river and building quays, are yearly adding to its capacity and importance, no less than £710,000 having been expended on the port between 1831 and 1887. A stone bridge and a suspension bridge lead to the Faubourg St Sever on the left bank. Rouen possesses several remarkably beautiful Gothic churches—in particular the cathedral (13th century onwards), St Ouen (14th-15th century; perhaps the best specimen of Gothic in existence), and St Maclou (florid style of the end of the 15th century). The cathedral, the seat of an archbishop, begun by Philippe Auguste, has a very rich west façade, and two fine though unfinished west towers—the south one (Tour de Beurre) was built (1485–1507) with indulgence money received for permission to eat butter during Lent—but is disfigured by a lofty cast-iron spire (485 feet) erected upon the central tower in 1876 in consequence of an old wooden belfry, which bore the date 1544, having been destroyed by fire in 1822. It contains in its twenty-five highly ornamented chapels numerous monuments of great interest, especially those of Rollo and of his son William Longsword. The heart of Richard Cœur de Lion, once buried there, is now preserved in the extensive Museum of Antiquities. Among other noteworthy buildings in Rouen are the palais de justice (15th century), in which the assizes are still held; the hôtel-de-ville, with its public library of 110,000 volumes, and its gallery of pictures; and the Hôtel Dieu, one of the largest of its kind. The principal branches of industry are cotton manufactures, including the checked and striped cottons specially designated *Rouenneries*, nankeens, dimity, lace, cotton-velvets, shawls, &c. Rouen has also extensive manufactories of hosiery, mixed silk and wool fabrics, blankets, flannels, hats, cordage, cotton and linen yarns, shot, steel, lead, chemicals, paper, confectionery (*Sucre de pomme*), &c. There are also shipbuilding-yards and engineering works. Pop. (1872) 102,470; (1886) 107,120.

History.—Rouen is specially interesting to Englishmen as the capital of the Northmen in France, and the first home of the Norman dukes. It was the scene of Rollo's baptism and marriage with Gisela, daughter of Charles the Simple, after that monarch had been constrained to cede Normandy under the treaty of Claire-sur-Epte (912), and there he and his successors lived until Duke William transferred his court to Winchester after the conquest of England (1066). At Rouen William died (1087), and till the time of John it continued the seat of government of the Norman possessions of the English kings. In 1204 it was taken by siege by the French king Philippe Auguste, and annexed along with the main part of the duchy to the French crown. During the wars of Henry V. and Henry VI. of England it was under the power of the English from 1419 to 1449, when it was retaken by the French under Charles VII. It was during this occupation by the English that Joan d'Arc was burned alive (1431) as a witch in the square of the city, in which stands her statue, and which is called in memory of her Place de la Pucelle. Rouen was the birthplace of Corneille (1606), of Fontenelle (1657), of Boieldieu (1775), of Armand Carrel (1800), and of Flaubert. Clarendon died here. It was occupied by German troops in 1870–71. See Fouquet's *Histoire de Rouen* (1875), and other works cited at NORMANDY.

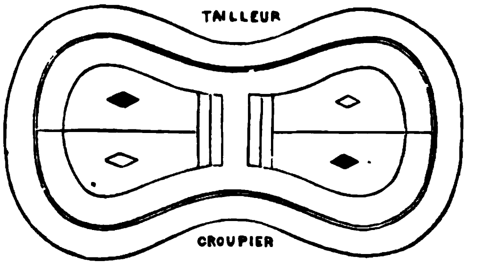
Rouergue, an old province of southern France, between Languedoc, Auvergne, and Guienne, ruled by counts until 1589, when it passed to the crown. See FRANCE, Vol. IV. p. 770.

Rouge, a powder used to give artificial colour to the cheeks. For commoner purposes vermilion rubbed up with almond-oil is employed, but the safer and better quality is prepared from carmine (the colouring matter of cochineal), either alone or mixed with the safflower colour. These are generally rubbed up with French chalk, and supplied either as powder or, along with a little oil, in the form of saucers.

Jeweller's rouge is an impalpable preparation of oxide of iron, obtained by gently heating the yellow oxalate of iron till it decomposes; carbonic acid escaping, and only a red powder being left. It is used for polishing silver, and for this purpose should be of the finest quality. Many cheaper varieties are sold under this name.

Rouge Croix, Dragon. See HERALD.

Rouge et Noir (Fr., 'red and black'), TRENTE-UN ('thirty-one'), or TRENTE ET QUARANTE ('thirty and forty'), is a modern game of chance, which is played by the aid of packs of cards on a table covered with green cloth. The table is of a form similar to that shown in the figure. It is divided into four portions, each marked in the centre with a diamond, the diamonds being alternately red and black; and these quarters are further separated, two and two, by bands which cross the table at its narrowest part. At the end of the table are a series of concentric bands painted of a yellow colour (not represented in the figure). The game is played as follows: one of the *tailleurs* (or dealers, who manage the table, take charge of the bank, and keep an eye on the players) takes up his position at one side of the table, opposite to the *croupier* (another tailleur), and unseals, in the presence of the players, six packs of cards, which are first counted, then shuffled by several tailleurs, and returned to the first tailleur, who presents them to one of the players to be cut. This is performed by the insertion of a blank card in any part of the pack, which is then adjusted, and the game proceeds. Each player must stake his money on some one of the four chances, denominated *noir*, *rouge*, *couleur*, and *l'inverse*, which will be afterwards explained. After the stakes have been laid on the table (those for the noir being laid on either of the quarters marked with a *black*, and those for the rouge on either of the quarters marked with a *red* diamond, those for the 'couleur' on one of the transverse bands, and those for the 'inverse' on one of the yellow circles at the end of the table), the tailleur takes a handful of cards from the top of the pack, and deals first for the noir, taking one card after another from the top of the handful and placing them on the table side by side, till the number of pips on them amounts to more than thirty, when he stops. He then deals out another row in a similar manner for the rouge, till, as before, the number of pips amounts to more than thirty. In reckoning the number of pips, the ace is counted as one, the other plain cards according to the number of pips, and the court-cards ten each. It will thus be seen that the number to which each of the two rows of cards amounts, must be more than thirty and not more than forty. If the value of the first row is nearer thirty-one than that of the second, then the first row, or noir, wins; if the contrary is the case, then the second row, or rouge, wins. Couleur wins if the first card tabled by the tailleur is of the winning colour—for instance, if the first card laid down is a 'spade' or 'club,' and if noir wins; but if the first card dealt be not of the winning colour, then inverse wins, and couleur loses. Two (and no more) of the four chances can be winning chances at one time; and the winning players have their stakes increased by an equal sum from the bank, and then withdraw their stake and winnings, while the stakes of the



Rouge et Noir.

losers are raked by the tailleurs to the bank in the centre of the table. When the value of the first, or noir-row, is equal to that of the second, or rouge-row, it is a *refait*, and the dealer must commence to deal anew from the cards remaining in his hand; when the refait occurs the player may either withdraw his stake, or stake on a different chance, with the same or more or less money as he thinks proper. The game of Rouge et Noir would be an even one between the players and the bank were it not for the following regulation: When the points dealt for the noir and the rouge each amount to thirty-one ('un refait de trente-et-un') the half of all the stakes on each of the chances belongs to the bank, and this the players may either pay or have their stakes 'put in prison,' the next deal determining whether they shall belong to the bank or be restored to the player. If a second doublet of thirty-one occurs in the deal immediately succeeding, the stakes which were in prison are diminished by one-half, which goes to the bank, and the other half is 'put into the second prison,' from which it requires two successive winnings of the player to regain them. The chance of 'un refait de trente-et-un' is about once in sixty-four deals. This game superseded *Faro* (q.v.) and *Biribi* in France about 1789, but along with Roulette was forbidden by law in 1838. See work cited at ROULETTE.

Rouget de Lisle, CLAUDE JOSEPH, author of the *Marseillaise* (q.v.), was born at Lons-le-Saulnier on 10th May 1760. When in 1792 he wrote and composed his celebrated song or hymn he was a captain of engineers stationed at Strasburg. Four months later, as too moderate a republican, he was imprisoned in Paris, but was released after Robespierre's fall. Wounded at Quiberon (1795), he quitted the army, and lived in Paris in narrow circumstances, until Louis-Philippe in 1830 awarded him a small pension. He died at Choisy on 26th June 1836. He published in 1796 a volume of *Essais en Vers et en Prose;* but none of the pieces it contains, nor indeed any of his other books, possess much real merit. The *Marseillaise* was his one inspiration. See a Memoir by Poisle-Desgranges (Paris, 1864), and one by Tiersot (1892).

Rouher, EUGÈNE, a French statesman, was born at Riom, on November 30, 1814, practised there as an advocate up to 1848, and then was returned to the Constituent Assembly. Towards the end of 1849 he was appointed minister of Justice; and with slight interruptions he was for twenty years a member of the French government. He was chiefly instrumental in negotiating the treaty of commerce between France and England in 1860, and that between France and Italy in 1863, and was thus instrumental in preparing the way for the introduction of the free-trade policy of Napoleon III. In 1863 he was appointed minister of State, and maintained that position until 1870, when he became president of the Senate. A staunch supporter of Napoleon III., and a clever debater, Rouher was, next after the emperor, the chief supporter of the system, domestic and foreign, which came to a disastrous end at Sedan—he was sometimes called the Vice-emperor. After the fall of the empire he fled abroad. But he was returned to the National Assembly for Corsica in 1872, and sat till 1875 as a staunch defender of the ex-emperor. He died at Paris, 3d February 1884.

Roulers (Flem. *Rousselaere*), a town of West Flanders, Belgium, 19 miles by rail SSW. of Bruges, has manufactures of cottons, lace, and chicory, and a trade in linen. Here the French defeated the Austrians on 13th July 1794. Pop. (1887) 19,735; (1892) 20,614.

Roulette (Fr., 'a little wheel'), a game of chance which from the end of the 18th century till the beginning of 1838 reigned supreme over all others in Paris. It continued to be played at German watering-places till 1872, when it ceased in terms of an act passed four years before. Roulette then found a home at Monaco. It is played on a table of an oblong form, covered with green cloth, which has in its centre a cavity of a little more than 2 feet in diameter, in the shape of a punch-bowl. This cavity, which has several copper bands round its sides at equal distances from each other, has its sides fixed, but the bottom is movable round an axis placed in the centre of the cavity, the handle by which motion is communicated being a species of cross or capstan of copper fixed on the upper extremity of the axis. Round the circumference of this movable bottom are 38 holes, painted in black and red alternately, with the first 36 numbers, and a single and double zero; and these 38 symbols are also figured at each end of the table in order that the players may place their stakes on the chance they select. Along the margin of the table and at each end of it are painted six words—*pair*, *passe*, *noir*, *impair*, *manque*, *rouge*, which will be afterwards explained. Those who manage the table and keep the bank are called *tailleurs*. The game is played as follows: One of the tailleurs puts the movable bottom in motion by turning the cross with his forefinger, and at the same instant throws into the cavity an ivory ball in a direction opposite to the motion of the bottom; the ball makes several revolutions, and at last falls into one of the 38 holes above mentioned, the hole into which it falls determining the gain or loss of the players. A player may stake his money on 1, 2, or any of the 38 numbers (including the zeros), and shows what number or numbers he selects by placing his stake upon them; if he has selected a number or zero corresponding to the one into which the ball falls, he receives from one of the tailleurs 36 times his stake—viz. his stake and 35 times more—if he selected only 1 number, 18 times if 2 numbers, 12 times if 3 numbers, &c. The blank rectangles at the bottom of each of the 3 columns of numbers figured on the table are for the reception of the stake of that player who selects a column (12 numbers) as his chance, and if the ball enters a hole the number of which is found in his column, he is paid 3 times his stake. Those who prefer staking their money on any of the chances marked on the edge of the table, if they win receive double their stake (their stake and as much more), and under the following circumstances: The 'pair' wins when the ball falls into a hole marked by an *even* number; the 'impair,' if the hole is marked *odd;* the 'manque,' if the hole is numbered from 1 to 18 *inclusive;* the 'passe,' if it is numbered from 19 to 36 *inclusive;* the 'rouge,' if it is coloured *red;* and the 'noir,' if it is coloured *black*. If the ball should fall into either of the holes marked with the single or the double zero, the stakes of those players who venture upon the 6 chances last described are either equally divided between the bank and the players, or as is more commonly the case, they are 'put in prison,' as it is called, and the succeeding trial determines whether they are to be restored to the players or gained by the bank. Should it so happen that at this trial the ball again falls into one of the two holes marked with zeros, then half of the stakes in prison are taken by the bank, and the remainder are 'put into the second prison,' and so on. The tailleurs thus have an advantage over the players in the proportion of 19 to 18. The player who bets upon the numbers labours under a similar disadvantage, for although the two zero-points do not affect him in the same way as the player who stakes upon one of the other 6 chances, still (supposing him to bet upon a single number) as the chances are 37 to 1 against him, he ought to receive 37 times his stake (besides the stake) when he does win, whereas he only receives 35 times that amount, a manifest advantage in favour of the bank in the proportion of 37 to 35. See Professor J. S. Bond, *The Problems of Roulette and Trente et Quarante* (New York, 1889).

Roumania, a kingdom in the south-east of Europe, situated between 22° 29′ and 29° 42′ E. long. and between 43° 37′ and 48° 13′ N. lat. Its general boundaries are on the east and south the rivers Pruth and Danube (with the exception of the Dobrudja, a province south of the latter river at its embouchures), and on the west and north the Carpathian Mountains, along whose heights the boundary line runs. The kingdom presents the form of an irregular blunted crescent, some writers comparing it to a sausage. Its average length is about 358 and its breadth about 188 miles; its approximate area is 49,250 sq. m., and its population about 5,376,000, including 200,000 Gypsies. Of these 4½ millions belong to the Greek Church (the national religion), and the remainder are Protestants, Jews, &c. There are believed to be about 4,000,000 of Roumanians outside the Roumanian kingdom—in Hungary and Transylvania, Bukowina, Bessarabia and adjoining Russian provinces, Servia and Bulgaria.

The general configuration of the surface of Roumania is an irregular inclined plane, sloping down from the Carpathian Mountains to the northern bank of the Danube, and it is traversed by numerous watercourses (many of which are dry in summer), taking their rise in the mountains and falling into the great river, which render the country well adapted for every kind of agricultural industry. Roumania is divided, roughly speaking, into the two provinces of Wallachia and Moldavia, the first bordering on the Danube, the second on the Pruth. These were formerly distinct principalities, were then united as Moldo-Wallachia, and finally incorporated as an independent kingdom under Charles I. The capital of Roumania is Bucharest in Wallachia, about 30 miles from the Danube; and the chief town of Moldavia is Jassy, not far from the river Pruth. The other towns of any note in Roumania are the seaports of Galatz and Ibrail (or Braila) at the mouth of the Danube, Craiova (Krajova), Botoshani, Ploiesti (Plojeschti), Pitesti, and the ancient capital Curtea d'Ardges. The last named is famous for its beautiful cathedral, built of a grayish-white limestone resembling alabaster, in the Byzantine order of architecture, with a profusion of Moorish or Arabesque ornamentation.

The most noteworthy peaks of the Carpathians rise from 3000 to 9000 feet above the sea-level, the highest two being Caraïman and Verful, from which a distant view of the Balkans, in Bulgaria, is obtainable in clear weather. Near the foot of Caraïman, at the junction of three valleys, and surrounded by lovely wooded slopes, nestles the charming summer-resort of the court and upper classes, Sinaïa. Here the king and queen occupied an old monastery until a beautiful palace was built in the Italian style, where the court spends a considerable portion of the summer. Besides the palace there are many handsome private residences, as well as a public garden, casino (not a gaming-table), and two or three good hotels.

The principal industries of Roumania are agriculture, salt-mining, and petroleum raising and distillation. The principal salt-mines are at Prahova, near Campina, in the Wallachian Carpathians, and at Ocna in Moldavia. They are worked by convicts, and produce a fine bluish-gray rock-salt. Petroleum wells are also worked near Campina, as well as elsewhere, and there are refineries at Tirgovistea, Ploiesti, &c. The chief products of agriculture are maize and cereals, which are largely exported, and amongst the fruits of the country gourds, plums, peaches, walnuts, apples, pears, and grapes are conspicuous and plentiful.

The sylvan scenery of the Carpathians is very lovely, and either there or in the plains are to be found the oak, elm, beech, and, less frequently, the maple, sycamore, mountain-ash, lime, horse-chestnut, and acacia. The usual flora of the subtropical and temperate zones flourish luxuriantly, and at Ferestreu, near Bucharest, there is an excellent agricultural and sylvicultural college. The manufacturing industries of the country are still in their infancy, and are greatly handicapped by the cheap productions of Germany and Austria. They include flour and saw milling, match-making, and petroleum-distillation, to which have been added (through an act passed in 1887 for encouraging Roumanian industries) tanning, boot and shoe making, and cement manufacture. Notwithstanding the large importation of manufactured articles of various kinds from Austria, Germany, France, and Great Britain, the peasantry are mainly clothed in garments made by themselves of home spun, woven, and dyed fabrics, and they possess such taste and skill in the manufacture and ornamentation of cloth, gauze, and muslin, and in the trimming of costumes, that their work finds a ready market in the best establishments in the capital.

The most remarkable feature in the agricultural system of Roumania is its peasant proprietary, which was created about the year 1864. Before that year the whole of the land of the country was practically held by the boyards or inferior nobles, who were frequently absentees, or by the state, for the peasants merely owned small patches of land contiguous to their huts or hovels, which were and are still frequently semi-subterranean. The peasantry had been robbed of their land during long ages of feudal oppression and foreign conquest, but when the government became democratic it was determined to restore a portion of it (about one-third) to its original owners at very moderate prices to be fixed by the state. In the first instance the government advanced the purchase-money, creating a loan for the purpose. The greater portion of the debt was paid off by the peasant proprietors by the year 1881, and an act was passed to prevent the alienation of embarrassed estates which would otherwise have fallen into the hands of usurers. The result was that in 1880 there existed in Wallachia and Moldavia 406,893 holdings, averaging 10·6 acres each, and the great change has added materially to the prosperity of the country and its thrifty peasantry.

The government of Roumania is a hereditary limited monarchy, and the constitution provides for an irresponsible king, who must belong to the Orthodox Greek Church; a council of ministers; a senate and a chamber of deputies. The members of both houses are indirectly chosen mainly by 'colleges' of voters; but the large towns elect directly. Senators are elected for eight years, one-half retiring every four years. Members of the lower house sit for four years, but either chamber may be dissolved separately. The income of a senator must be at least £376 per annum. One of the most important political institutions in which Roumania is largely concerned is the 'Danubian Commission' (see Danube), whose headquarters are at Galatz. There is a British representative on the Commission. This is rendered necessary by the great preponderance of British trade; for whilst the total number of vessels which cleared from the Danube at Sulina in 1889 was 1870, with a tonnage of 1,473,345, the proportion of British vessels (all steamers) was 842, of 1,000,773 tons, and those figures form approximately the proportion during recent years. The following statistics, concisely stated, show the financial and commercial position of Roumania at the present time, and of her commercial relations with Great Britain.

In 1890 the National Debt was £36,080,860, paying £2,277,076 annual interest; the revenue amounted to £6,885,120, the expenditure to £6,080,604. The total exports of all kinds of produce and manufactures, including bullion and specie, in 1888 were valued at £10,272,000; the total value of exports to the United Kingdom, chiefly cereals and seeds, £3,204,776 (in 1890, £6,455,420): the total value of exports from the United Kingdom to Roumania, chiefly cotton, yarn, and manufactures, wrought and unwrought metals, coal, &c., £1,308,882.

History and Political Relations.—The early Greek historians mention a Thracian tribe, the Getæ, from whom were descended the Dacians, a brave race who occupied the northern side of the Ister or Danube, and flourished as a free people down to about the end of the first century of our era. Before that time the Dacians had come into conflict with both Greeks and Romans, but in the year 101 A.D. the Emperor Trajan undertook the first of two expeditions against their king, Decebalus, which terminated in the complete subjugation of the country. Traces of the Roman invasion and conquest are still to be found in the military road constructed by Trajan along the banks of the Danube, including a commemorative tablet, and in the piers of a bridge across the river near Orsova. Pressed by the barbarian races who eventually compassed the downfall of the Roman empire, Dacia, which had been constituted a Roman colony, was evacuated by the Romans in the reign of Aurelian (about 274 A.D.), and for about a thousand years the banks of the Danube served as halting-places for the first-named wandering tribes, amongst whom the most conspicuous were the Goths; the Huns under Attila; the Lombards under Alboin; the Bulgari, who afterwards settled on the plains south of the Danube and founded Bulgaria; the Ungri, a savage race who settled in Hungary; and the Wallachs, from whom Wallachia has derived its name. For a considerable period both banks of the Danube were governed by the sovereigns of what is known as the Wallacho-Bulgarian dynasty, which was brought to a close by a Tartar invasion about the year 1250 A.D. After that there gradually arose out of a number of smaller states an independent realm in Wallachia, with its traditions of heroes and chiefs, Mircea the Old, Michael the Brave (whose memory is perpetuated by a beautiful equestrian statue at Bucharest), and others; whilst the neighbouring state of Moldavia had also its heroes in Stephen the Great, &c. These rulers for a long time resisted the Mussulman advance, but were eventually reduced to vassalage by the victorious Turks, and were compelled to sign what are known as the 'Capitulations,' and to pay an annual tribute to the sultan. The first treaty with Wallachia known by that name was signed as far back as 1393; but that with Moldavia, which country was supported by the king of Poland, followed as late as 1513.

Although Wallachia and Moldavia thus became states tributary to the Porte, they retained sufficient independence to be in a sense autonomous; but in the course of time their princes, or voivodes as they were called, were Turkish nominees, whose tenure of office may be judged by the fact that in the course of ninety years (from 1723 to 1812) the government of Wallachia passed through the hands of no less than forty of those rulers. They were mostly Greeks, known as Phanariotes or Fanariots (q.v.), who during their brief tenure of power practised the most scandalous extortions upon the people, in order to enrich themselves and remit the annual tribute to Constantinople. The great majority of those Fanariot voivodes either were assassinated or were disgraced through the intrigues of their rivals at the Sublime Porte; and some of them did not scruple to appeal during their brief tenure of power for the support of Russia, which country was constantly at war with their suzerain.

The Muscovites began to make inroads into the Danubian principalities as early as the year 1709, under Peter the Great, and continued to invade them at intervals, especially in the reign of the Empress Anne in 1755 and in that of Catharine IV. in 1768. In the first instance the Czar Peter was invited to enter the states by the voivodes Brancovano of Wallachia and Cantemir of Moldavia, who desired to secure their independence under his protection; but no such inducement was afterwards requisite; and although the Russian invasions and occupations were always undertaken on the pretext of liberating the Christians from the Mussulman yoke, the real object has been to advance step by step to Constantinople and to secure possession of the whole Balkan peninsula. At different times the Russians exercised absolute sway in the principalities, notably from 1789 to 1792 and from 1806 to 1812, when the princes under their protection were called Hospodars (q.v.), a Slavonic word. In 1848 they helped to suppress the national rising there, as they did in Hungary, but in 1853, before the Crimean war, their power began to wane. At the termination of that war they were compelled by the allied powers to cede Bessarabia to the principalities.

In the year 1859 both principalities elected Prince Couza (born at Galatz, 1820) as their ruler, and he reigned in Roumania, as the united provinces were then called, until 1866, when he was deposed on account of his extortions and gross immorality, and was succeeded by Prince Charles of Hohenzollern. This revolution was mainly led by two able statesmen, Bratiano and Rosetti, who may be said to have been jointly the counterpart of the Italian Cavour, and who for many years enjoyed great popularity as the chief ministers of state. On the outbreak of the Russo-Turkish war in 1877 the Roumanians espoused the Russian cause. Prince Charles was actually appointed commander-in-chief of the allied armies, the Russian Cesarewitch serving under him; and the Roumanians captured the first redoubt, the Grivitza, at Plevna, thereby enabling the Russians to reduce that stronghold and bring the war to a triumphant close. The conquerors, however, deprived their allies of part of their territory, Bessarabia, giving them in exchange the Dobrudja, which they exacted from the Porte—an exchange laid down in the treaty of San Stefano, and subsequently confirmed by the Berlin Conference (June 1878), when Roumania was recognised as a completely independent power. The effect of that exchange has, however, been unfortunate for Russia in two respects. It has caused a permanent estrangement between the Roumanians and their guardian allies, and the Dobrudja has served as a barrier against Russian aggression in Bulgaria. In 1881 Prince Charles was invested with the kingly dignity with the acquiescence of the European Powers, and since that time, although there have been ministerial crises, and although the Russians have continued to carry on secret intrigues, not only in Roumania, but from thence in Bulgaria, the Roumanians have practically freed themselves from Russian as well as Turkish influence, and have taken their place amongst the independent nationalities of Europe.

The various conquerors who have at one time or another occupied Roumania have left their traces in her language and customs. The social condition of the middle and upper classes bears traces of the libertinage of their barbarian conquerors of the Mussulman as well as of the Christian faith. The peasantry are a hardy and thrifty race, and in the highest circles of society the influence of Queen Carmen Sylva has been throughout beneficent. As her marriage left no heir, the succession to the throne passed to Prince Ferdinand of Hohenzollern (born in 1865), the nephew of the king.

Language and Literature.—Roumanian (or Wallachian) is one of the Romance Languages (q.v.), a daughter of the Latin; but, though the language is unmistakably Romance in type, the vocabulary is mixed, the number of Latin roots being variously estimated at more or less than half of the total, the next greatest element being Slavonic words (amounting, according to some authorities, to even more than the Latin roots), with some hundreds of Turkish, Greek, and Albanian words. Most Roumanians speak what is practically the same language—the Daco-Roumanian—throughout the kingdom, in Transylvania, in the Banat, and other parts of Hungary, Bukowina, and Bessarabia. The Macedo-Roumanian, south of the Danube and amongst the Balkans and Pindus, is largely modified by Greek; and the Istro-Roumanian, spoken by 2000 or 3000 in Istria and Croatia, has been much Slavonised.

Roumanian literature may be said to date from the 17th century, though the first Roumanian book, a psalter, was printed in 1577. The chronicles of the 17th century are the earliest specimens of national literature; but Greek was long the language of the educated, and it is only since the beginning of the 19th century that there is a popular Roumanian literature, the most interesting part of it being the songs. Of these Alexandri (q.v.), himself the most notable of native Roumanian poets, made a full collection (1866). Other names are Alexandrescu, Eminescu, and Scherbanescu. There are German translations by Carmen Sylva (q.v.), Kotzebue, and others. Dora D'Istria (see GHIKA) wrote mainly in French. Among authorities on the language are Hasdeu, Miklosich, Gaster, and Titkin, and there are histories of the literature by Cipariu, Densusianu, Gaster, and Popfiu. The great dictionaries are those of Codresco (1875), Laurianu and Massimu, *Dictionariulu Limbei Romane* (2 vols. 1876–79), and Hasdeu, *Etymologicum Magnum Romaniæ* (part i. 1885). Gaster's *Chrestomathie Roumaine* (2 vols.) appeared in 1891.

There have been few trustworthy books published on Roumania, the most recent in English being by Samuelson, *Roumania Past and Present* (Lond. 1882), and in German by Bergner, *Rumänien* (Breslau, 1887), both illustrated. Others are Wilkinson, *The Principalities of Wallachia and Moldavia* (Lond. 1820); Engel, *Geschichte der Moldau und Walachei* (Halle, 1801); Hammer-Purgstall, *Geschichte des Osmanischen Reiches* (Pesth, 1834–36); Lauriani, *Ueberblick der Geschichte der Rumanen* (Bucharest, 1846); Neigebauer, *Moldau und Walachei* (Breslau, 1854); Obedenare, *La Roumanie économique* (Paris, 1876); Aurelian and others, *Notice sur la Roumanie* (Paris, 1867); Kogalnitschan, *Histoire de la Dacie, &c.* (Berlin, 1854); Pic, *Ueber die Abstammung der Rumänen* (Leip. 1880); Raicewich, *Moldau und Walachei* (Vienna, 1879); Roesler, *Rumänische Studien* (Leip. 1871); Teutschländer, *Michael der Tapfere* (Wien, 1879); Zallony, *Essai sur les Phanariotes* (Marseilles, 1824). There are also very useful Foreign Office, consular, and other reports: 1873 (Green), 1876 (Vivian), 1877 (Sanderson), 1878 (Bonham), 1883 (White), 1885 (Sanderson), 1888 (Lascelles, Kennedy, Sanderson), 1889, 1890 (Lascelles, Sanderson), and several Board of Trade Returns containing information on the subject.

Roumelia (Turk. *Rum Ili*, 'land of the Romans'—the inhabitants of the Western Roman empire, or Byzantine Greeks, being known to the Turks as 'Romans'), a name which once applied generally to the whole of ancient Thrace and part of Macedonia. The province aptly enough called Eastern Roumelia was in 1886 incorporated with Bulgaria (q.v.), and is now known as Southern Bulgaria. In central Asia *Rum* or *Rumi* means the peoples of western Asia; but the Sultan of Turkey is *Rum-Padishah*. In Turkey itself *Rum* means now usually the Greek nation and the Greek Church.

END OF VOL. VIII.